State of the Nation in Upper Gastrointestinal Cancers in Australia

Final Report to Pancare Foundation

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Insight Economics
Public Policy Corporate Strategy

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Contents

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- Prof John Zalcberg – Head, Cancer Research Program, Monash University
- Dr Lorraine Chantrill – Chair, Australian Gastrointestinal Trials Group and GI Cancer Institute, Senior Staff Specialist Medical Oncologist and Head of Service for Medical Oncology
- Mr Russell Conley – CEO, Australian Gastrointestinal Trials Group (AGIGT)
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- Mr David Meredyth – Assistant Secretary, Cancer Policy and Services Branch, Federal Department of Health
- Petrina Keogh – Carer
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Foreword

For people living with an upper gastrointestinal (GI) cancer, the road to diagnosis is lengthy and frustrating. Often a diagnosis is not confirmed until the cancer is dangerously advanced.

Once the initial shock subsides, patients and their families find themselves in desperate need of complex physical, emotional and financial support to manage life with an upper GI cancer. For those living in regional and rural areas, Aboriginal and Torres Strait Islanders and culturally and linguistically diverse communities, the challenges are far greater and further amplifies the inequity.

Collectively these little-known cancers account for approximately one in five cancer deaths each year. The latest data shows that as a nation we will face significant challenges in the years ahead.

A growing number of Australians will succumb unless we take coordinated and urgent action to improve early detection, treatment, support for those diagnosed and investment in groundbreaking cancer research.

For the past decade, Pancare Foundation has been at the forefront, helping and advocating for Australians impacted by upper GI cancers. Our goal is to support patients and their families through every aspect of their cancer journey; from diagnosis, through treatment and beyond.

State of the Nation in Upper Gastrointestinal Cancers in Australia is a first-of-its-kind report offering in-depth analysis of the challenges across the cancer care continuum. The report provides a framework for action that will improve the lives of those living with upper GI cancer today and into the future. It demonstrates the dire need for policy reform and investment to reduce incidence and improve the quality of life for patients and their carers. Critically, it outlines priority areas for research investment that can improve survival.

For far too long, upper GI cancers have witnessed little progress. Conversely, other cancers have observed improved survival as a direct result of increased awareness, early detection and improved treatments – underpinned by strategic investment and collaborative action. Together as a community, we must urgently address the unmet needs of patients and their families and work in partnership with governments to develop long-term solutions. Now is the time to take action.

On behalf of Australian families impacted by and living with upper GI cancers and the upper GI cancer community, I thank you for your contribution to the report. I look forward to progressing our ambitious agenda collaboratively to achieve better outcomes for all Australians.

Doug Hawkins

Chief Executive Officer
Pancare Foundation

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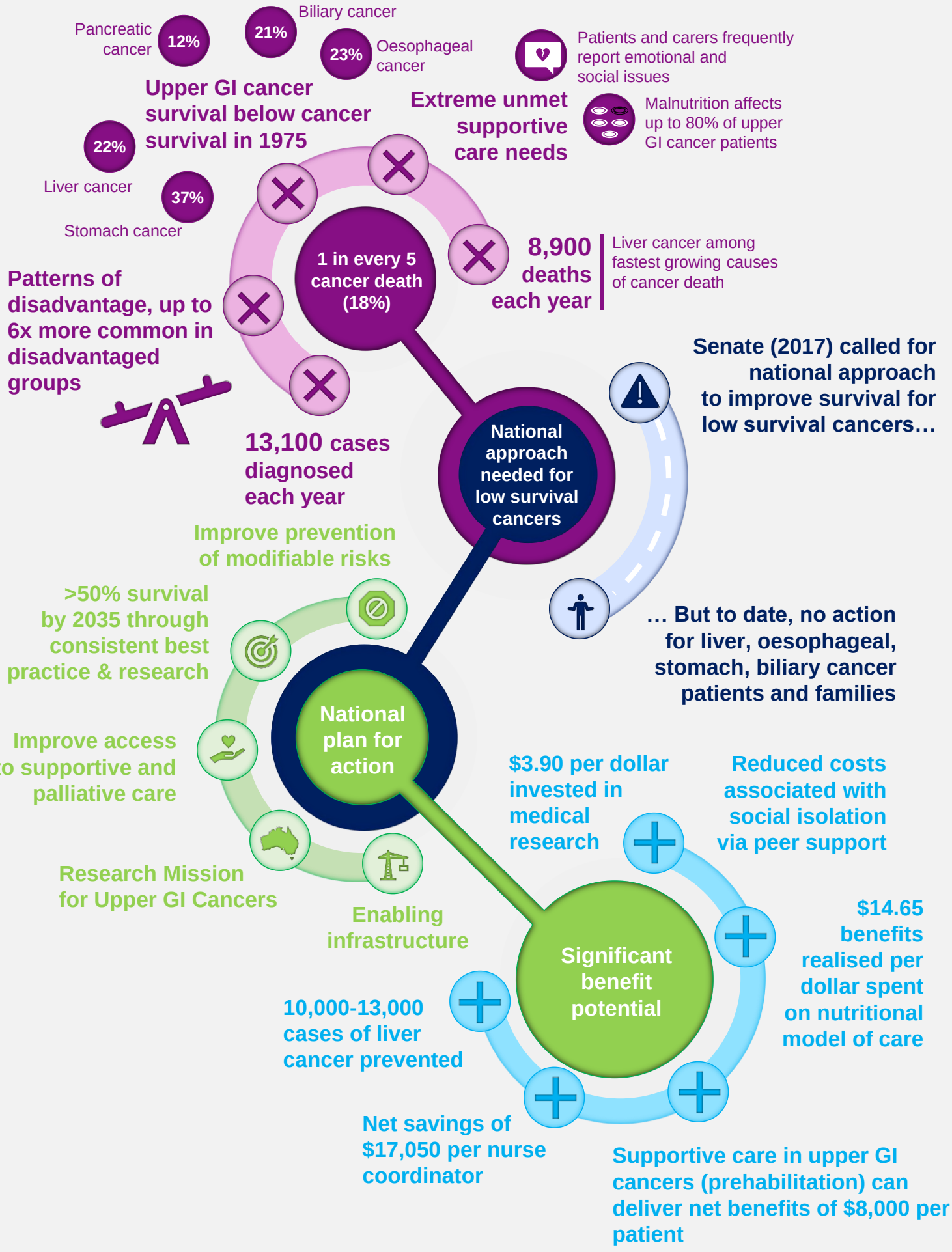
State of the Nation in Upper Gastrointestinal Cancers



State of the Nation in Upper Gastrointestinal Cancers

Immediate next steps needed to reach a future where fewer people are diagnosed with an upper GI cancer, and where upper GI cancer patients live longer, better lives together with their families

Action		Partners	Rationale
Fund Patient Support Services 	**Improve outcomes for patients immediately by funding increased access to patient support services to close gaps in information and access to supportive care**	Australian Government State governments Upper GI Cancer NGOs and consumers pancare FOUNDATION	• Limited services nationally leading to high unmet needs for patients and families • Consumer navigation at national level will take time to establish, specialist help is needed today • Service can support 6,500 upper GI cancer patients and carers by 2027 • Decreasing costs per case reflecting scale
Ensure Equitable Access to Nurses 	**Ensure nationally equitable access to specialist nursing support for Upper GI cancers nationally**	Australian Government State governments pancare FOUNDATION Upper GI Cancer NGOs and consumers	• High unmet supportive and palliative care needs for upper GI patients • A nationally equitable approach, nurse-to-patient ratios consistent with breast, prostate, melanoma cancers • Nurse support can lead to savings, up to $200,000 per year per nurse
Fund an Upper GI Cancer Research Mission 	**Nationally approach to research collaboration to address challenges and deliver high impact outcomes**	Australian Government State & federal governments Research and clinical leaders Patients, carers & NGO community Aboriginal health leaders FECCA Health Alliance & CALD community health leaders	• National approach for low survival cancers recommended by Senate • National collaboration limited • $5.80 for every dollar invested in Australian investigator led clinical trials • $3.90 for every dollar invested in medical research
Commit to reform for all Upper GI cancers 	**Leverage and expand the reform agenda for pancreatic cancer to include upper GI cancers, due to low survival outcomes & high unmet needs**	Australian Government State governments Patients, carers & NGO community	• National approach for low survival cancers recommended by Senate • No low survival cancer left behind • Efficiencies from whole upper GI approach
Establish an Upper GI Cancer Taskforce 	**Establish a National Upper GI Cancer Taskforce to support policy reform and investment for upper GI actions**	Australian Government State & federal governments Aboriginal health leaders FECCA Health Alliance & CALD community health leaders Research and clinical leaders Patients, carers & NGO community	• Ensure upper GI-specific reforms are implemented in timely and nationally consistent way alongside Australian Cancer Plan reforms

Executive Summary

Upper gastrointestinal (GI) cancers, including oesophageal, stomach, liver, biliary and pancreatic cancers, are the deadliest group of cancers in Australia today. Combined, these cancers account for approximately one in five cancer deaths (18 per cent) each year.

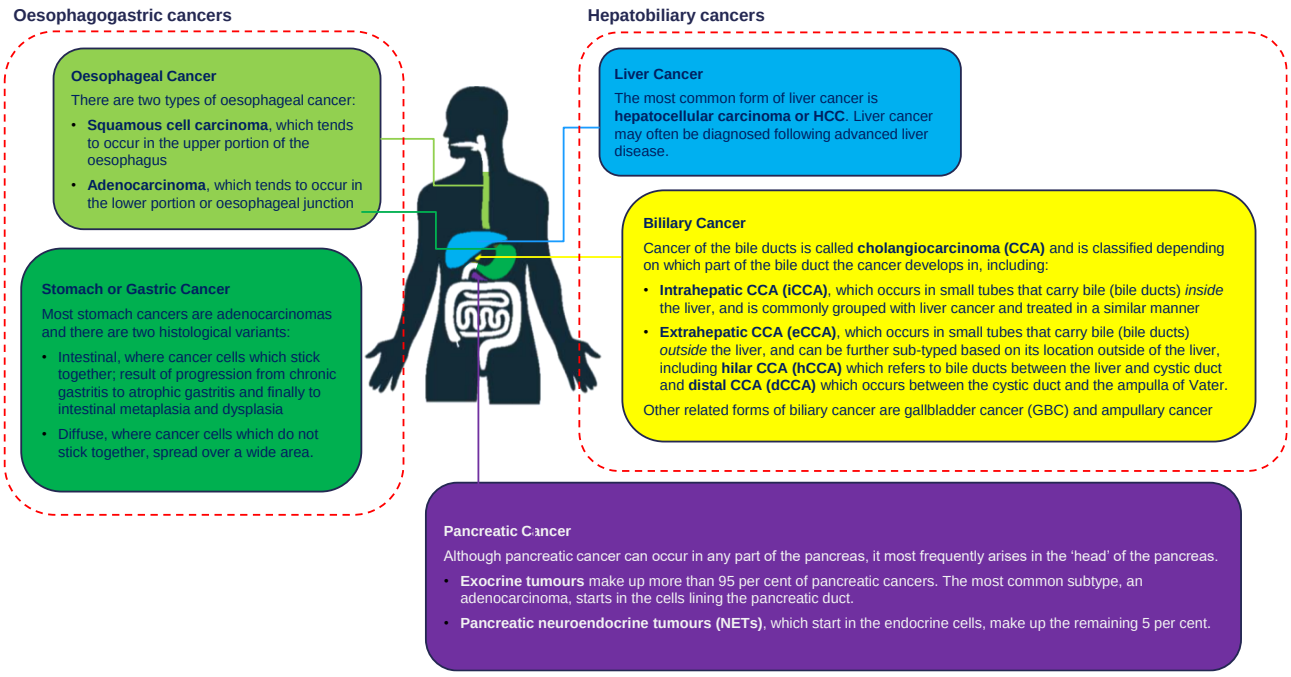
Patients and families impacted by upper GI cancers also experience some of the poorest quality of life outcomes due to the nature of these conditions, which severely impede a patient's ability to eat and absorb nutrients, and often involve treatments such as major organ removal and/or the insertion of feeding tubes. This can lead to debilitating weight loss and fatigue, among other symptoms, which slows recovery and can contribute to clinical depression and anxiety for patients and their families.

While many other cancers have seen step-change improvements in survival and quality of life, upper GI cancer patients and their families sadly have not. Five-year survival rates for upper GI cancers in Australia today remain worse than outcomes for cancer observed in 1975.

This is due in large part to poor funding for upper GI cancer research, which has been and remains inordinately low compared to its burden of disease, both globally and within Australia. It also reflects inconsistent implementation of evidence-based reforms to improve safety and quality of treatment, as well as a lack of standardised pathways for supportive and palliative care.

Upper GI cancers also disproportionately impact Australia's most vulnerable and disadvantaged communities. Indigenous Australians, new migrants, people from culturally and linguistically diverse backgrounds, and Australians from low socioeconomic backgrounds, for example, face significant cultural and social barriers to healthcare that many other Australians are fortunate enough to never contemplate. These barriers include challenges related to poverty, racism, poor health literacy, homelessness, educational disparities, cultural and language barriers, stigma, poor access to basic nutrition and geographic remoteness. These cultural and social challenges often intersect and result in higher risks of cancer. Combined with later and poorer engagement with health services, these communities experience higher rates of cancer incidence and death from upper GI cancers than the general population.

Figure 1: Overview of upper gastrointestinal cancers



These extreme treatment and care challenges and inequities make policy reforms and investments to improve outcomes for patients diagnosed with upper GI cancers and their families among the highest priorities for Australian governments and communities today.

The purpose and method of this report

With survival rates at or below 37 per cent, upper GI cancers need urgent policy focus and investment in research to improve survival outcomes.

In 2017, Australia's Senate Select Committee recommended the development of a national strategy to improve outcomes for low-survival cancers and set an explicit goal to increase 5-year survival rates for low-survival cancers to above 50 per cent before the end of the decade.

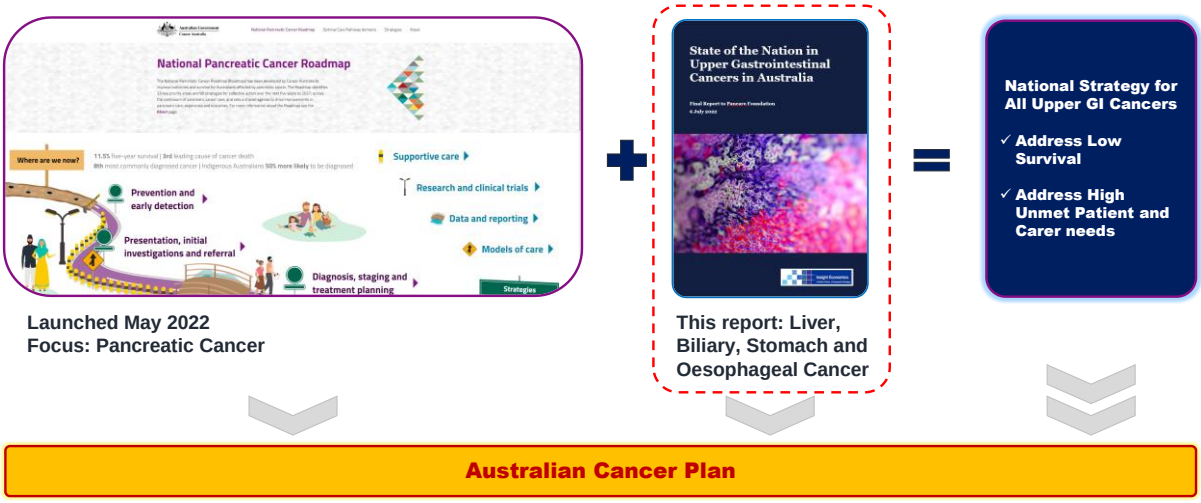
The Australian Government has responded to the call to improve outcomes for low-survival cancers in part through the development of a National Pancreatic Cancer Roadmap, which was released in April 2022; this is a welcome and important first step. The Australian Government is also leading the development of the first-ever Australian Cancer Plan which will articulate a long-term reform plan aimed at improving outcomes for all Australians diagnosed with cancer.

At the same time, no process has been initiated for the other four upper GI cancers — even as liver, biliary, stomach and oesophageal cancers experience among the poorest survival outcomes and quality of life of any cancer in Australia today. With survival rates well below 50 per cent, these cancers need disproportionate, nationally collaborative policy reform and investment to improve outcomes (as called for by the Senate Select Committee in 2017).

Patients and their families need policy action to improve quality and safety in treatment and to improve access to supportive and palliative care services. Patients need to understand their diagnosis, they need help to make informed choices in their treatment, and to receive effective supportive and palliative care services as needed to better manage the physical, emotional, financial and social impacts of an upper GI cancer diagnosis.

In light of the disparity in survival outcomes and the large burden these cancers have on patient and carers, as well as the wider Australian community, Pancare Foundation (Pancare) commissioned the development of a State of the Nation in Upper Gastrointestinal Cancers in Australia report. This report is focused on the needs of these four other upper GI cancers, with the goal of identifying the needs of this underserved cohort and providing a framework for action. The report explicitly considers and seeks to align with other policy work underway, including the development of the Australian Cancer Plan and the National Pancreatic Cancer Roadmap (Figure 2).

Figure 2: This report addresses the needs of the other four low-survival upper GI cancers – Liver Cancer, Biliary Cancer, Oesophageal Cancer and Stomach Cancer



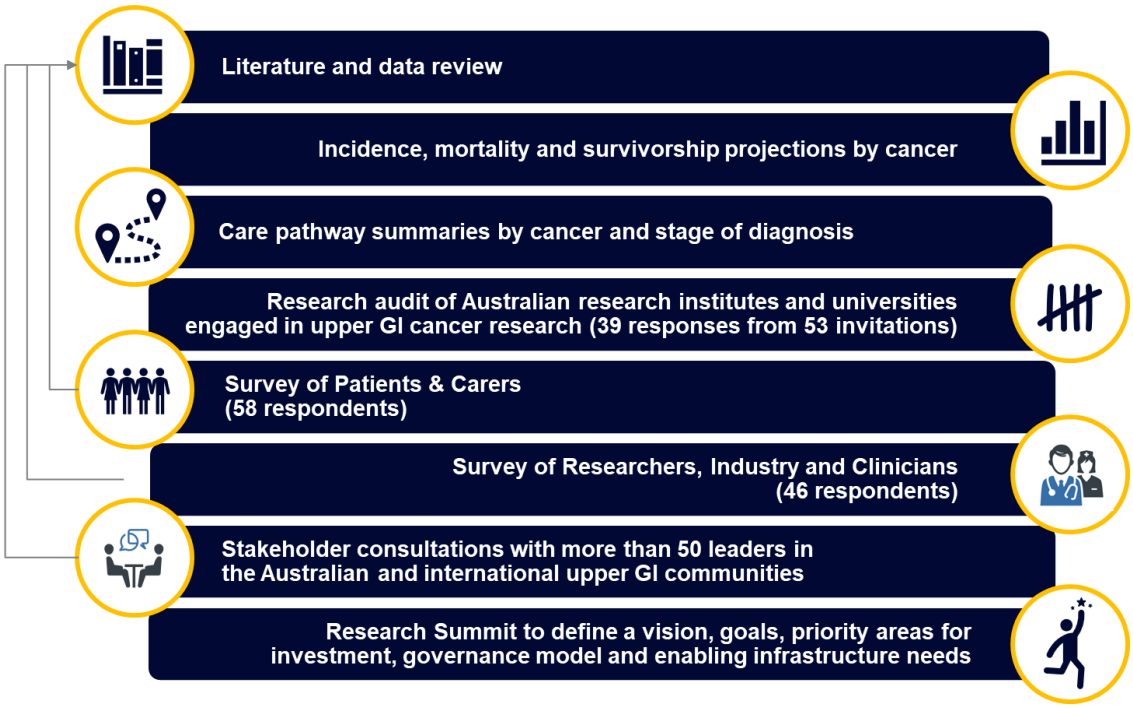
Importantly, this report has been developed from a public interest perspective, with the needs of the patients and carers put first. In this way, the report seeks to present a summary of the upper GI community's ideas and recommendations for change.

Eight major streams of work were undertaken to develop an evidence-based assessment of the challenges and opportunities facing people living with upper GI Cancers in Australia today. These included:

- A survey of Patients and Carers across all upper GI cancers
- A survey of Researchers, Industry and Clinicians across Australia
- Stakeholder consultations with more than 50 leaders in the Australian and international upper GI communities
- A research audit of Australian research institutes and universities engaged in upper GI cancer research, with 39 institutions responding from every state and territory
- A literature and data review
- Incidence, mortality and survivorship projections to 2035
- Care pathway summaries by cancer and stage of diagnosis based on a review of international and Australian clinical guidelines
- A Research Summit with more than 40 stakeholders including patients, carers, clinicians and researchers across every cancer and research discipline, other upper GI charities, clinical trials groups and government to define a vision, goals, priority areas for investment, governance model and enabling infrastructure needs for an Upper GI Cancer Research Mission.

The project was also supported by an Advisory Council comprised of six experts from the upper GI cancer community, which brought together clinician, researcher, consumer, and government perspectives, including Cancer Australia and the Department of Health and Ageing. Pancare Foundation is grateful to the support of this Advisory Council for their strategic guidance and review of this report to ensure alignment with wider policy reform.

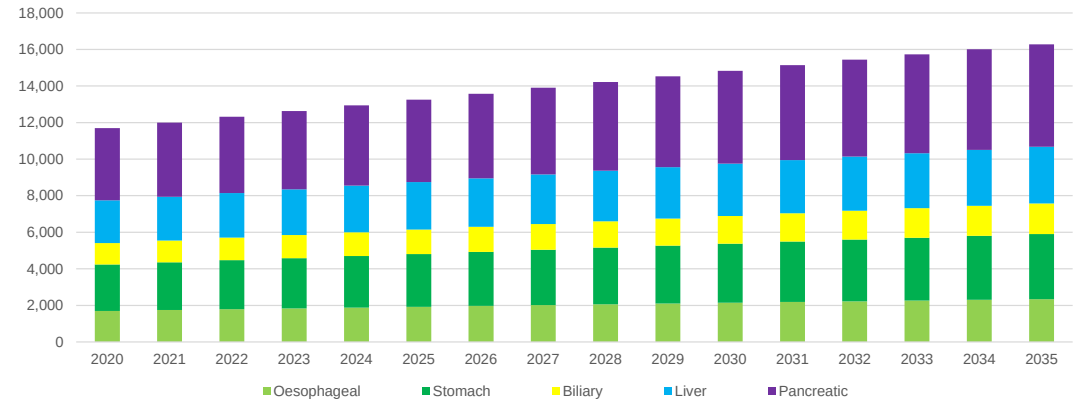
Figure 3: Research methodology



Australian incidence, mortality and trends in upper GI cancers: more than 200,000 Australians to be impacted by upper GI cancers by 2035

Whilst upper GI cancers are individually rare, together they account for approximately 13,100 new cases of cancer each year. As a result, between 2022 and 2035 (inclusive) more than 200,000 new cases of upper GI cancer are expected to be diagnosed in Australia (Figure 4).

Figure 4: Incidence (new diagnoses each year) projections (2022 to 2035)

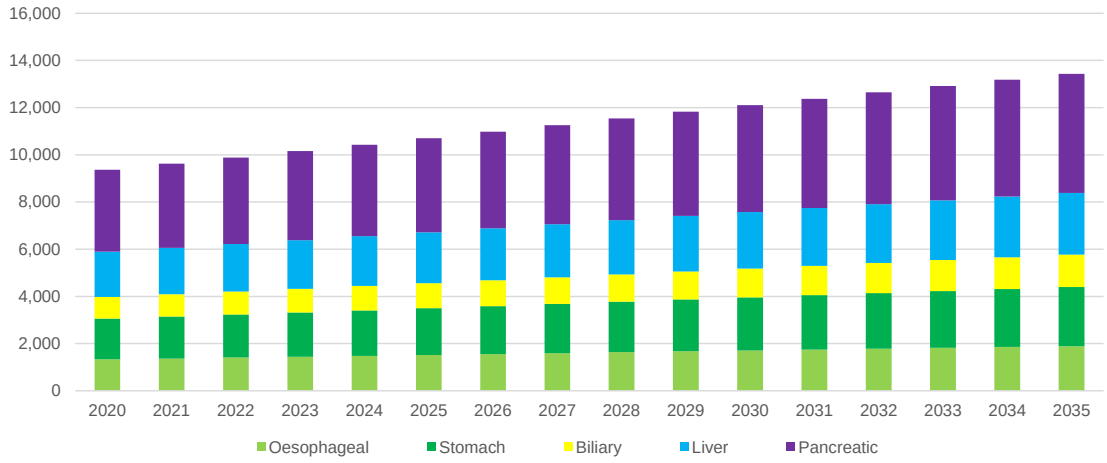


Source: Insight Economics modelling, See Appendix B. Incidence means number of new diagnoses each year.

Due to the poor survival outlook for these patients, approximately 163,000 deaths are expected over that same time horizon (Figure 5), comprised of:

- More than 61,000 deaths due to pancreatic cancer
- More than 32,500 deaths due to liver cancer
- More than 30,000 deaths due to stomach cancer
- More than 23,000 deaths due to oesophageal cancer
- More than 16,400 deaths due to biliary cancer.

Figure 5: Mortality (deaths from upper GI cancers) projections (2022 to 2035)



Source: Insight Economics modelling, See Appendix B. Mortality means death from upper GI cancers.

Upper GI cancers are expected to be among the leading causes of cancer death in Australian communities and one of the highest policy priorities for government over this period.

Challenges and risks for people diagnosed with an upper GI cancer

Poor outcomes for people living with upper GI cancers are a function in part of relatively late detection. People often experience few early symptoms, or symptoms which could be attributed to a number of conditions, and surveillance of underlying medical conditions, such as Barrett's oesophagus or liver disease, which are precursors to upper GI cancers, is often inconsistently implemented.

Upper GI cancers are also complex and difficult to treat, often involving some of the most drastic surgeries in cancer care today and drug therapies that currently have relatively limited effectiveness. The severity of treatment regimes and high supportive care needs of patients and their families necessitate a multidisciplinary approach to treatment and care; however, access to supportive and palliative care services is limited, late and varied across Australia.

Reducing deaths from upper GI cancers will require governments and the upper GI community to address a complex set of issues encompassing health system reforms and investments in research. Figure 6 below summarises the existing and emerging challenges to improving the survival outcomes for upper GI cancers and quality of life for people living with upper GI cancers from diagnosis through treatment to supportive care.

As shown in Figure 6, the challenges and risks for people diagnosed with an upper GI cancer today are many, starting from inadequate primary and secondary prevention of risks, and continuing through to unwarranted variation in treatment and poor access to supportive and palliative care:

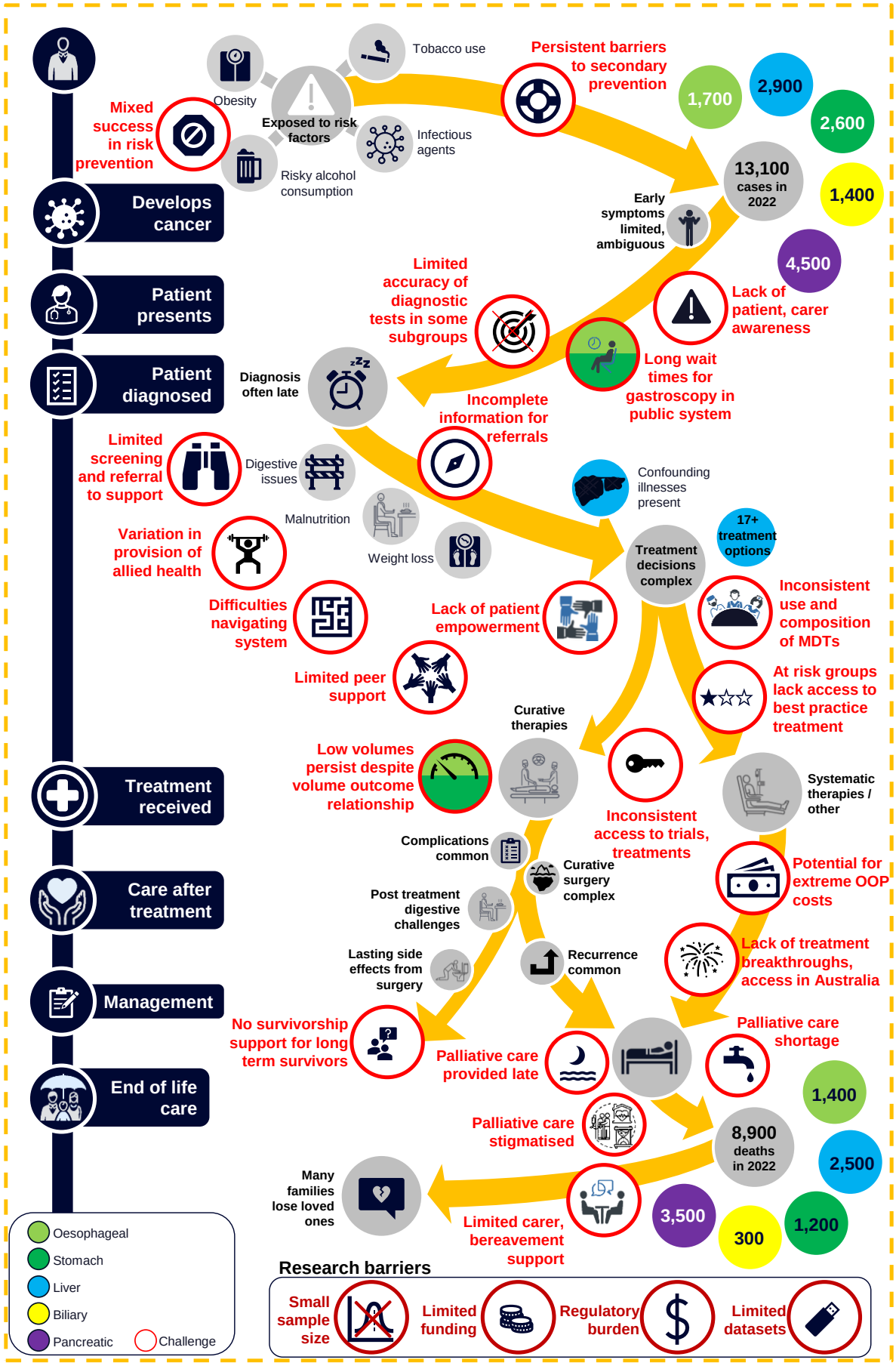
- *Mixed success in risk prevention and early detection* — Australia has performed well overall in reducing key risks for upper GI cancers in the general population, such as reducing tobacco consumption and reducing risks of infectious disease for most Australians. At the same time, key gaps remain. In the general population, there remains a high and increasing trend in obesity, as well as very high excess alcohol use rates. Three out of four Australians are now obese or overweight, making Australia a 'world leader' in obesity, and nearly one in five Australians consume alcohol in excess at rates that lead to a lifetime risk for cancer.

  There has also been relatively limited progress in risk mitigation for a number of key 'at-risk' populations, including Aboriginal and Torres Strait Islander communities, new migrants, culturally and linguistically diverse communities, regional Australians, and Australians from low socioeconomic backgrounds. These communities face very significant cultural and social barriers to primary and secondary prevention of cancer. Significant system level challenges include poverty, lack of education, misinformation, misconceptions, stigma, discrimination, racism, employment status, housing status and homelessness, access to healthy food, relative remoteness and rurality, and access to transport. All of these factors can influence access to prevention and early detection services. As a result, risks from tobacco use, alcohol consumption, infectious disease and obesity are all an order of magnitude higher for these communities, notwithstanding some improvements that have been realised over the past decade:

  - Indigenous and Asian communities have a 2.8 times greater risk of H. pylori infection, which is a risk factor for stomach cancer
  - Asian Australians and Indigenous Australians account for 75 per cent of people with hepatitis B, which is a risk factor for liver cancer
  - Eight in 10 new cases of hepatitis C in Australia result from the unsafe injecting of drugs, which is a risk factor for liver cancer

  (cont'd)

Figure 6: Challenges in upper gastrointestinal cancer prevention, detection, diagnosis, treatment and supportive care today



  - Australians from low socioeconomic backgrounds are four times more likely to smoke daily, with one in five Australians in this cohort being a daily smoker
  - Indigenous Australians are seven to 10 times more likely to smoke daily, with one in two (52 per cent) of all Indigenous Australians in remote communities being daily smokers
  - One in three adult male Indigenous Australians consume alcohol in excess at rates that lead to a lifetime risk for cancer, with 70 per cent of Indigenous patients experiencing alcohol-related cirrhosis compared to 47 per cent of non-Indigenous patients
  - Liver disease is growing in low socioeconomic communities at three times the rate of that observed for Australia's most affluent communities (9.4 per cent per annum compared to 3.4 per cent per annum).

  Moreover, these communities also consistently present later for treatment and face higher barriers to accessing health services than the general population once they become ill.

- *Persistent barriers and missed opportunities in secondary prevention: liver disease and Barrett's oesophagus* — While evidence shows benefits from surveillance of populations that have higher risk of cancer arising from precursor medical conditions, many patients in these high-risk groups are not under surveillance at the time of their cancer diagnosis. For example, less than half of all patients diagnosed with liver cancer are under any formal surveillance at the time of diagnosis, even though these patients will have often experienced liver disease in advance of their cancer diagnosis. There are also significant inconsistencies in adherence to best practice management of Barrett's oesophagus, which is a precursor medical condition to oesophageal cancer. This frustrates secondary prevention and early detection of these cancers, which can have significant implications for whether a patient is able to access curative treatments. It also contributes to higher, potentially avoidable costs of care in the health system. These issues are likely exacerbated by lack of clinician education and awareness regarding these cancers.

- *Issues in timely diagnosis* — Significant issues exist in the timely diagnosis and appropriate referral of patients to specialist centres. Timely diagnosis can be jeopardised by low patient and clinician awareness of risks and symptoms of upper GI cancers as well as long wait times for diagnosis. For example, median wait times for endoscopy in public care settings fail to meet clinical best practice recommendations. The COVID pandemic has only exacerbated long-term barriers to access for this essential diagnostic tool. Risks were reported to be magnified for regional and remote patients, who can experience lengthy delays to diagnosis and treatment, again potentially frustrating access to curative therapies and leading to poorer survival outcomes. Patients in private settings were reported to be seen rapidly on a consistent basis, which gives rise to the risk of inequities in Australia's universal healthcare system.

- *Barriers to informed specialist referrals* — Treatment of upper GI cancers often involves highly specialised services, which research has shown is best delivered by centres that meet minimum case volume thresholds. In spite of this evidence, many patients continue to be referred to, and treated by, health services that fail to meet these thresholds, which results in poorer survival outcomes compared to high volume centres. Data show that in some jurisdictions as many as one in five patients continue to be treated at low volume centres for oesophagogastric cancer (defined as less than six patients per annum). Available data show that 30- and 90-day mortality rates at low volume centres are more than double those for high volume centres for oesophagogastric services.

- *Variation in treatment* — Staging and treatment planning for upper GI cancers is complex and challenging, with significant implications for the treatment pathway, survival outcome and quality of life for a given patient. Upper GI cancers lack a complete definition of clinical best practice, with gaps in the provision of optimal care pathways for biliary cancer and a lack of Australian clinical guidelines for stomach, oesophageal and biliary cancers. Growing knowledge of best practice has the potential to improve outcomes for patients with upper GI cancers. However, evidence indicates that best practice is not uniformly implemented, resulting in variation in quality of treatment provided. Multi-disciplinary teams were also reported to be inconsistently used, and the composition of these teams are reported to vary significantly between jurisdictions and public-private care settings. This, paired with low case volumes at some hospitals, further contributes to poorer survival outcomes than is possible today given available treatment options. Access to novel and developing treatments is also limited due to scarce access clinical trials.

- *Workforce challenges* — Exacerbated by COVID, workforce shortages limit the ability of health care practitioners to provide best practice care. For example, less than half the number of needed palliative care specialists per 100,000 persons are in the workforce today, which limits capacity to provide early palliative care which would otherwise improve pain management and allow death at home. Similarly, Health Workforce Australia projects significant shortages in available nurses by 2030. Skill shortages can also limit the quality of health care provided to population subsets; for example, through limited cultural responsiveness among health care practitioners.

  For both researchers and health care practitioners, limited resourcing can lead to staff departure. Chronically low funding for upper GI cancer research further disincentivises young professionals from entering the upper GI cancer field, in spite of globally leading research output by Australian upper GI research teams, which perpetuates the slow improvement in survival for these low survival cancers.

- *Inconsistent access to supportive care* — Patients and their families experience significant adverse physical, emotional, social and financial effects arising from the diagnosis of cancer and its treatment, which require supportive care services to be delivered in a timely and integrated way alongside other treatments. For example:

  - Over 70 per cent of oesophageal cancer patients experience unintended weight loss and 26 to 75 per cent of patients experience sarcopenia at diagnosis. Patients with upper GI cancer are one of the highest-risk groups for malnutrition, which can affect up to 80 per cent of upper GI cancer patients.

  - More than one in two upper GI cancer patients reported experiencing anxiety in the Patient and Carer Survey. Approximately 50 per cent reported experiencing extreme sadness, fear, and helplessness. Between 40 and 50 per cent of respondents also reported experiencing social isolation, which was exacerbated by the COVID pandemic.

  - More than 80 per cent of carers reported experiencing anxiety, more than 50 per cent reported experiencing social isolation, and more than 40 per cent experienced significant anger.

  - Out-of-pocket costs can also be extreme, particularly where novel therapies are not publicly subsidised. Immunotherapies, for example, can cost over $100,000, based on a cost of $11,000 per treatment or roughly $10,000 per three-week session. Over five per cent of patients in the Patient and Carer survey reported out of pocket costs exceeded $10,000. These additional costs can put incredible stress on households. In 2017–18, the average equivalised disposable household income was $1,062 per week; for low-income households this drops to just $462 per week.

Despite high care needs, patients are inconsistently and infrequently screened for supportive care needs, with unmet needs in psychosocial support services for patients and carers reported to be frequently severe. There is poor awareness of available patient support services, which can crucially support patients to navigate to needed services, and patients often lamented 'stumbling' onto patient support late in their treatment and care journey.

Access to allied health services is also a major barrier: a 2022 Australia-wide study found that while dietetic services were available at 92 per cent of services providing upper GI cancer surgeries, only one third of these offered a routine service, and only 44 per cent of services had a routine nutrition protocol or pathway in place. In Victoria, a 2018 study found only 40 per cent of all upper GI cancer patients and only 37 per cent of malnourished patients were receiving dietetics intervention.

Stakeholders also reported little to no access peer support groups for upper GI cancers in Australia, with carers often feeling overwhelmed and invisible. Carers report a lack of communication, stress related to fears of being in hospital or providing the 'wrong' care, or of not knowing what to do and the impact of various restrictions such as being unable to accompany their loved ones to health appointments or hospital. There is very limited awareness of any available counselling and support services, and very limited funding for any of these services. Moreover, owing to the poor survival outlook for these cancers, there is no model of care for long-term survivors. Likewise, poor survival contributes to a lack of survivor stories, which has led to reduced visibility of these cancers.

- *Significant variation and barriers to palliative and end of life care* — Early palliative care is recommended by clinical guidelines and understood to be a critical component of safe and quality upper GI cancer care, and yet significant inconsistencies in access and quality were evident from stakeholder consultations, the survey and supporting literature and data. Less than half the number of needed palliative care specialists per 100,000 persons are in the workforce today, and the impacts on patients in regional areas and from disadvantaged backgrounds are amplified through an undersupply of palliative care professionals.

- *Extreme historical underfunding of research* — Upper GI cancers have suffered from long-term underfunding of research by both industry and governments alike, both globally and within Australia, which has contributed to the persistent poor prognosis for these cancers. Despite recommendations for a national strategy to rapidly lift survival outcomes for these cancers within a generation, no significant funding has been invested to date. This is in spite of Australia's upper GI research community outperforming prestigious research impact benchmarks for health and medical research, including National Health and Medical Research Council funded projects.

Thus, the reform agenda for upper GI cancers is extensive and demanding, requiring significant focus from governments at all levels and collaboration with patient support organisations and professional bodies.

Opportunities to improve outcomes for people living with an upper GI cancer and their families

While there are major challenges to be overcome, there is good reason for hope: significant opportunities are available to substantially reduce the incidence of upper GI cancers, survival and quality of life through policy actions and investment in research.

Evidence presented in this report show these opportunities have the potential to:

- Substantially reduce upper GI cancer incidence, through better primary prevention

- Improve survival in the short run, through earlier detection and improved adherence to clinical best practice today
- Improve quality of life and health services utilisation through empowerment and support of consumers to navigate to the right support when they need it
- Deliver significant breakthroughs in treatment and care through a nationally coordinated approach to research.

Opportunities to reduce the incidence of upper GI cancers

While some upper GI cancers occur sporadically, there are a number of significant, modifiable risk factors, particularly for liver cancer, that could be substantially reduced in the community today.

For example, the development of a National Strategy for Liver Health could substantially reduce the risks arising from precursor medical conditions, such as hepatitis and cirrhosis, and significantly slow growth in hepatocellular carcinomas. These actions would yield enormous benefits to the community, not only through reduced incidence of liver cancer, but also the incidence and costs of liver disease, which are high and increasing. Complemented with a Roadmap to a Targeted Liver Cancer Screening Program (see below), this offers the potential to improve the early detection of liver cancers and double 5-year survival outcomes based on currently available therapies. The benefits from a National Strategy for Liver Health alone would include:

- Prevent 10,000 hepatitis infections
- Reduce healthcare costs associated with hepatitis infection by $272 million by 2030
- Reduce cases of cirrhosis by 52 per cent
- Avoid hospitalisation costs associated with the treatment of cirrhosis of $976 million in $NPV_{5\%}$ terms over the 2025-2035 horizon
- Reduce the incidence of hepatocellular carcinoma by 47 per cent, preventing between 10,000 and 13,300 cases of liver cancer over the 2025-2035 period depending on the rate of hepatocellular carcinoma
- Avoid hospitalisation costs associated with the treatment of hepatocellular carcinoma patients of between $323 million and $427 million in $NPV_{5\%}$ terms over the 2025-2035 horizon (depending on the rate of hepatocellular carcinoma).

In addition, the development of new models of care for vulnerable and disadvantaged groups, including Aboriginal and Torres Strait Islander people, migrants, culturally and linguistically diverse communities and people from low socioeconomic backgrounds, is needed. In particular these at-risk groups would benefit from new models of primary health care and prevention strategies, with the goal of bringing risks and outcomes for these groups in line with the general population over a 10-year horizon.

Opportunities to improve survival through adherence to clinical best practice

Significant opportunities to improve outcomes through improved detection, diagnosis, treatment and care also exist. Major opportunities include:

- *A Targeted Liver Cancer Screening Program* — A targeted screening program offers the potential to substantially improve long-term survival. For example, 5-year survival outcomes in Japan are double (44 per cent) those observed in Australia today (22 per cent) as a result of investment in a risk-stratified surveillance program.

- *Improving systems to support referrals to appropriate services and service reform* — Evidence show that 5-year survival for oesophagogastric patients treated at high volume hospitals is between 10 and 60 per cent higher than those treated at low volume health services, but in 2019 nearly one in 10 patients in NSW and one in five patients in Queensland were treated in low volume centres. Stakeholders indicated low volume services remained a challenge in Victoria as well.

Added to these potential programs and service reforms, the development of national cancer data sets, clinical guidelines and clinical care standards represent core, enabling infrastructure needed to drive the uptake of improvements in treatment and care across all care settings. These are critical tools for performance management, which will catalyse the realisation of benefits in survival and quality of life for patients and carers, as well as efficiencies in health services utilisation. Clinical quality registries and national cancer datasets have the potential to deliver a significant return on investment, with benefit cost ratios in the order of 4:1 to 12:1 depending on the scope of the dataset. If a national cancer dataset could realise a one per cent efficiency in cancer care treatment, this could yield net benefits to the community of more than $1 billion in $2022 dollars over the 2022-2035 horizon.

Opportunities to improve quality of life through consistent access to supportive and palliative care for all patients

More than 200,000 patients and families are projected to be impacted by upper GI cancers before 2035. There are significant opportunities to improve outcomes for these patients and their carers, including:

- Expanding access to consumer navigation and patient support services
- Improving nationally consistent and equitable access to nurse support
- Developing a standardised pathway for supportive and palliative care services.

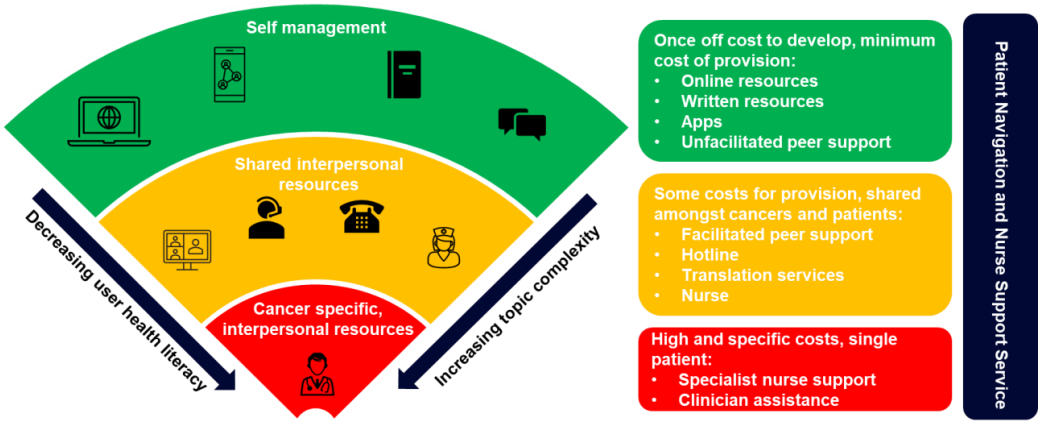
Data and case studies show that these services not only improve patients' quality of life, but they also improve patterns of health service utilisation, preventing hospital admissions. For example:

- The introduction of timely, same-day referrals to dietitian services for upper GI cancer patients at a Gold Coast hospital saw a 70 per cent reduction in the number of feeding tube insertions.
- Specialist liver nurses have been shown to reduce demand for outpatient services, prevent emergency department presentations, prevent hospital admissions and improve discharge procedures, delivering a cumulative net saving of $200k per nurse.
- All.Can Australia estimated consumer navigation support, appropriately designed, could deliver net savings of $46 million in $2020, as access to better information helps patients to better manage side effects of treatment, leading to fewer hospitalisations and adverse outcomes.

A national consumer navigation service could be designed to close gaps in consumer information and improve referrals to supportive care services through a mix of printed and online information support services, as well as virtual and in-person support as appropriate (Figure 7). The service could be delivered through a triaged approach, progressing from general care coordinators, to oncology nurses to specialist nurse support.

Because a national consumer navigation service has the potential to deliver improvements to all cancers, this should be implemented as part of the development of an Australian Cancer Plan.

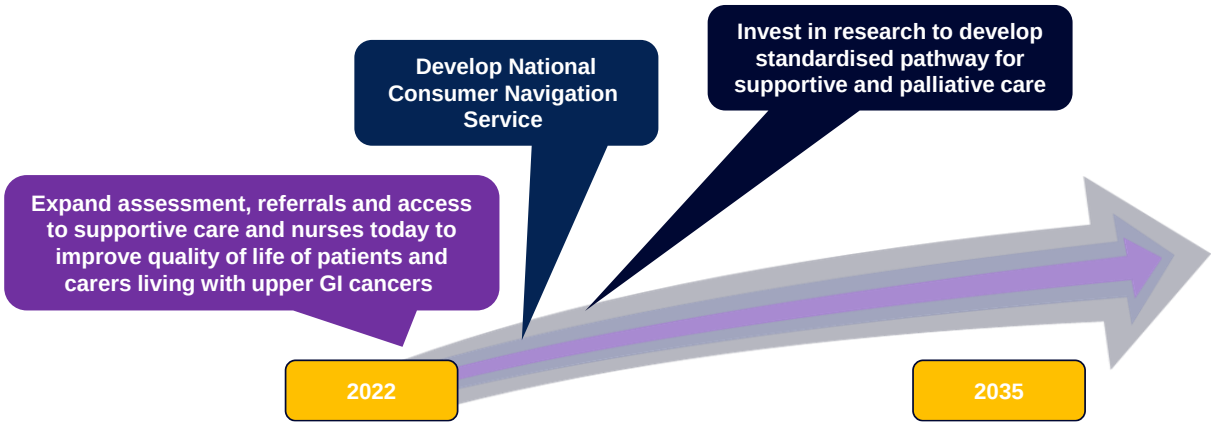
Figure 7: Visualisation of information needs of patients and resource intensity



While the development of a national consumer navigation service is critical, this will take time to develop and will need to be designed in such a way that caters to specific needs of different cancers.

In parallel to the important work of the Australian Cancer Plan, there is an opportunity to improve access to support services for upper GI cancers today. Upper GI cancer patients and families have been shown to have very high unmet needs with limited to no support nationally. Expanding access to patient support services today (Figure 8) offers the potential to improve access to counselling, peer support, financial advice, advanced care planning, physical exercise and nutrition support services.

Figure 8: Enhancing supportive care in the short and long-term



In addition, there is an opportunity to define a nationally equitable approach to nurse funding to ensure all patients enjoy equitable access to nursing support, even if their cancer is relatively rare.

Over the medium-term, support for research to define and optimise a standardised pathway for supportive and palliative care will also see improvements in outcomes over the forward horizon.

Opportunities to realise breakthroughs through a nationally coordinated approach to research

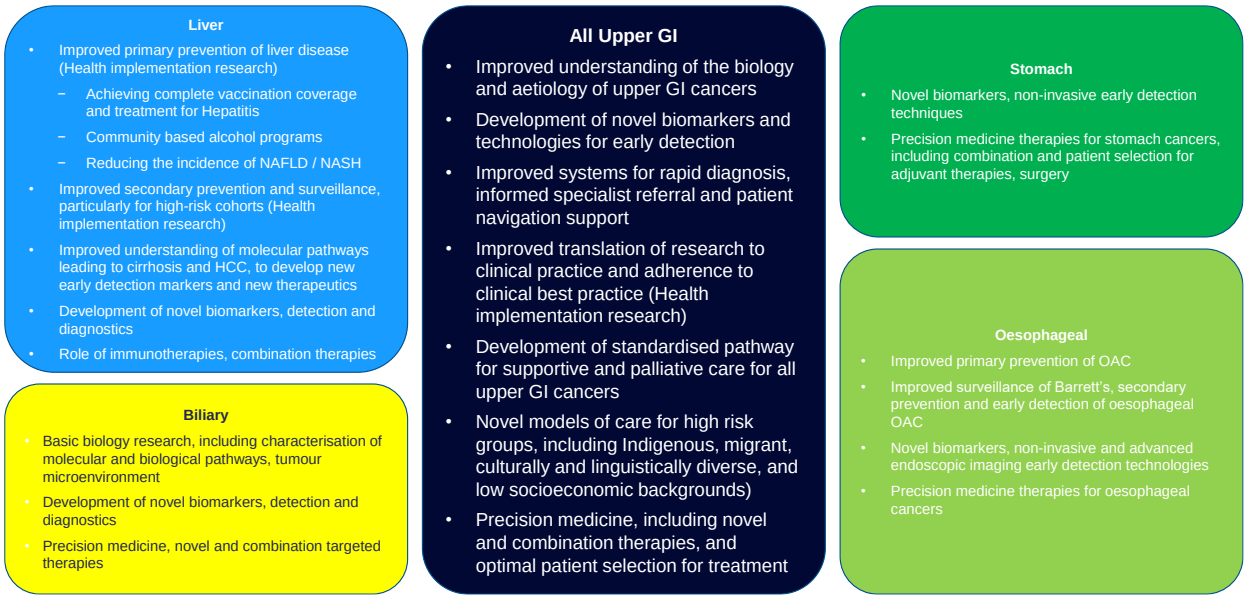
Finally, a nationally coordinated approach to upper GI cancer research, supported by a multi-year funding commitment, has the potential to deliver breakthroughs in treatment and care. This is the approach contemplated by the Senate Select Committee, which called for a

significant, new, coordinated national approach to research across a range of domains to address disparities in survival outcomes. A ten-year Upper GI Cancer Research Mission would provide the core enabling infrastructure and coordination of the wider research community around shared research priorities needed to deliver a step change improvement in outcomes for patients.

Australia's upper GI research community has shown itself to be a consistent, world-leading performer in high impact research within basic biology and aetiology, early detection technologies and treatment domains – outperforming even prestigious National Health and Medical Research Council-funded grant citation benchmarks. Notwithstanding the upper GI cancer research community's outperformance in citation benchmarks, funding for upper GI cancer research has lagged other areas of cancer research, which further contributes to the poor survival outlook for these patients and their families.

The Research Summit for Upper GI Cancers identified a shared vision for the Upper GI Cancer Research Mission, as well as priority areas for research (Figure 9).

Figure 9: Priority areas for research investment



Source: Upper GI Cancer Research Summit

A Plan for Action

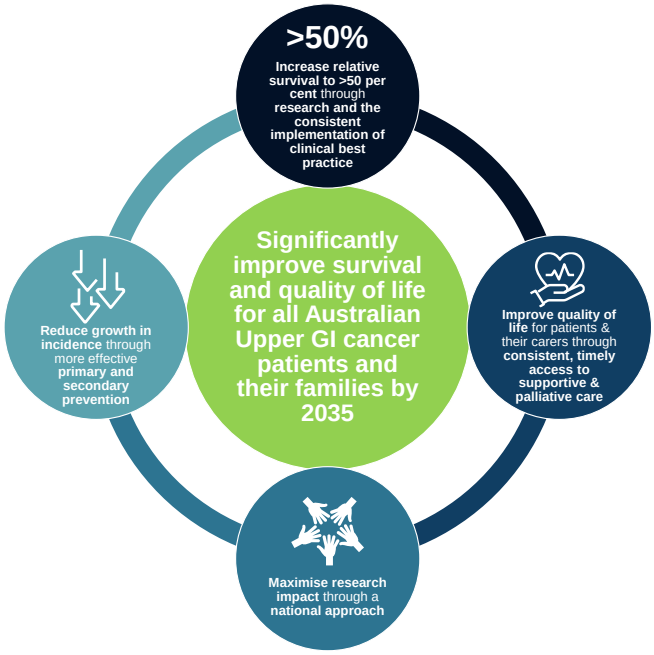
Together with upper GI patients and their carers, as well as the wider upper GI research and clinical community, the Pancare Foundation is calling on Australians to help deliver a vision for a future where fewer people are diagnosed with an upper GI cancer, and where upper GI cancer patients live longer, better lives together with their families.

To that end, this report sets out a long-term, 2035 vision statement for upper GI cancers, underpinned by four major goals (Figure 10):

> ***To significantly improve survival and quality of life for all Australian upper GI cancer patients and their families by 2035, by:***
>
> - ***Increasing 5-year survival to >50 per cent through the consistent adoption of research as the standard of care and the consistent implementation of clinical best practice***
> - ***Improving quality of life for patients and their carers through consistent, timely access to supportive and palliative care for all people diagnosed with an upper GI cancer***

- ***Reducing growth in incidence through more effective primary and secondary prevention***
- ***Maximising research impact in upper GI cancers through a national approach.***

Figure 10: 2035 vision and priority areas for action



Critically, this long-term, 'ambition statement' for upper GI cancers cannot be achieved through a continuation of the status quo. It will require significant investment and policy reform, with new approaches to collaboration and service delivery to be implemented.

Within each goal statement, a series of actions to improve outcomes are identified to provide a high-level roadmap for implementation. In addition, investments in core enabling infrastructure and activities are identified to support the realisation of all goals and the broader vision. This is summarised in Figure 11 below.

As shown in Figure 11 below, **key strategies to realise the goal of reducing growth in incidence** through more effective primary and secondary prevention include:

- Improve primary prevention of modifiable risk factors
- Develop a National Liver Health Strategy

The **key strategies to realise the goal of increasing relative survival to >50 per cent** through research and the consistent implementation of clinical best practice include:

- Develop a Roadmap to a Liver Cancer Screening Program
- Improve cancer symptom education and awareness
- Establish systems for rapid and informed specialist referral
- Conduct a review of endoscopy services
- Establish a quality framework for upper GI cancers, which comprehensively articulates:
  - Optimal care pathways for every upper GI cancer

  - Australian clinical guidelines for every upper GI cancer
  - Clinical care standards for every upper GI cancers
- Conduct a review of specialist service delivery in upper GI Cancers.

The **key strategies to realise the goal of improving quality of life for patients and their carers** through consistent, timely access to supportive and palliative care include:

- Expand access to patient support services, including supportive care groups, for patients and carers today
- Establish a standardised pathway for supportive and palliative care in upper GI cancers
- Conduct a review Palliative Care Services to improve access, timeliness and quality of care.

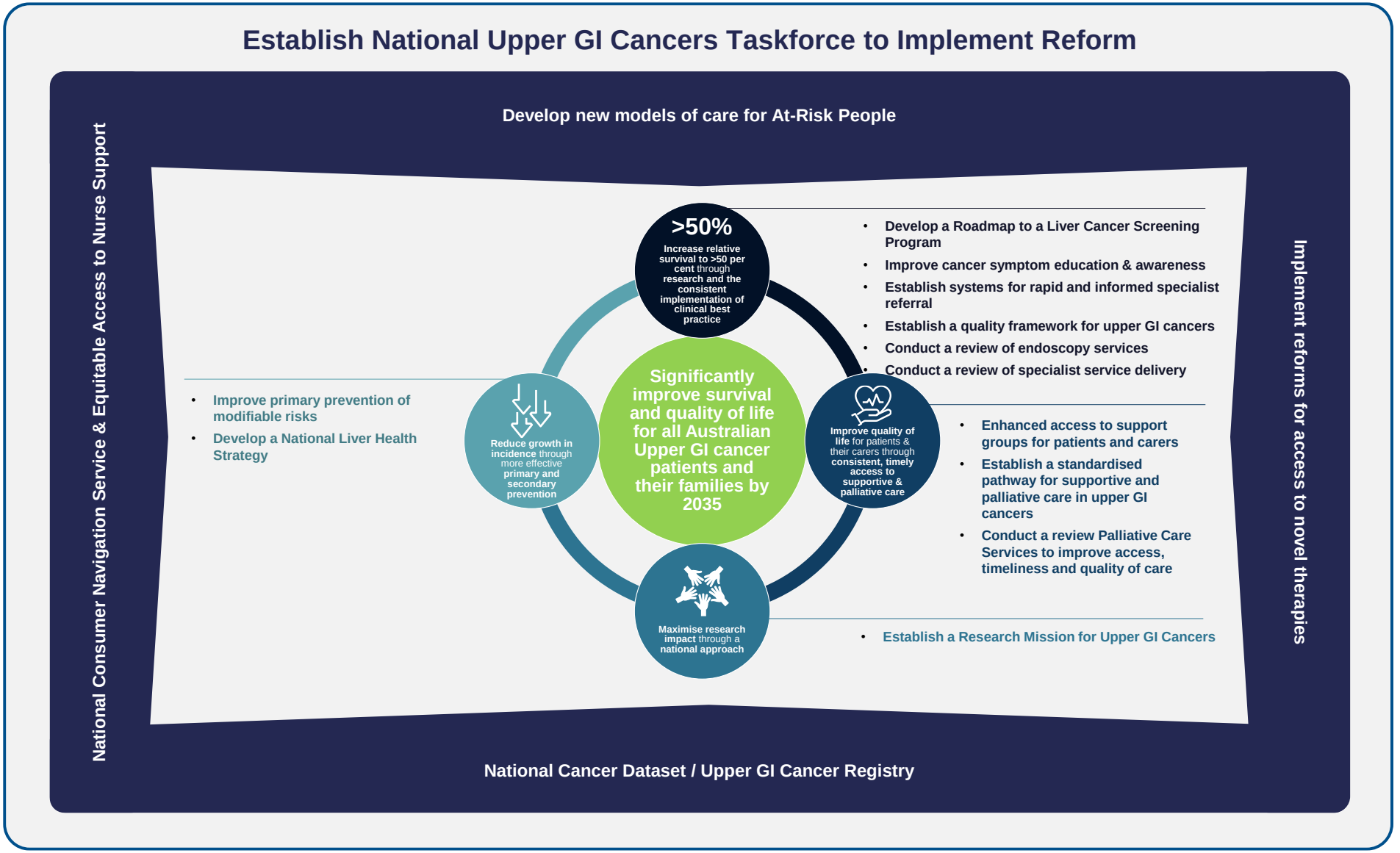
The **key strategy to realise the goal of maximising research impact through a national approach is to**:

- Establish a Research Mission for Upper GI Cancers.

The **core enabling infrastructure and activities** needed to realise the vision include:

- **Establish a National Upper GI Cancer Taskforce**, comprised of federal and state governments as well as consumer, clinician and research leaders to support the national implementation of 'upper GI-specific' actions that will not be covered through the core Australian Cancer Plan implementation, which will necessarily be focused on actions and strategies that cut across all cancers.
- **Develop new models of care for at-risk people**, including in particular Aboriginal and Torres Strait Islander people, culturally and linguistically diverse communities, new migrants, Australians from low socioeconomic backgrounds and regional Australians. These models of care will need to work across multiple Optimal Care Pathway domains, from improved prevention and early detection, through to treatment and supportive care.
- **Develop a National Australian Cancer Data Ecosystem and national expansion of the Upper GI Cancer Registry**, which is fundamental to improving patient outcomes and reducing waste of scarce health resources. The development of a National Australian Cancer Data Ecosystem is expected to be a core priority of the Australian Cancer Plan.
- **Develop a National Consumer Navigation Service and Equitable Approach Nurse Support** based on an evidence-based assessment of need spanning from basic informational support about upper GI cancers through to consumer navigation support services, which could be provided by a range of trained personnel (e.g., not necessarily nurses) through to specialist GI cancer nurse support, which requires specialist knowledge of the supportive care needs of a patient through treatment and beyond. Such a service should leverage existing capability and be delivered as a core priority of the Australian Cancer Plan.
- **Implement reforms to improve access to novel therapies**, which is two-fold: the adoption of recommendations by the Zimmerman Report for a targeted fund to be established for products with rare indications and clinical trials reforms focused on increasing the number of upper GI cancer trials in Australia.

Figure 11: A plan for action to improve outcomes for upper gastrointestinal cancers



Key partners in implementation

The successful realisation of the long-term ambition for upper GI cancers will depend on sustained partnerships across the upper GI community and with governments at all levels.

To support the implementation of this plan, short-term (2-year) and medium-term (5-year) activities are identified, consistent with the National Pancreatic Cancer Roadmap, which are upper GI specific and not expected to be delivered by other reform work, such as the Australian Cancer Plan or other major reform efforts such as the National Preventive Health Strategy (2021-2030), the National Obesity Strategy (2022-2032), National Alcohol Strategy (2019-2028), or National Primary Health Care 10-year Plan (2022-2032). These actions would be the major focus of the National Upper GI Cancer Taskforce. A series of draft performance indicators have been developed to provide an indication of the timing and magnitude of benefits that could be realised through the effective execution of each action.

Table 1: Implementation considerations and key partners for success for Upper GI specific actions

Strategy	Key partners	Action	Timing
Develop a National Liver Health Strategy	Federal Department of Health The Liver Foundation LiverWell Hepatitis Australia Cancer Council Australia National Aboriginal Community Controlled Health Organisation Federation of Ethnic Communities' Council of Australia Upper GI Cancer NGOs and consumers	Review current federal and state policy approaches to improving liver health	Short term
		Refresh National Hepatitis B and C strategies to better target incidence in at-risk groups	Short term
		Develop National Liver Health Strategy based on evaluation	Short term
		Implement National Liver Health Strategy	Medium term
		Implement refreshed National Hepatitis Strategies	Medium term
Develop a Roadmap to a Targeted Liver Cancer Screening Program	Federal Department of Health The Liver Foundation Hepatitis Australia LiverWell Cancer Council Australia National Aboriginal Community Controlled Health Organisation Federation of Ethnic Communities' Council of Australia Primary Health Networks Australian College of Rural and Remote Medicine Upper GI Cancer NGOs and consumers	Systematic review of trials of risk-based population screening in terms of (i) evidence about the benefits and harms for different risk groups and (ii) their potential translation to the Australian health setting.	Short term
		Design or adapt and test existing approaches to targeted surveillance	Short term
		Implement a targeted surveillance program	Medium term
		Identify existing decision support tools for assessment of signs and symptoms of upper GI cancers	Short term
		Implement upper GI cancer decision support tools	Medium term
Conduct a review of endoscopy services	Federal Government State Governments Australian Commission for Safety and Quality in Health Care Gastroenterological Society of Australia Upper GI Cancer NGOs and consumers	Identify barriers and enablers for gastroscopy for public patients by state, territory and region	Short term
		Implement reforms to improve access	Short term
		Implement systems of rapid and seamless referral into specialist care	Medium term

Strategy	Key partners	Action	Timing
Establish a quality framework for upper GI cancers including, OCPs for every cancer, clinical guidelines for every cancer and a clinical care standard for upper GI cancers	Federal Department of Health Cancer Australia State Governments Australian Commission for Safety and Quality in Health Care Australian and New Zealand Gastric and Oesophageal Surgery Association Australian and New Zealand Hepatobiliary Association Gastroenterological Society of Australia Palliative Care Australia National Aboriginal Community Controlled Health Organisation Federation of Ethnic Communities' Council of Australia Upper GI Cancer NGOs and consumers	Develop an OCP for biliary cancer	Short term
		Establish baseline metrics for quality standard metrics (e.g., access to MDT, discussion of clinical trials, screening for supportive care, early access to palliative care, and define PROMs/PREMs)	Short term
		Implement a clinical care standard for upper GI cancers to measure and promote adherence to minimum quality standards established through the clinical guidelines.	Medium term
		Implement a clinical care standard for upper GI cancers to measure and promote adherence to minimum quality standards established through the clinical guidelines.	Medium term
		Establish working definition of 'high-volume centre' in order to map and categorise existing centres	Short term
Conduct a review of specialist service delivery in upper GI Cancers	Federal Government State Governments Australian and New Zealand Gastric and Oesophageal Surgery Association Australian and New Zealand Hepatobiliary Association Gastroenterological Society of Australia Upper GI Cancer NGOs and consumers	Create a registry of treatment centres that are considered high-volume/specialised in upper GI cancer treatment across each state and region	Short term
		Develop national standards of clinical capability for high-volume, specialist centres in upper GI cancers	Medium term
		Develop a nationally agreed minimum dataset and framework for data collection, collation and reporting on clinical quality indicators and national benchmarking	Medium term
		Develop structured pathway for supportive care services	Short term
Establish a standardised pathway for supportive and palliative care in upper GI cancers	Federal Government State Governments Royal Australian College of General Practitioners Primary Health Networks Australian College of Rural and Remote Medicine Upper GI Cancer NGOs and consumers	Enhance provision and strengthen awareness of supportive care services through improved funding of patient support	Short term
		Identify current status and gaps in access to coordinated supportive care	Short term
		Design or adapt and test standardised supportive and palliative care pathway	Short term
		Develop and implement educational modules on best-practice supportive and palliative care for upper GI cancers	Short term
		Strengthen linkages between primary health professionals and specialist multidisciplinary teams	Medium term
		Implement standardised supportive care pathways	Medium term
		Promote awareness of upper GI supportive care services to health professional	Medium term

Strategy	Key partners	Action	Timing
		Expand access to available patient support services	Short term
Enhanced access to support groups for upper GI patients and carers	Upper GI Cancer NGOs and consumers Federal Government State Governments	Review Australian and international best practice models for support groups in upper GI cancers, including peer support and professionally-led support groups	Short term
		Develop and implement first generation support network for upper GI cancers	Short term
		Promote support networks with health professionals	Short term
		Review support network strategy and refine as required	Medium term
		Establish Strategic Advisory Group for mission	Short term
Upper GI cancers Research Mission	Federal Government (MRFF, Dept Health) State Governments Research and clinical leaders from cross section of cancers, research fields and disciplines Patients and carers, Upper GI cancer NGOs National Aboriginal Community Controlled Health Organisation FECCA Multicultural Health Collaborative.	Agree upon funding model, policies and principles, and core enabling infrastructure	Short term

Immediate next steps for action

Working together, with long-term funding support from governments and the NGO sector, this plan has the potential to deliver significant improvements for patients and their families, as well as the wider health care system and to Australian community. This plan will prevent disease and cancer in the community, substantially increase long-term survival, and improve quality of life for patients and their families today through consistent and enhanced access to supportive care.

The Pancare Foundation calls on the Australian Government to:

- Improve outcomes for patients immediately by funding increased access to patient support services
- Ensure nationally equitable access to specialist nursing support for Upper GI cancers
- Fund an Upper GI Cancer Research Mission
- Respond to the recommendations of this report with a plan for expanding the reform agenda for Pancreatic Cancer to include Upper GI Cancers, reflecting their similarly low survival outcomes and high unmet supportive care needs
- Establish a National Upper GI Cancer Taskforce to support interjurisdictional policy reform and investment for upper-GI specific actions alongside the development and delivery of the Australian Cancer Plan and other reform work.

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Chapter 1

Upper gastrointestinal cancers in Australia: the cause of one in five cancer deaths in Australia

Upper gastrointestinal (upper GI) cancers include cancers of the pancreas, liver, biliary, stomach and oesophagus. These cancers are individually relatively rare, but combined account for approximately 13,100 new cancer diagnoses every year.

While many cancers have seen significant improvements in survival in the past three decades, upper GI cancers have not, with 5-year survival rates for these cancers ranging from between 12 and 37 per cent. As a result, upper GI cancers sadly account for nearly one in five deaths from cancer (17.5 per cent) in Australia today.

As the significant disparity in survival outcomes among cancers has become more apparent, developed nation governments have called for increased focus and funding for strategies to rapidly improve survival and quality of life outcomes for patients diagnosed with low survival cancers. For example, in 2017 the Senate Select Committee into Funding for Research into Cancers with Low Survival Rates report was published, highlighting its goal of achieving 50 per cent survival for all cancers by 2027.

The Australian Government has responded as a first step with the development of a National Pancreatic Cancer Roadmap, which was launched in April 2022. This represents an important first step to improving outcomes for patients with pancreatic cancers. At the same time, no similar process had been developed to address the needs of patients diagnosed with oesophageal, stomach, biliary or liver cancers.

This chapter provides a brief overview of upper GI cancers and sets out the rationale for this report and the urgent need for policy reform and investment to improve outcomes for patients with upper GI cancers. This report brings together evidence and recommendations for how Australia can best improve outcomes for upper GI cancer patients and their families both today and into the future.

1.1 What are upper gastrointestinal cancers?

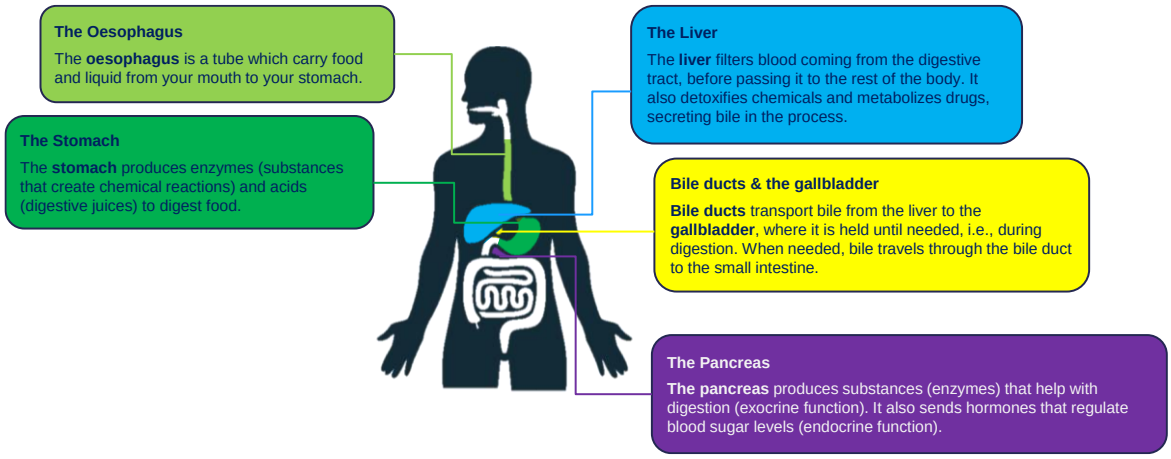
The gastrointestinal (GI) tract is the digestive tract which leads from mouth to anus.

Its principal functions are to digest and absorb ingested nutrients, and to excrete waste products of digestion. The gastrointestinal tract is often further subdivided into two groups:

- The *upper gastrointestinal tract*, which includes the oesophagus, stomach, liver, bile ducts, pancreas
- The *lower gastrointestinal tract*, which is comprised of the small intestines and large intestines.

The focus of State of the Nation in Upper Gastrointestinal Cancers in Australia report (report) is on cancers of the upper gastrointestinal tract.

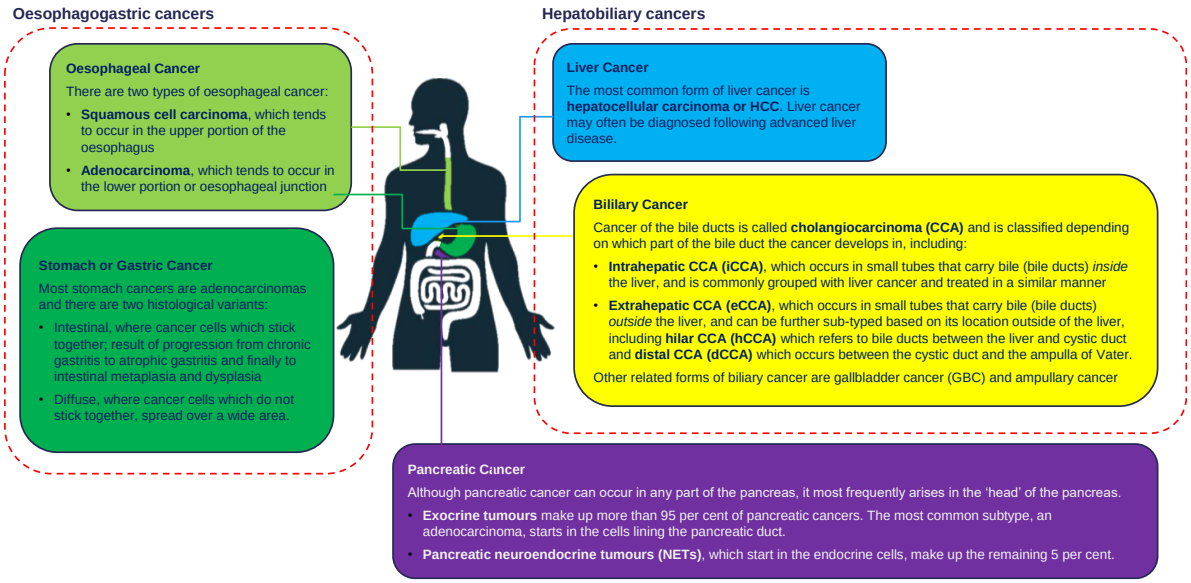
Figure 1.1: Overview of upper gastrointestinal system



Upper gastrointestinal cancer is a term for the group of cancers that affect the upper digestive system. Because each organ and duct is geographically, structurally and functionally different (with individual roles in facilitating digestion), upper GI cancers vary in many aspects. There are five main forms of upper GI cancer:[1]

- Oesophageal cancer
- Stomach cancer
- Liver cancer
- Biliary cancer (i.e., bile duct cancer or cholangiocarcinoma)
- Pancreatic cancer.

Figure 1.2: Overview of upper gastrointestinal cancers



The discussion below includes a short overview of the risk factors, symptoms and treatment relevant to each cancer; Chapter 2 provides a detailed discussion of each cancer.

[1] There are numerous less common cancers that can affect the upper GI tract, including lymphomas, small cell carcinomas, sarcomas, gastrointestinal stromal tumours (GIST) and angiosarcomas. In addition, cancers from other primary sites can also metastasise to these organs, e.g., colorectal metastases detected in the liver. This report focuses on the most common cancers originating in the upper GI tract.

Oesophageal cancer: overview

The oesophagus is the tube leading from the pharynx to the stomach, separated by a weak ring of muscle (sphincter).

There are two common, biologically distinct types of oesophageal cancer, both of which arise in the lining of the oesophagus:

- *Squamous Cell Carcinoma (SCC)* — Squamous cells are flat, thin cells which normally line the surface of the upper portion of the oesophagus. Squamous cell carcinoma, which arises in these cells, is often found in the upper-middle portion of the oesophagus.[2]
- *Adenocarcinoma (AC)* — Adenocarcinoma is most common in the lower third and oesophagogastric junction (OGJ), and begins in the cells of mucus-secreting glands in the oesophagus.

Corresponding with biological differences, the risk factors for developing each sub-type of oesophageal cancer differ. For oesophageal adenocarcinoma, obesity, gastro-oesophageal reflux (GORD), Barrett's oesophagus (including familial), being male and aging are risk factors. For oesophageal squamous cell carcinoma, tobacco and alcohol consumption are major risk factors, as well as achalasia, aging and Bloom syndrome. Risk factors are discussed further in Chapter 2, Section 2.2.

Oesophageal cancers show limited symptoms when in early stages. When symptoms begin developing, they are often ambiguous albeit severe. Reflecting the function of the oesophagus, symptoms can significantly impair physical status, i.e., compounding upon weight loss. Symptoms are discussed further in Chapter 2, Section 2.3.

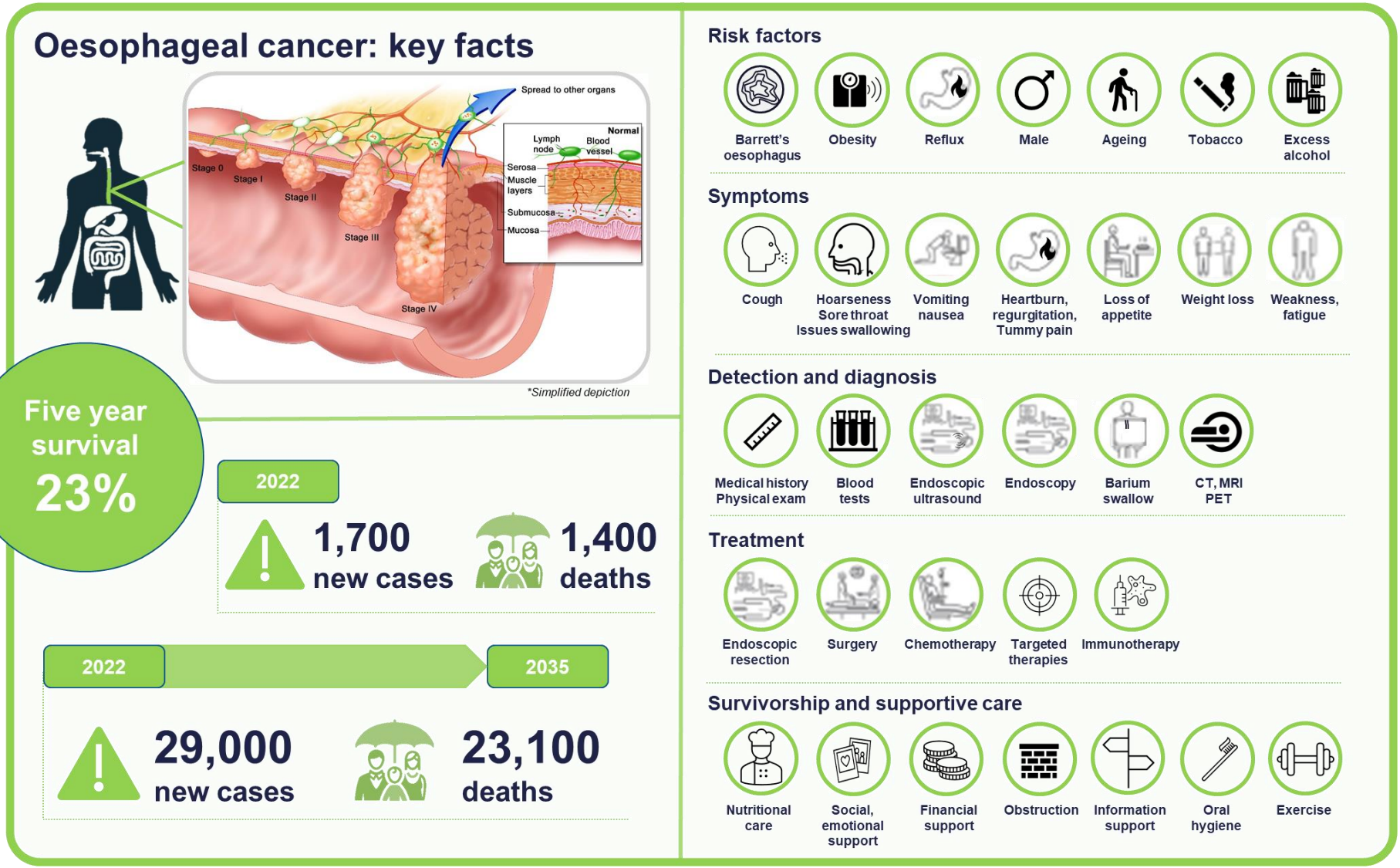
To detect and diagnose oesophageal cancer, various tests are utilised. The location of tumour within the oesophagus adds complexity to diagnosis; the current 'gold standard' of diagnosis is an upper endoscopy or gastroscopy, which involves the examiner passing an endoscope (a thin, flexible tube with a light and a small video camera on the end) down the patient's throat. If the precursor to oesophageal cancer (Barrett's oesophagus with high grade dysplasia) is detected, ablation may be possible. Detection and diagnosis are discussed further in Chapter 2, Section 2.4.

Once the cancer is diagnosed, treatments are selected based on cancer stage. For early stage tumours, resection (surgery) remains a curative option; however, if endoscopic resection is not possible, resection becomes complex, and involves the removal of portions of the oesophagus. Historically, chemotherapy has been used to treat patients with unresectable cancers, with limited success. However, recent trials are indicating that novel therapies may improve outcomes. Treatment is discussed further in Chapter 2, Section 2.4.

In curative cases, resection (oesophagectomy) is a complex procedure, and can impact the patient for months after treatment; therefore, prehabilitation, supportive care and rehabilitation are crucial. Where curative treatment is not available, symptoms associated with oesophageal cancer necessitate appropriate management, including pain medication and dietary assistance to overcome possible appetite reduction. Reflecting the poor prognosis associated with this cancer, family members and carers are often significantly impacted from diagnosis. Survivorship, supportive and palliative care are discussed further in Chapter 2, Section 2.4.

[2] The oesophagus is anatomically divided based on the position between the pharynx and stomach. The upper portion is about eight inches long and extends from the pharynx (at the top) to the lower portion, which is called the oesophagogastric junction (OGJ) and refers to the area that connects to the oesophagus to the stomach. The oesophagus is comprised of four layers: the innermost layer, mucosa, which comes into contact with digested food and provides mucus which eases the passage of food; the second layer, submucosa, which contains glands that secrete mucus; the third layer, which is comprised of muscle that surrounds the submucosa and propels food through the oesophagus, and the fourth layer, or the adventitia, which covers the oesophagus.

Figure 1.3: Overview of oesophageal cancer – incidence and mortality, risk factors, symptoms, detection and diagnosis, treatment and supportive care needs



Sources: AIHW 2022 Cancer Data in Australia; Insight Economics modelling 2022-2035; See Chapter 2 and Appendix B.

Stomach cancer

The stomach performs a chemical breakdown by means of enzymes and gastric acid to promote food digestion. It is connected to the oesophagus via the oesophagogastric junction, and transfers food into the small intestine (duodenum). It is comprised of five main components, the cardia, fundus, body, the antrum, and the pylorus.

Most stomach cancers are adenocarcinomas which start in the mucosa[3], of which there are two histological variants:[4]

- *Intestinal* – cells which stick together; result of progression from chronic gastritis to atrophic gastritis and finally to intestinal metaplasia and dysplasia
- *Diffuse* – cells which do not stick together, spread over a wide area.

Risk factors vary based on the type of stomach cancer. Stomach cancer of the lower regions of the stomach may follow from H. pylori infection, which is treatable and relatively uncommon in Australia. Risk factors for cancer of the upper stomach include obesity and Gastro-oesophageal reflux disease (GORD). In addition to obesity, lifestyle factors for gastric cancer relate to diet, smoking and alcohol consumption. There are also hereditary conditions which put some families at high-risk of gastric cancer. Risk factors are discussed further in Chapter 2, Section 2.2.

The symptoms of stomach cancer share similar characteristics with oesophageal cancer. There are limited symptoms while in early stages and are ambiguous. Furthermore, once symptoms start developing, they can be severe, and can include vomiting blood, nausea and stomach pain. Symptoms can significantly impair physical status through reduced appetite. Symptoms are discussed further in Chapter 2, Section 2.3.

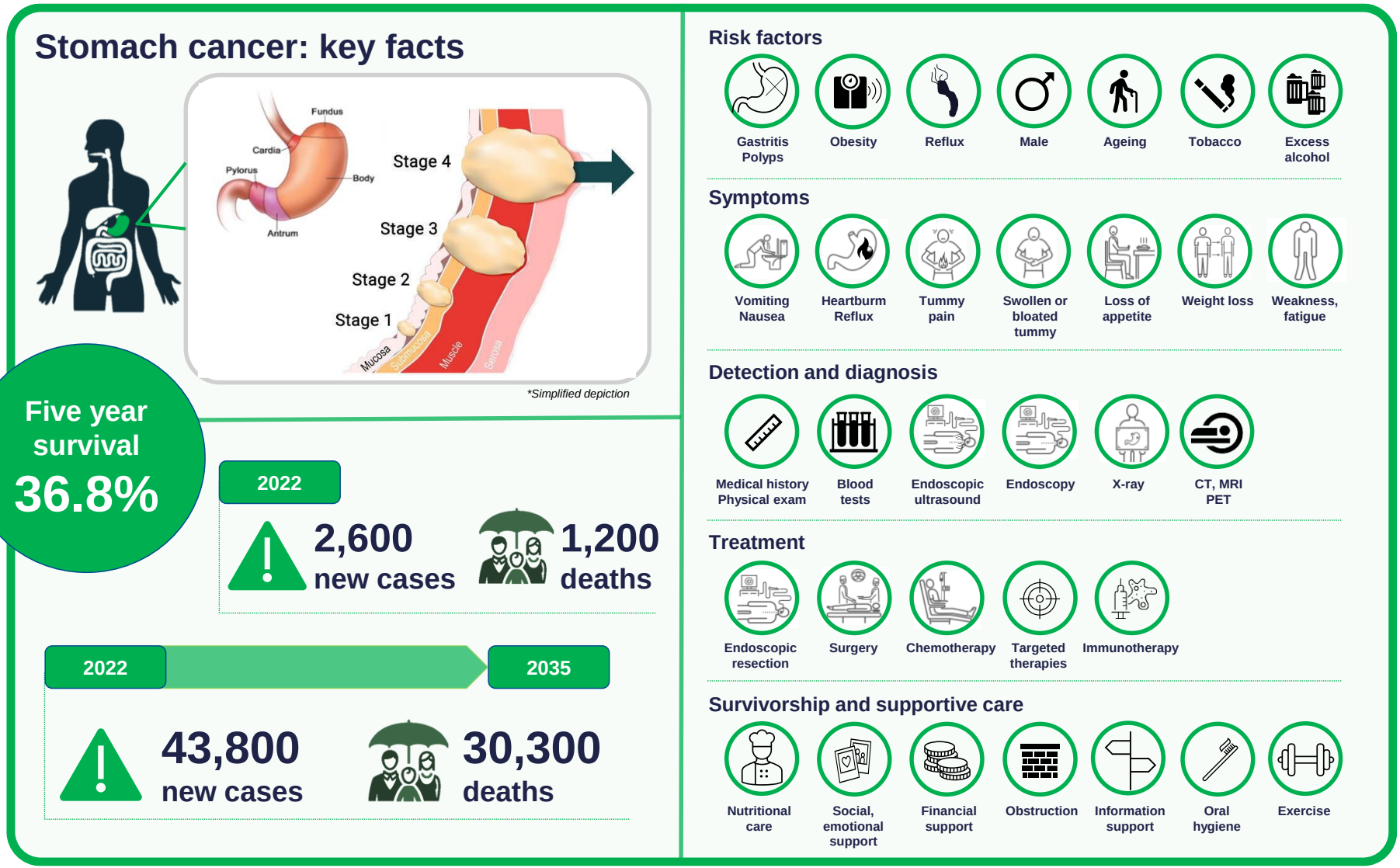
Akin to oesophageal cancer, the 'gold standard' test used to detect stomach cancer is gastroscopy or upper endoscopy. There have been limited alternative tools to detect stomach cancer. Detection and diagnosis are discussed further in Chapter 2, Section 2.4.

Once the cancer is diagnosed, treatments are selected based on cancer stage. For early stage tumours, resection (surgery) remains a curative option. If identified sufficiently early, endoscopic resection is an option, otherwise, surgery involves complete (or partial) removal of the stomach (gastrectomy). Historically, chemotherapy has been used to treat patients with unresectable cancers, with limited success. However, recent trials are indicating that novel therapies may improve outcomes. Treatment is discussed further in Chapter 2, Section 2.4.

Gastrectomy is a complex procedure both for patient and medical team, and can lead to short to complications and long-term impacts (e.g., vitamin deficiencies, bone loss); this means that prehabilitation and rehabilitation are crucial. Where curative treatment is not available, the symptoms of stomach cancer necessitate appropriate management (e.g., dietary). Reflecting the poor prognosis associated with this cancer, family members and carers are often significantly impacted from diagnosis. Survivorship, supportive and palliative care are discussed further in Chapter 2, section 2.4.

[3] The stomach wall has five layers: the mucosa, which is the innermost layer where stomach acid and digestive enzymes are made; the submucosa, which is a second layer that supports the mucosa; the muscle or muscularis propria, which is a third layer of muscle that helps move and mix stomach contents; the subserosa and serosa, which are the outer and outermost layers, respectively, that wrap the stomach.
[4] Hopkins Medicine website, available: https://www.hopkinsmedicine.org/gastroenterology_hepatology/_pdfs/esophagus_stomach/gastric_cancer.pdf.

Figure 1.4: Overview of stomach cancer – incidence and mortality, risk factors, symptoms, detection and diagnosis, treatment and supportive care needs



Sources: AIHW 2022 Cancer Data in Australia; Insight Economics modelling 2022-2035; See Chapter 2 and Appendix B.

Biliary cancer

The bile ducts allow bile to travel between the liver and the small intestine. Cancer of the bile ducts is called cholangiocarcinoma (CCA) and is classified depending on which part of the bile duct the cancer develops in:

- *Intrahepatic CCA (iCCA)* occurs in the intrahepatic bile ducts, which are small tubes which carry bile *inside* the liver; iCCA is commonly grouped with liver and treated in a similar manner
- *Extrahepatic CCA (eCCA)* occurs in the extrahepatic bile ducts, which are bile ducts outside the liver, and is further sub-typed into:
  - *Hilar CCA (hCCA)*, which is sometimes referred to as *perihilar CCA (pCCA)*, and occurs in the bile ducts outside the liver that span from the liver to the cystic duct
  - *Distal CCA (dCCA)* or 'common bile duct' CCA, which occurs in the bile ducts outside of the liver that span from the cystic duct to the ampulla of Vater.

Mixed forms of cholangiocarcinoma are considered an independent entity (mixed hepatocellular carcinoma - cholangiocarcinoma tumours); these are rare and can be relatively aggressive and associated with an especially poor prognosis.[5] Cancer occurring in multiple locations is called multifocal bile duct cancer.

The other related forms of cancer are gallbladder cancer (GBC) and ampullary cancer.[6]

Different forms of cholangiocarcinoma have different risk factors, pathobiology, clinical presentations, management and prognosis.

There are various risk factors for developing cholangiocarcinoma. In addition to liver fluke infection, which is a well recognised risk factor but uncommon in Australia, risk factors include biliary conditions such as sclerosing cholangitis, liver damage and hepatitis, as well as lifestyle choices, such as tobacco and/or alcohol consumption, obesity and exposure to some hazardous substances. Risk factors are discussed further in Chapter 2, Section 2.2.

The symptoms of biliary cancer are extremely limited in early stages, and when they show are both ambiguous and severe (reflecting late stage of diagnosis). A notable symptom which reflects blockage of bile ducts is jaundice. Symptoms are discussed further in Chapter 2, Section 2.3.

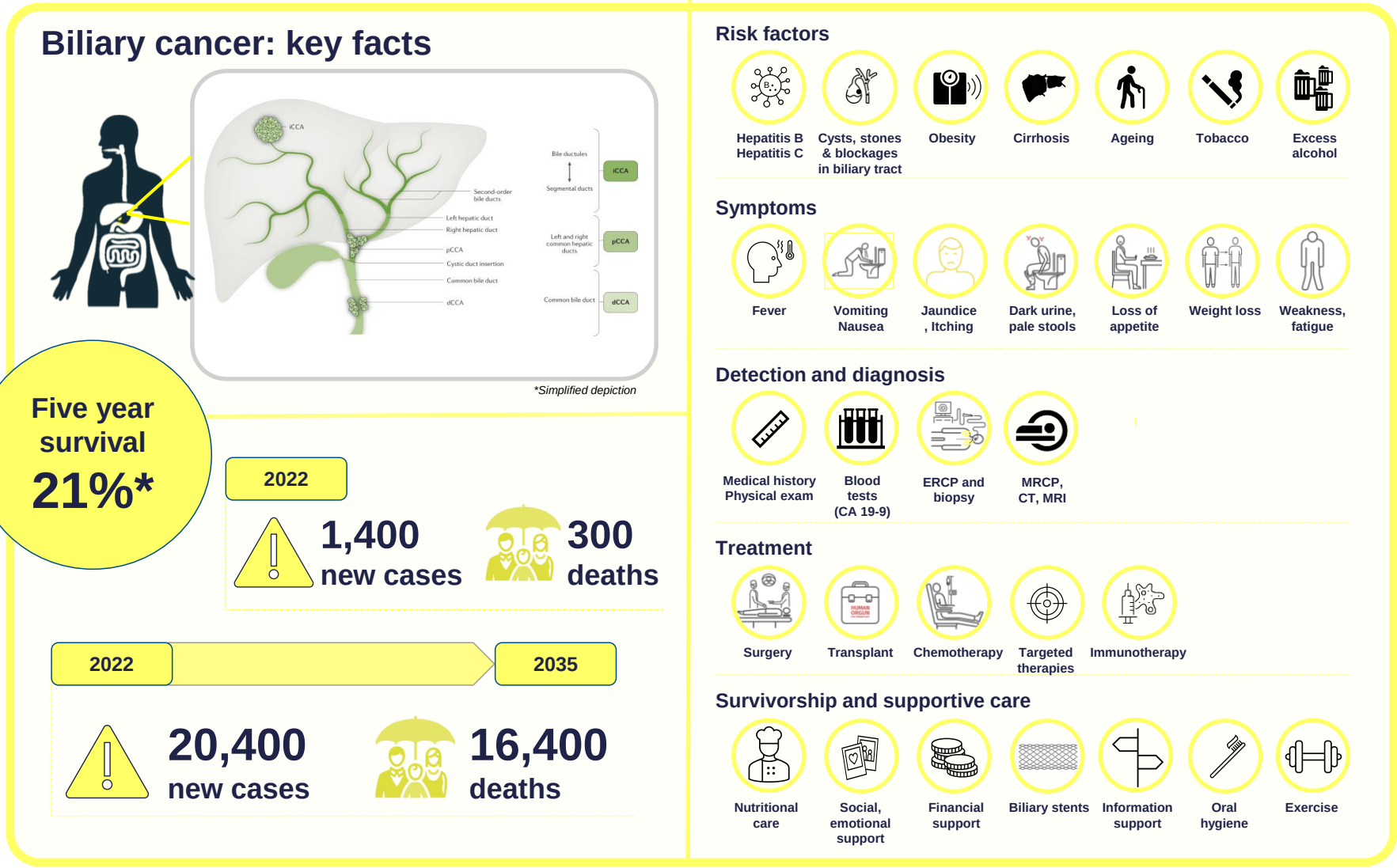
Biliary cancer is diagnosed via an array of tests, including diagnostic imaging (including endoscopic ultrasound), biopsy and a limited number of biomarkers. Detection and diagnosis are discussed further in Chapter 2, Section 2.4.

Once biliary cancer is diagnosed, treatments are selected based on cancer stage. For early stage tumours, resection (surgery) remains a curative option; here, portions of the bile duct, gallbladder and nearby organs may be removed, with the remnants connected back together. iCCA is often treated in a similar manner to liver cancer. Treatment is discussed further in Chapter 2, Section 2.4.

Survivorship, supportive and palliative care are discussed further in Chapter 2, Section 2.4.

[5] Banales, J.M., Marin, J.J.G., Lamarca, A. et al., 2020, Cholangiocarcinoma 2020: the next horizon in mechanisms and management, Nat Rev Gastroenterol Hepatol, 17, 557–588, https://doi.org/10.1038/s41575-020-0310-z.
[6] The gallbladder holds bile and the ampulla of vater is where the common bile duct is joined by the pancreatic duct and meets the duodenum.

Figure 1.5: Overview of biliary cancer – incidence and mortality, risk factors, symptoms, detection and diagnosis, treatment and supportive care needs



Note: (*) Calculated as incidence weighted average of AIHW survival rate data for ampullary cancer, extrahepatic biliary cancer, gallbladder cancer, and cancers of overlapping and unspecified sites in biliary tract. Sources: AIHW 2022 Cancer Data in Australia; Insight Economics modelling 2022-2035; See Chapter 2 and Appendix B.

Liver cancer – Hepatocellular carcinoma (HCC)

The liver performs an array of functions within the body, including the filtration of blood coming from the digestive tract, the detoxification of chemicals and metabolisation of drugs and the creation of proteins. In performing these functions, it also produces bile that is distributed via the bile ducts to the small intestines.

Although there are numerous types of primary liver cancer, the most common type is hepatocellular carcinoma (HCC).[7] Because intrahepatic bile ducts are within the liver, these are also often classified as a type of primary liver cancer.

There are various known risk factors for developing hepatocellular carcinoma. These include chronic infection with the hepatitis B virus (HBV) or hepatitis C virus (hepatitis C), cirrhosis (progressive and irreversible scarring), and nonalcoholic fatty liver disease (NAFLD), which includes nonalcoholic steatohepatitis (NASH), as well as preventable risk factors such as obesity and excess alcohol consumption. Importantly, many of these risk factors can be treated and/or mitigated if identified early. Risk factors are discussed further in Chapter 2, Section 2.2.

The symptoms of hepatocellular carcinoma are limited in early stages, and when they show may be ambiguous. When they do emerge, symptoms include weight and appetite loss, abdominal pain, jaundice and nausea and vomiting. Symptoms are discussed further in Chapter 2, Section 2.3.

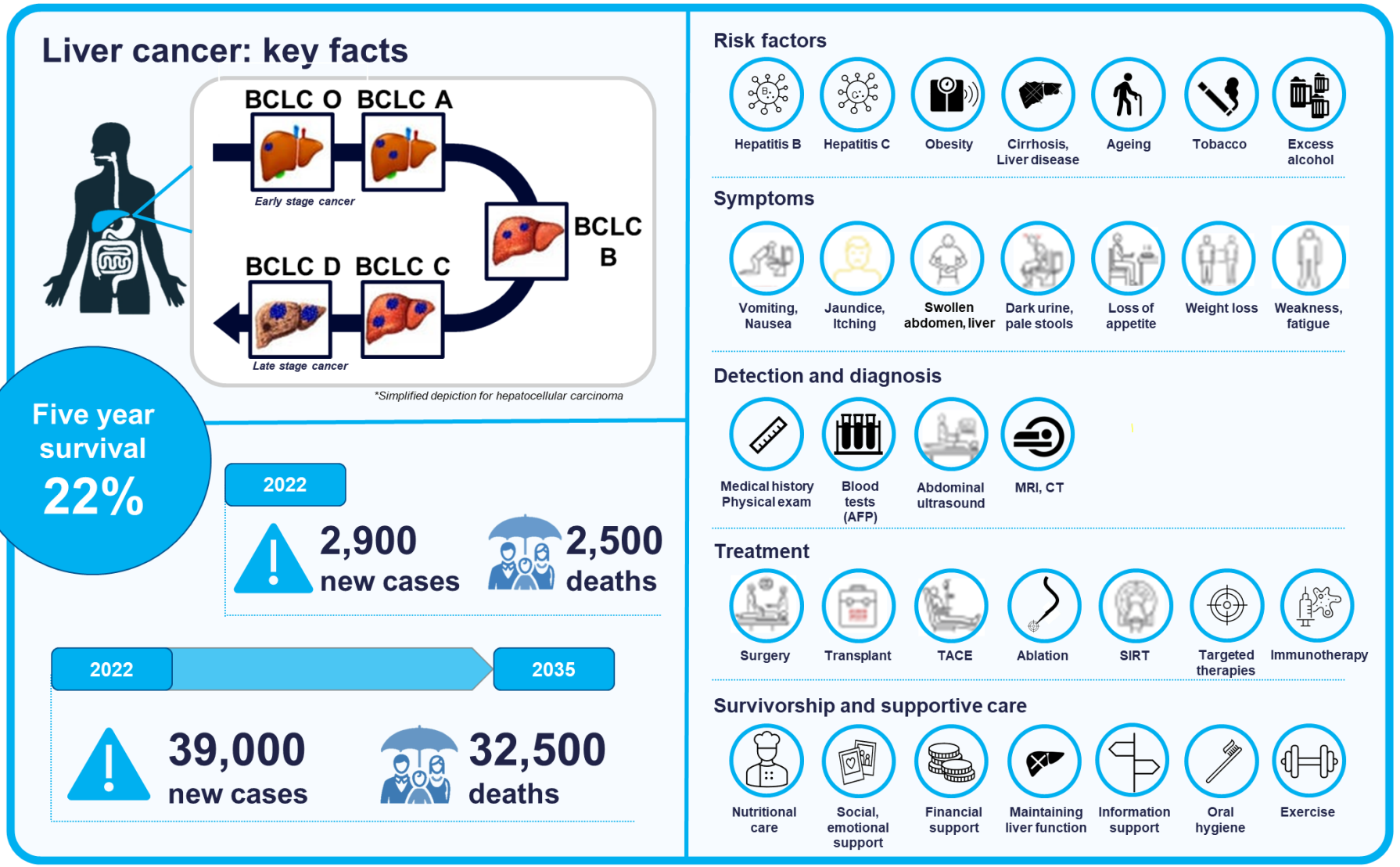
Hepatocellular carcinoma is most commonly diagnosed via adnominal ultrasound with or without a tumour marker called alpha-fetoprotein (AFP). However, as abdominal ultrasound may be of limited effectiveness in obese patients or patients with cirrhotic livers, additional tools may be used to support diagnosis, including magnetic resonance imaging (MRI). Historically, diagnosis has not required liver biopsy and so this is not common practice in Australia today. Detection and diagnosis are discussed further in Chapter 2, Section 2.4.

Once hepatocellular carcinoma is diagnosed, treatments are selected based on cancer stage. There is a vast array of possible treatments, which can be adopted based on tumour progression. A further constraint on treatment selection is liver condition, which is often poor due to associated liver diseases. If hepatocellular carcinoma is detected early, ablation, resection or liver transplant are possible options. Advanced cancer is treated with targeted therapies and/or immunotherapy; these treatments reflect breakthroughs that have been made in the last 15 years. Treatment is discussed further in Chapter 2, Section 2.4.

Critically, a damaged liver results in a patient often presenting as severely unwell and can lead to numerous complications to treatment, including difficulty absorbing nutrients and varices (enlarged or swollen veins). This complicates provision of supportive care following treatment. Reflecting the poor prognosis associated with hepatocellular carcinoma, family members and carers are also often significantly impacted from diagnosis. Survivorship, supportive and palliative care are discussed further in Chapter 2, Section 2.4.

[7] For example, fibrolamellar hepatocellular carcinoma (FLHC).

Figure 1.6: Overview of liver cancer – incidence and mortality, risk factors, symptoms, detection and diagnosis, treatment and supportive care needs



Note: Staging consistent with hepatocellular carcinoma staging system. Sources: AIHW 2021 Cancer Data in Australia; Insight Economics modelling 2022-2035; See Chapter 2 and Appendix B.

Pancreatic cancer

The pancreas is a gland that sits behind the stomach. It produces enzymes that help digestion and hormones that help regulate blood sugar. The pancreas is comprised of four general regions: the head, neck, body and tail. The pancreatic duct joins the pancreas to the common bile duct, enabling the supply of pancreatic juice from the exocrine pancreas, which aid digestion.

Although pancreatic cancer can occur in any part of the pancreas, it most frequently arises in the head of the pancreas. Exocrine tumours make up more than 95 per cent of pancreatic cancers. The most common subtype, an adenocarcinoma, starts in the cells lining the pancreatic duct. Pancreatic neuroendocrine tumours (NETs), which start in the endocrine cells, make up the remaining 5 per cent.

There are various known risk factors for developing pancreatic cancer, including aging, being male, race, diabetes, family history, familial conditions (e.g., hereditary pancreatitis, Peutz-Jeghers syndrome), genetic mutations (e.g., KRAS2 and TP53) and lifestyle factors (smoking, obesity, poor diet and alcohol). People with a strong family history of pancreatic cancer and related hereditary conditions are at high-risk; high-risk populations can be monitored using endoscopic ultrasounds and blood tests (CA 19-9, carcinoembryonic antigen and liver biochemistry).

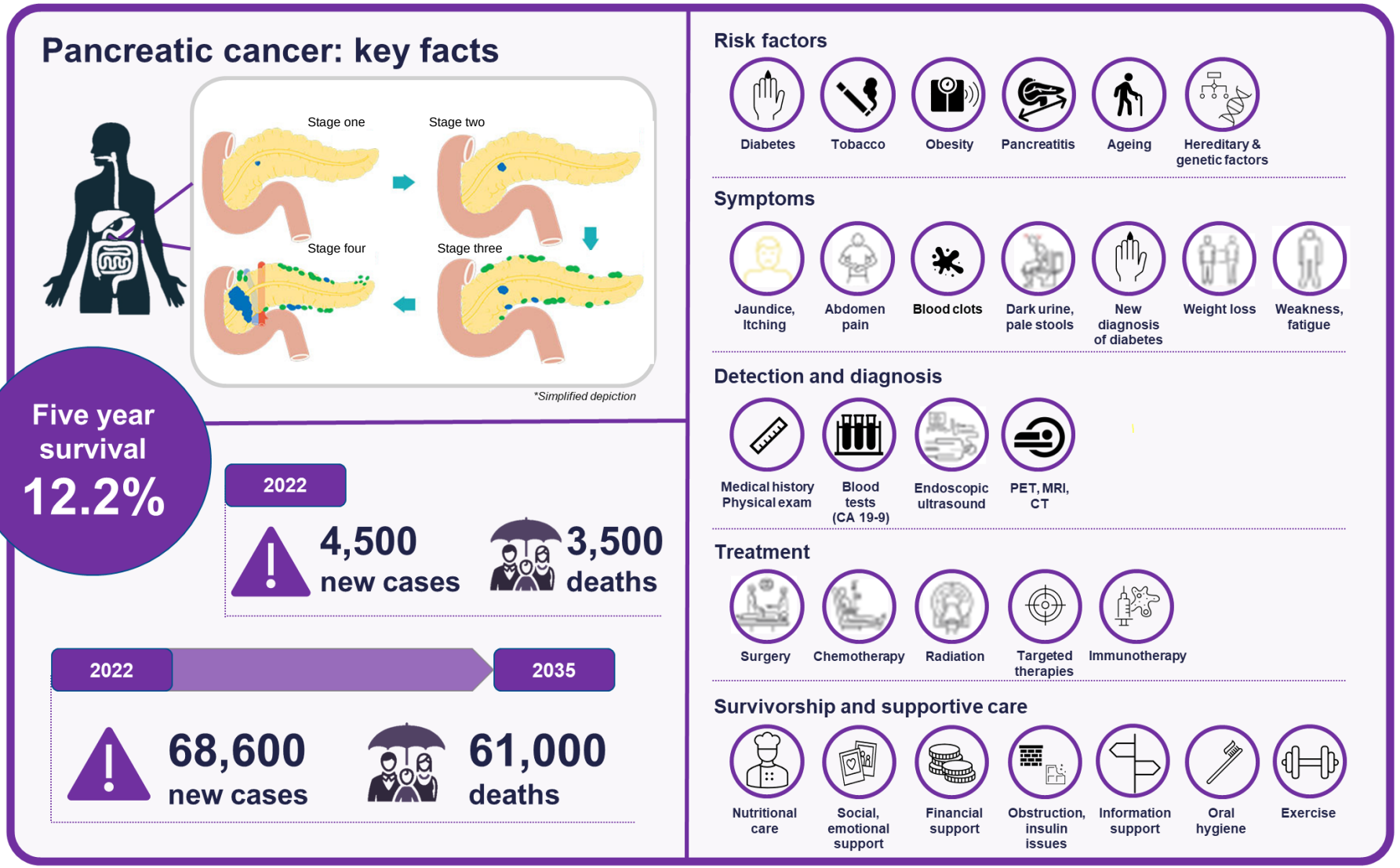
The symptoms of pancreatic cancer are limited in early stages, and when they show may be ambiguous. When they do emerge, symptoms include weight and appetite loss, sudden onset diabetes, blood clots, gallbladder or liver enlargement and nausea and vomiting.

There are various means by which a pancreas cancer is diagnosed. Initial investigations include abdominal computed tomography (CT) scans with pancreatic protocol, serum CA 19-9 and liver function tests. Where jaundice is present, liver function tests, abdominal ultrasound and CT should be performed urgently. For diagnosis and staging, biopsy is only required where there is diagnostic uncertainty, or for research and/or management purposes.

Once pancreatic cancer is diagnosed, treatments are selected based on type and stage. The most common form of surgery for resectable cancer is the Whipple procedure, which involves the removal of the head (and possibly body) of the pancreas – as well as nearby structures (if needed). This operation is very complex and carries relatively high-risk of complication. For unresectable cancers, other forms of treatment include systemic therapies such as immunotherapies (e.g., pembrolizumab) and chemotherapy, and targeted therapies (e.g., EGFR inhibitor, PARP inhibitor or NTRK inhibitors).

The consequence of pancreatic cancer and its treatment often includes weight loss and weakness from poor nutrition; surgery can impact hormone production which influences regulation of blood sugars.

Figure 1.7: Overview of pancreatic cancer – incidence and mortality, risk factors, symptoms, detection and diagnosis, treatment and supportive care needs



Sources: AIHW 2021 Cancer Data in Australia; Insight Economics modelling 2022-2035; See Chapter 2 and Appendix B.

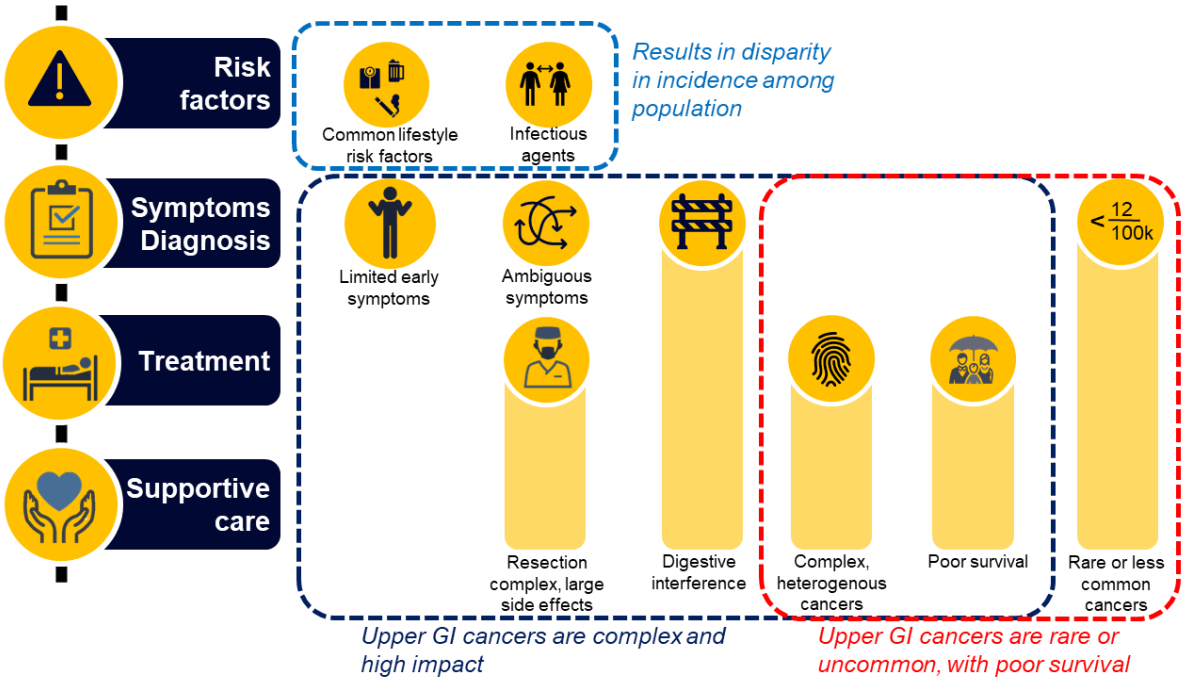
1.2 Shared features across upper GI cancers: severe side effects, complex and extreme treatment, poor survival and significant disparity in outcomes for disadvantaged groups

While upper GI cancers are diverse in terms of their biology and treatment options, they share a number of key features which contribute to the poor outcomes observed in Australia today; in addition to limited and vague symptoms in the early phases of disease, other shared features to upper GI cancers include:

- Severe side effects and poor quality of life
- Complex treatment often with high impacts for patients and their families, as well as the broader healthcare system
- Lowest survival outcomes of any cancer group
- Significant disparities for disadvantaged communities, have both higher incidence rates of upper GI cancers as well as substantially poorer outcomes, stemming from increased underlying risks for these patients as well as higher barriers to timely treatment and supportive care.

Figure 1.8 below summarises these features.

Figure 1.8: Summary of complicating characteristics of upper gastrointestinal cancers



Upper GI cancer patients are often severely unwell

Symptoms of upper GI cancers are often ambiguous and limited in early stages, which hinders early detection and diagnosis.

By nature of the role of the organs and ducts involved in the upper gastrointestinal tract, cancers can cause blockages and disrupt digestive processes. Therefore, in addition to cancer cells consuming more energy than normal cells, the combination of symptoms and blockages

can promote dramatic weight loss and malnutrition; indeed, malnutrition affects up to 80 per cent of pancreatic, oesophageal and stomach cancer patients.[8] For example:

- Trouble swallowing associated with oesophageal cancer can impair nutrition intake
- Feeling of fullness associated with stomach cancer (and pancreatic cancer which can press against the stomach) can reduce desire to eat, and result in nausea and vomiting
- Jaundice associated with liver, pancreatic and biliary cancers can limit ability to absorb fat and nutrients from digested foods.

Moreover, liver cancer often arises is the context of cirrhosis and liver disease, which further contributes to poor patient health and quality of life. For example, cirrhosis may impair processing of nutrients, and result in an inability to clear toxins from the blood. These issues may necessitate the use of medical interventions such as stents and dietary supplements/enzymes.

There are various additional complications which relate to these cancers. For example, in cirrhotic livers, increased pressure within the vein which carried blood from digestive organs to the liver (portal hypertension), can cause large veins (varices), which can bleed easily.

Treatment is complex with extreme impacts for patients and their families

Removal of these cancers often involves complex procedures to remove part or all of the relevant organ or duct. These procedures often come with high-risks of postoperative complications resulting in prolonged hospital admission and reduced quality of life.[9] To illustrate, one study of complications of oesophagectomy and gastrectomy at a major hospital highlighted that:[10]

- 58.8 per cent of patients undergoing oesophagectomy had complications, with 36.8 per cent having a respiratory complication and 33 per cent having an anastomotic leak
- 51.6 per cent of patients undergoing gastrectomy had complications, with 34.5 per cent having an anastomotic leak.

While curative treatment may eventually improve health, it can have large impacts on lifestyle, particularly diet related:

- Most patients who undergo gastrectomy experience a significant decline in overall health, physical and functional domains of health-related quality of life (HRQoL) within the first few months after surgery, followed by significant improvements by one year to at least baseline levels[11]
- After resection for stomach or oesophageal cancer, swallowed food may pass more quickly into the intestine, which can cause diarrhea, sweating, and flushing after eating (dumping syndrome)

[8] Deftereos, I., et al., 2020, A systematic review of the effect of preoperative nutrition support on nutritional status and treatment outcomes in upper gastrointestinal cancer resection, European Journal of Surgical Oncology, 46(8), 1423-1434, doi: 10.1016/j.ejso.2020.04.008.
[9] Zhou, J., Hiki, N., Mine, S., et al., 2017, Role of prealbumin as a powerful and simple index for predicting postoperative complications after gastric cancer surgery, Ann Surg Oncol, 24, 510–7, doi:10.1245/s10434-016-5548-x.
[10] Burton, P.R., Ooi, G.J., Shaw, K., Smith, A.I., Brown, W.A., Nottle, P.D., 2018, Assessing quality of care in oesophago-gastric cancer surgery in Australia, ANZ J Surg, 88(4), 290-295, doi: 10.1111/ans.13752.
[11] Shan, B., et al., Systematic review on quality of life outcomes after gastrectomy for gastric carcinoma, 2015, Journal of Gastrointestinal Oncology, 6(5), doi: 10.3978/j.issn.2078-6891.2015.046.

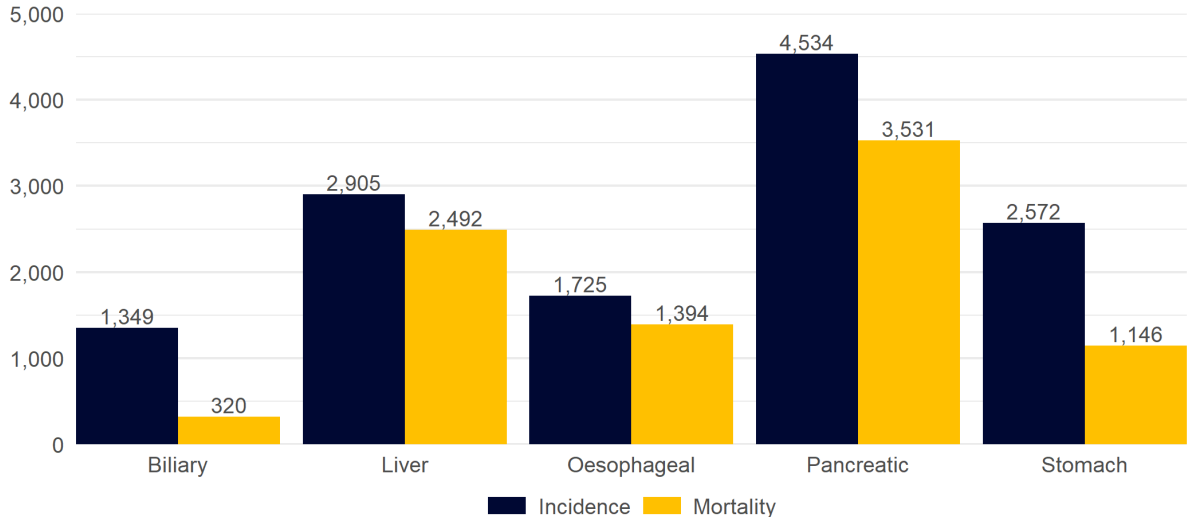
- Removal of the pancreas leads to diabetes, which results in the need to take insulin; it also reduces the body's ability to absorb nutrients, necessitating artificial insulin injections and digestive enzymes.

The interplay of related digestive issues which reduce health, as well as other comorbidities and old age,[12] and complexity of treatment can reduce treatments available. Furthermore, this combines with ambiguous and limited early symptoms to limit the capacity to resect these cancers.

Lowest survival outcomes for any group of cancer

In 2022, approximately 13,100 new cases of upper GI cancer are expected in Australia (Australian Institute of Health and Welfare [AIHW], 2022); excluding pancreatic cancer, just over 8,500 new cases are expected. In Australia, pancreatic cancer is the highest incidence upper GI cancer, followed by liver cancer and stomach cancer.[13] The relative levels of incidence and mortality are illustrated in Figure 1.9.

Figure 1.9: Mortality and incidence counts, by upper gastrointestinal cancer, 2022

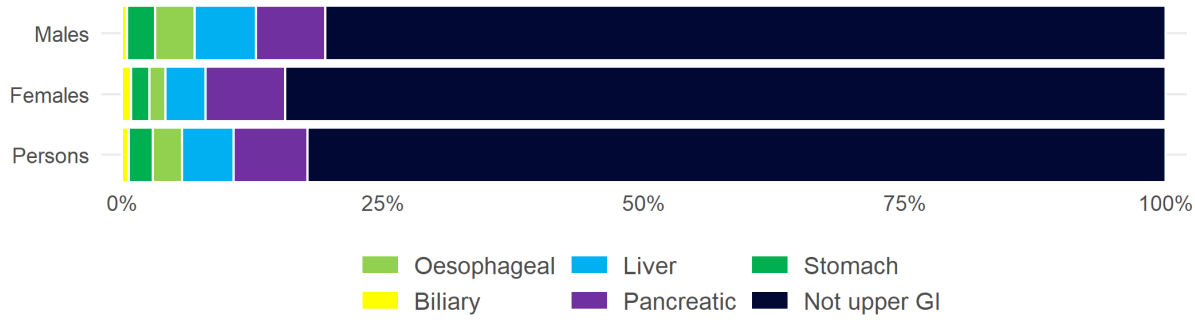


Note: 'Biliary' cancer reflects the aggregation of gallbladder cancer, ampullary cancer, extrahepatic bile duct cancer, gallbladder cancer and cancers of overlapping and unspecified sites in biliary tract. Source: AIHW, Cancer in Australia 2022. Note that mortality data is not necessarily consistent with mortality estimated using five year relative survival rates and incidence (discussed below).

Although upper GI cancers were estimated to account for approximately only 8.2 per cent of cancer incidence in Australia in 2022, they were expected to contribute to approximately 18 per cent of all cancer related deaths (AIHW, 2022). Upper GI cancers are relatively strong contributors to male cancer deaths as opposed to female cancer deaths (19.5 per cent versus 15.6 per cent, respectively).

[12] Maharaj, A.D., Holland, J.F., Scarborough, R.O., et al., 2019, The Upper Gastrointestinal Cancer Registry (UGICR): a clinical quality registry to monitor and improve care in upper gastrointestinal cancers, BMJ Open, doi: 10.1136/bmjopen-2019-031434
[13] Notably, the ICD-10 includes iCCA within liver cancer, thereby interfering with direct comparability of figures.

Figure 1.10: Proportion of mortality by cancer, by sex 2022



Source: AIHW, 2022, Cancer Data in Australia. Note: 'Biliary' cancer reflects the aggregation of gallbladder cancer, ampullary cancer, extrahepatic bile duct cancer, gallbladder cancer and cancers of overlapping and unspecified sites in biliary tract.

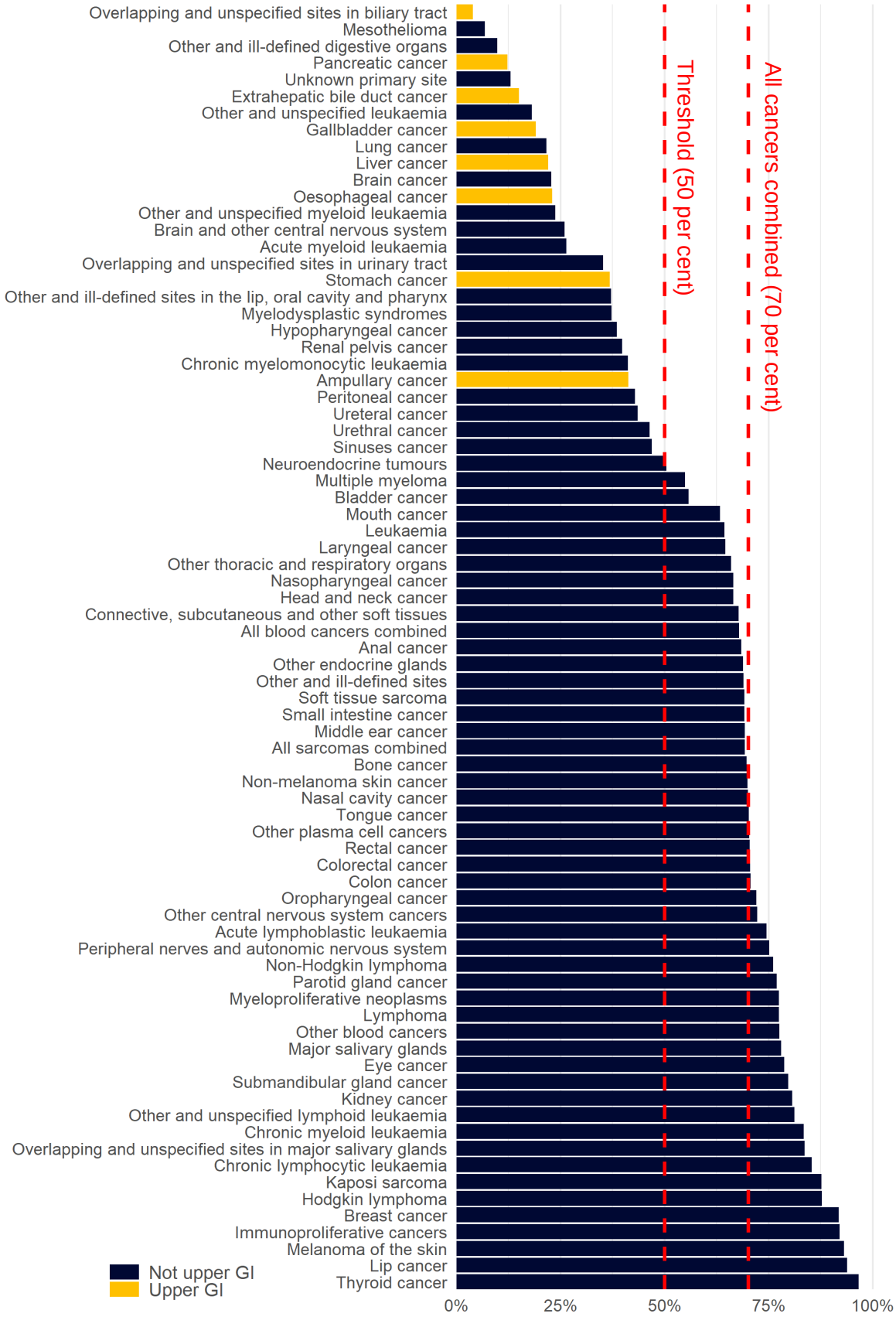
The mortality levels are not driven by relatively high incidence; rather, they are driven by low survival rates. Indeed, the five year relative survival rates for all upper GI cancers (AIHW, 2022) are far below the Australian Senate's threshold for low survival cancers (50 per cent):[14]

- 12.2 per cent – pancreatic cancer
- 21 per cent – biliary cancer[15]
- 22 per cent – liver cancer
- 23 per cent – oesophageal cancer
- 36.8 per cent – stomach cancer.

By consequence, the survival rate for stomach cancer, which has the highest five year relative survival rate of the upper GI cancers (36.8 per cent), is over 10 percentage points lower than the average five year survival rate for cancer observed in the period 1982-1987 (47 per cent).

[14] Five year survival rates presented by the AIHW are based on 2013-2017 data.
[15] Calculated as the 2014 incidence weighted average of AIHW survival rate data for ampullary cancer (five year survival rate of 41.3 per cent; 2014 incidence 173 cases), extrahepatic bile duct cancer (five year survival rate of 15 per cent; 2014 incidence 279 cases), gallbladder cancer (five year survival rate of 19.1 per cent; ; 2014 incidence 343 cases) and cancers of overlapping and unspecified sites in biliary tract (five year survival rate of 3.9 per cent; 2014 incidence 92 cases)

Figure 1.11: 5 year relative survival rates, upper gastrointestinal and other cancers



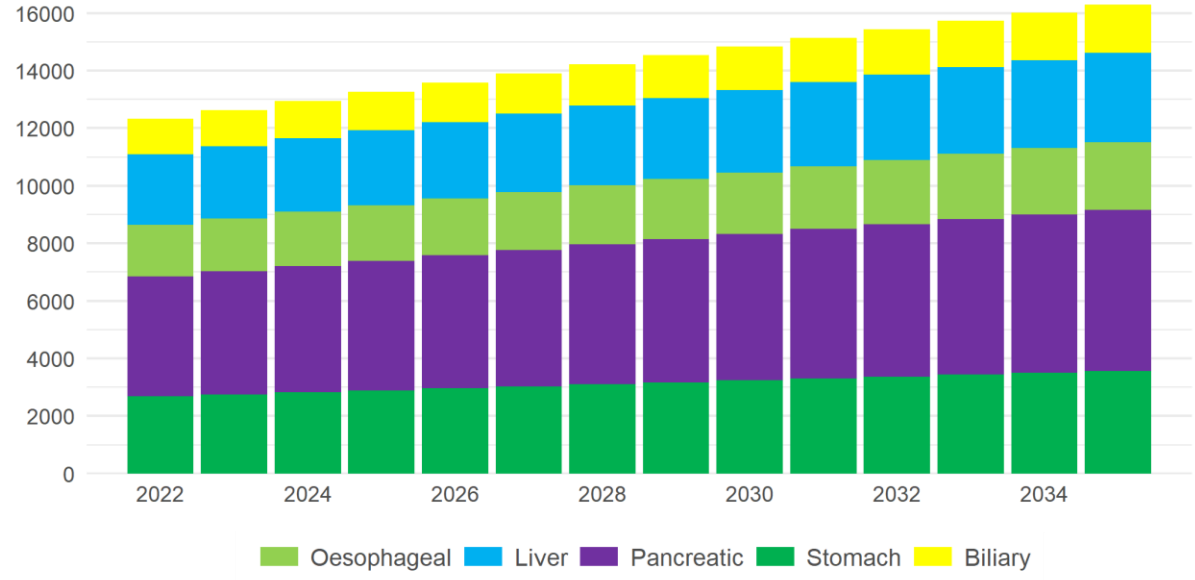
Note: 'Threshold' refers to the Australian Senate's threshold for low survival cancers of 50 per cent. Source: AIHW, Cancer in Australia 2022. Survival rates are based on 2014-2018 data.

Over time, these poor survival rates are expected to contribute to significant mortality in Australia's communities. For example, between 2022 and 2035 (inclusive) over 200,000 new cases of upper GI cancer are projected (see Appendix B), comprising:

- Over 68,600 new cases of pancreatic cancer
- Close to 39,000 new cases of liver cancer
- Close to 43,800 new cases of stomach cancer
- Over 29,000 new cases of oesophageal cancer
- Over 20,400 new cases of biliary cancer.

The estimated number of cases of upper GI cancers, for women and men, are depicted in Figure 1.12.

Figure 1.12: Incidence forecast, 2022 to 2035



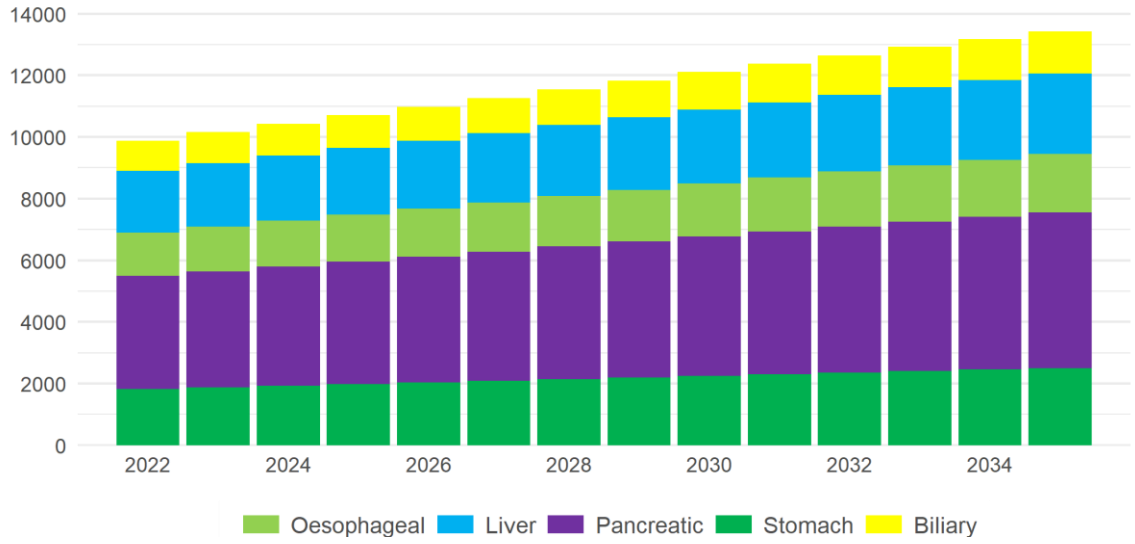
Source: Insight Economics modelling, See Appendix B.

As a result of the poor survival outlook for these patients, approximately 163,000 deaths due to upper GI cancer are projected over that same time horizon (2022-2035), comprising:

- Over 61,000 deaths due to pancreatic cancer
- Over 32,500 deaths due to liver cancer
- Over 30,000 deaths due to stomach cancer
- Over 23,000 deaths due to oesophageal cancer
- Over 16,400 deaths due to biliary cancer.

The estimated number of cases of upper GI cancers, for women and men, are depicted in Figure 1.13.

Figure 1.13: Mortality forecast, 2022 to 2035



Source: Insight Economics modelling, See Appendix B.

The number of deaths estimated using the cohort model can diverge substantially from those presented by the AIHW. This occurs for biliary cancer and stomach cancer, for which the model estimated number of deaths from biliary cancer in 2021 is 956 (relative to 302) and the number of deaths from stomach cancer in 2021 is 1,700 (relative to 1,141). This issue it well recognised, with possible causes including: variations in classification over time, attribution of mortality to other cancer International Classification of Diseases (ICDs) and attribution of mortality to other non-cancer ICDs.

Significant disparities present across the Australian population

Upper GI cancers are relatively prevalent within subgroups of the Australian population. These populations overlap with those which face issues accessing the Australian healthcare system (Table 1.1), i.e., due to stigma, lack of education and awareness, and cultural differences.

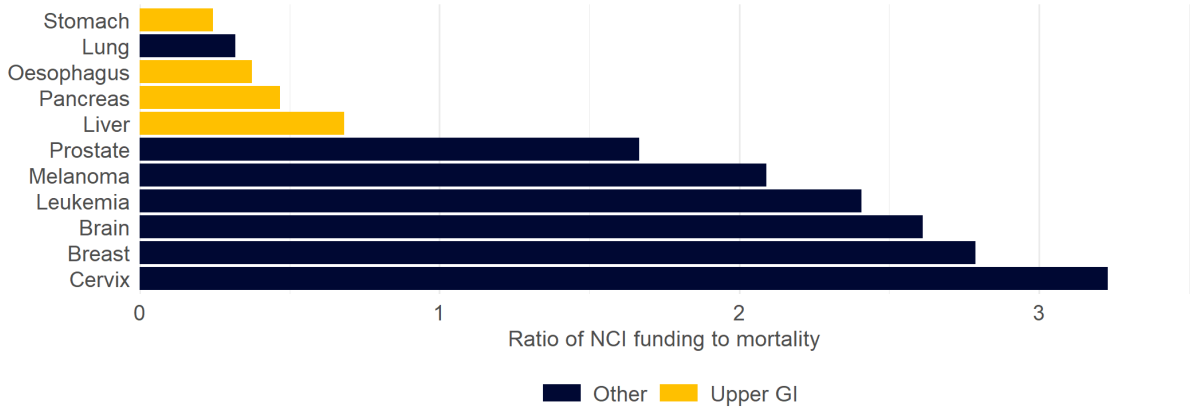
Table 1.1: Groups at-risk of developing upper gastrointestinal cancers

Group	Note
Men	Men are more often diagnosed with liver, stomach and oesophageal cancer.
Low socioeconomic status (SES)	Corresponding with distribution of lifestyle risk factors, low SES populations are disproportionately affected by a subset of upper GI cancers, particularly liver and oesophageal cancer.
Indigenous Australians	Indigenous Australians face dramatically higher rates of a subset of upper GI cancers, particularly liver cancer.
Migrants from endemic regions (culturally and linguistically diverse)	While Australia has limited prevalence of infectious agent risk factors (e.g., hepatitis B and H. pylori), these are endemic in Asian and African countries. The implication of this is that higher rates of selected upper GI cancers are observable within some migrant populations – particularly liver cancer.

1.3 Investment and reform needed to improve outcomes for low survival cancers

Despite the poor survival outcomes plaguing upper GI cancers, research funding for these cancers has been historically low. Funding for upper GI cancer research has lagged behind other cancers with higher rates of incidence. This is a product of their relative rarity and complexity, which has limited commercial and government incentives for investment in research and development compared to other cancers. For example, analysis of National Cancer Institute (NCI) funding highlighted the challenges related to underfunding of some cancers given their poor survival outcomes (Figure 1.14).

Figure 1.14: Historical underfunding of upper gastrointestinal cancers



Source: Carter, A.J., Nguyen, C.N., 2012, A comparison of cancer burden and research spending reveals discrepancies in the distribution of research funding, BMC public health, 12(526), doi: 10.1186/1471-2458-12-526.

Further review of National Cancer Institute funding over the period spanning 1996 to 2018 (Table 1.2) indicates considerable discrepancy in funding for upper GI cancers research and funding for other selected cancers. For example, over the period spanning 1996 to 2018:

- Funding for breast cancer research was 3.1 times funding for **all** upper GI cancers
- Funding for prostate and colorectal cancer research was over 1.4- and 1.3-times funding for **all** upper GI cancers, respectively.

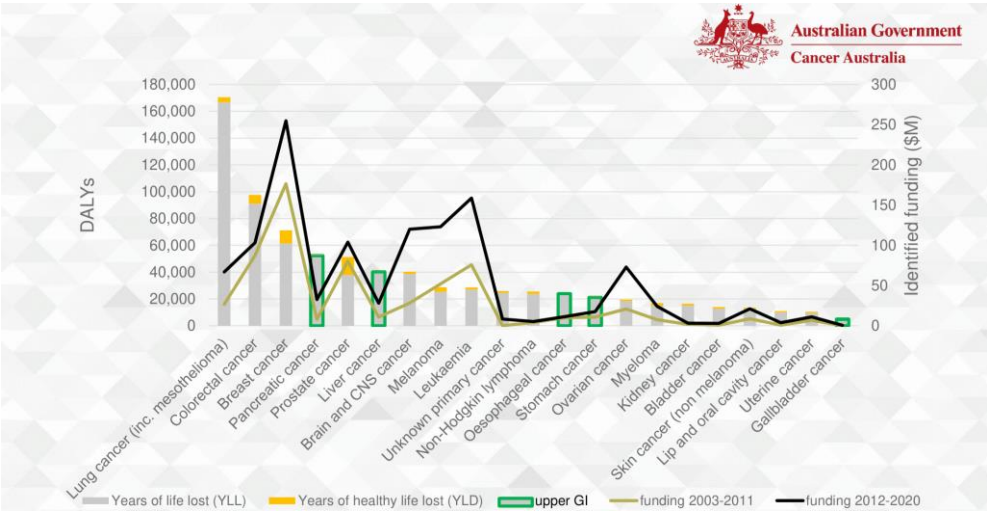
Table 1.2: Historical funding for selected cancers ($million), National Cancer Institute (United States)

Funding by cancer type	1996-2018	2000-2018	2010-2018
Upper GI cancer			
Liver	$1,411	$1,266	$641
Stomach	$266	$233	$117
Oesophagus (a)	$340	$340	$266
Pancreas	$1,775	$1,726	$1,164
Total (b)	**$3,791**	**$3,564**	**$2,188**
Other / all cancers			
All cancers	$98,722	$88,648	$47,798
All other cancers (c)	$94,931	$85,084	$45,610
Colorectal	$5,059	$4,584	$2,139
Prostate	$5,477	$5,100	$2,269
Breast	$11,957	$10,571	$5,130

Note: (a) Oesophageal cancer data is not available before 2007 (via National Cancer Institute budget fact book); (b) calculated as the summation of function for cancers of the liver, stomach, oesophagus and pancreas; (c) calculated as funding for all cancers less (b).

In the Australian context, analysis by Cancer Australia within its Research Audit similarly indicates that funding to these cancers remained proportionally low compared with burden of disease (DALYs) on the Australian population (Figure 1.15).

Figure 1.15: Funding against cancer impact



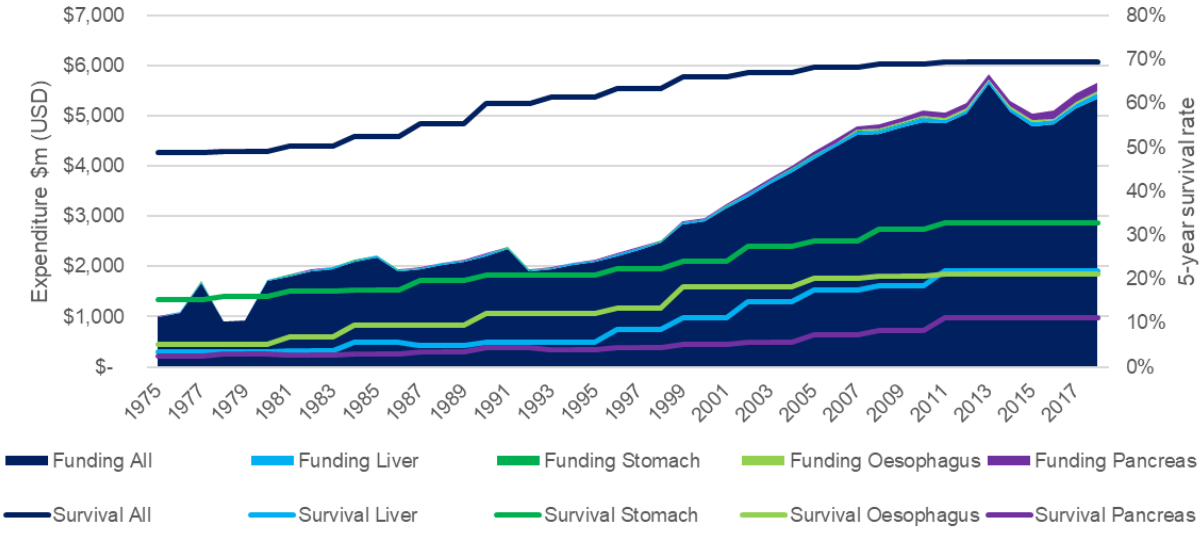
Source: Cancer Australia, 2022, Research Audit.

Unquestionably, investment in cancer research translates into significant improvements in survival. Survival rates across all cancers improved by approximately 42 per cent between 1975 and 2018; these advances have been realised through significant and sustained funding for high-impact research since the 1970s.

Thus, these persistent low levels of funding for upper GI cancer research have contributed to the poor survival outlook for people diagnosed with upper GI cancers. While many cancers

have seen survival rates substantially improve over the modern cancer research era, upper GI cancers have not (Figure 1.16).

Figure 1.16: Limited funding for upper gastrointestinal cancers in modern cancer era has stifled breakthroughs ($US)



Note: Biliary cancer is excluded from this figure due to insufficient data. Source: National Cancer Institute (NCI) Budget Factbook Archives 1975-2017, accessed at www.cancer.gov.au/about-nci/budget/factbook/archive. NCI SEER, 2016, Age-Adjusted SEER Incidence and U.S. Death Rates and 5-Year Relative Survival (Percent); Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov).

The need for increased research funding to address low survival cancers has been increasingly recognised by developed nation governments; for example:

- In the United States, for example, the Federal government passed legislation in 2012 mandating public investment in research to improve survival for so-called 'recalcitrant' cancers with a relative survival of less than 50 per cent.
- In 2017, Australia's Senate Select Committee similarly recommended that the Australian Government develop a comprehensive, Australia-wide strategy to address low-survival cancers, with the explicit goal of increasing the 5-year survival rates for those cancers to above 50 per cent by 2027.[16]

While the Australian Government has provided some funding for upper GI cancers since the release of the Senate Select Committee recommendations, investment to improve outcomes for patients with upper GI cancers falls short of the national approach called for by the Senate Select Committee. This stands in contrast to the approach and funding provided for other, similarly high-risk and rare cancers, such as the ZERO Childhood Cancer project which has seen a systematic, national approach deliver significant improvements in treatment and health outcomes for children and young adults with similarly complex, high-risk cancers.

[16] Senate Select Committee, 2017, *Funding for Research into Cancers with Low Survival Rates*.

1.4 Purpose of this report

This report seeks to bring together evidence of the challenges and potential benefits from addressing these challenges through a nationally coordinate plan for policy reform and investment. In light of the recent development of a National Pancreatic Cancer Roadmap, this report seeks to explicitly link to that strategy, and includes an implementation plan that follows the model set out by Cancer Australia to enable efficiencies in reform efforts.

This report also seeks to inform the development of the Australian Cancer Plan, with an identification of the shared and specific needs of upper GI cancer patients within a broader cancer reform agenda.

Figure 1.17: Context of this report

1.5 Method and structure of this report

The report was commissioned by Pancare Foundation in mid-2021. It presents the synthesis of evidence developed through five key avenues:

- *Literature and data review* – A comprehensive literature and data review, including information around trends in survival, investment and outcomes
- *Stakeholder consultations* – Interviews with 51 stakeholders, including Australian and international patients and carers, government, non for profits, researchers and clinicians
- *Surveys* – A patient and carer survey, seeking to obtain information about patient and carer experiences and their thoughts on challenges and opportunities moving forward, and a researcher and clinician survey, seeking to obtain their opinions on possible challenges and opportunities moving forward
- *Research Audit* – A review of research projects undertaken by Australian research institutions, including analysis of historical research funding and topics of focus

The remainder of this report is structured as follows:

- Chapter 2 provides a description of risk factors, symptoms, staging and treatment of upper GI cancers
- Chapter 3 summarises and benchmarks Australian incidence, mortality and risk factors against international comparator countries
- Chapter 4 summarises key evidence of the major challenges in upper GI cancers based on a synthesis of the stakeholder consultations, literature and data review, survey responses, and research audit
- Chapter 5 summarises key evidence of the major opportunities and associated expected benefits from policy reforms and investments based on a synthesis of the stakeholder consultations, literature and data review, survey responses, and research audit
- Chapter 6 outlines a vision and goals statement for upper GI cancers, as well as a plan for implementation including key 2-year, 5-year and 10-year activities and performance targets
- Appendix A provides a summary of care pathways for each cancer
- Appendix B outlines the key assumptions for incidence and mortality projections
- Appendix C provides a summary of the survey work
- Appendix D details the Research Audit
- Appendix E summarises the stakeholder consultation process
- Appendix F provides a glossary and list of acronyms
- Appendix G provides a bibliography for the report.

Chapter 2

Understanding upper gastrointestinal cancers: risk factors, symptoms, staging. treatment and supportive care

This chapter lays the foundation for a more in-depth discussion of the challenges and opportunities facing people diagnosed with liver, biliary, stomach and oesophageal cancers by first establishing the major risk factors, signs and symptoms, staging and treatment pathways and supportive care needs for each cancer.

Key Findings:

- **Risk factors vary by cancer and include lifestyle factors, infectious agents, medical conditions and other factors; some of these risk factors are treatable, which enables secondary prevention**
- **Signs and symptoms of disease are often limited in early stages and ambiguous**
- **Detection and diagnosis varies by cancer; while no population screening program exists, surveillance is recommended for some at risk cohorts**
- **Treatment includes systemic therapies, which include chemotherapy, targeted therapies and immunotherapies, as well as surgical and precision therapies; decisions should be reviewed by a multidisciplinary team**
- **Reflecting severity of disease and treatment, high quality supportive care is needed throughout the upper GI cancer patient journey.**

2.1 Overview and chapter structure

Upper GI cancers share a number of key similarities related to risk and treatment pathways: all upper GI cancers occur within the digestive system and therefore interfere with the patients' ability to digest and absorb ingested nutrients. These cancers also share some common risk factors, including in the main obesity, overconsumption of alcohol and tobacco smoking. Furthermore, reflecting the important role of these organs, resection (surgery) is complex and patients have significant supportive care needs.

At the same time, there are a number of significant differences between these cancers that require different strategies for prevention, detection, diagnosis, treatment and supportive care. All are biologically distinct and individually complex. This chapter builds on the high level overview provided in Chapter 1 to provide a full summary of the shared and distinct risk factors, signs and symptoms, staging considerations, treatment options and supportive care requirements for liver, biliary, stomach and oesophageal cancers.

The chapter follows the following structure:

- Section 2.2 describes the *risk factors* associated with developing upper GI cancers, with specific reference to lifestyle risk factors, medical conditions, and hereditary or unmodifiable risk factors
- Section 2.3 identifies the *signs and symptoms* of upper GI cancers
- Section 2.4 describes *detection and diagnosis* of upper GI cancers in Australia
- Section 2.5 explains the *stages* of upper GI cancers
- Section 2.6 outlines the *treatment options and supportive care needs* for patients and their families.

2.2 Risk factors

There are numerous factors which increase the risk of upper GI cancer. Reflecting locational and structural variation, these risk factors vary both between and within organs. These risk factors can grouped into the following major categories:

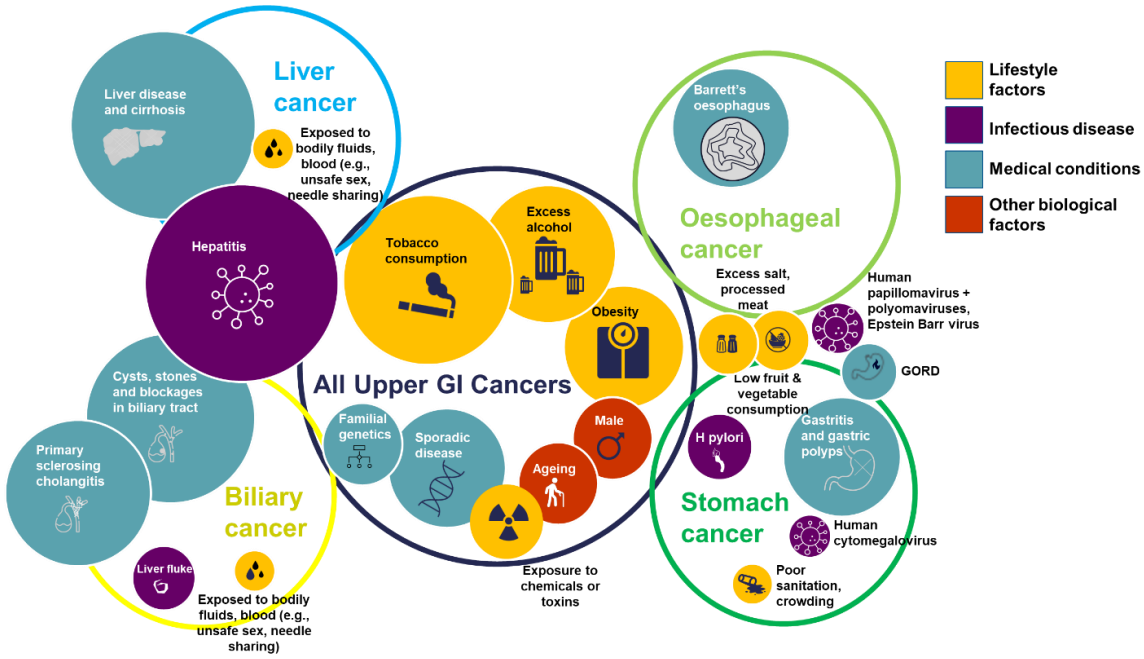
- Lifestyle factors
- Infectious agents
- Medical conditions
- Other risk factors.

The presence (or avoidance) of one of more of these risk factors does not completely confirm (or prevent) the incidence of an upper GI cancer. For example, in many countries, cholangiocarcinoma cases remain sporadic without any identifiable risk factor present.[17]

Figure 2.1 provides a summary of the major risk factors for upper GI cancers across these four major categories of risk (lifestyle choices, infectious disease, medical conditions and other risks. The chart shows the relative magnitude of the risk for each cancer, and as well as whether the risk is common to all upper GI cancers or unique to a particular cancer or subset of cancers.

[17] Banales, J.M., Marin, J.J.G., Lamarca, A. et al., 2020, Cholangiocarcinoma 2020: the next horizon in mechanisms and management, Nat Rev Gastroenterol Hepatol, 17, 557–588, https://doi.org/10.1038/s41575-020-0310-z.

Figure 2.1: Summary of risk factors for upper gastrointestinal cancers



Note: The figure represents a simplification of risk factors present.

As shown in the figure, significant shared risk factors include:

- Tobacco consumption
- Obesity
- Excess alcohol consumption
- Genetics and hereditary disease
- Being male
- Ageing
- Exposure to known chemicals or toxins.

Each cancer also has its own unique risk factors, which tend to be a function of a precursor medical condition or infectious disease. For example, Barrett's oesophagus is a medical condition that increases the risk of oesophageal cancer, while cirrhosis and liver disease increase the risk of liver and biliary cancers. Similarly, unsafe sex and needle sharing is a vector by which hepatitis spreads, which can lead to cirrhosis and cancer of the liver or biliary, while exposure to *H. pylori* bacteria, which is uncommon in Australia can lead to stomach cancer.

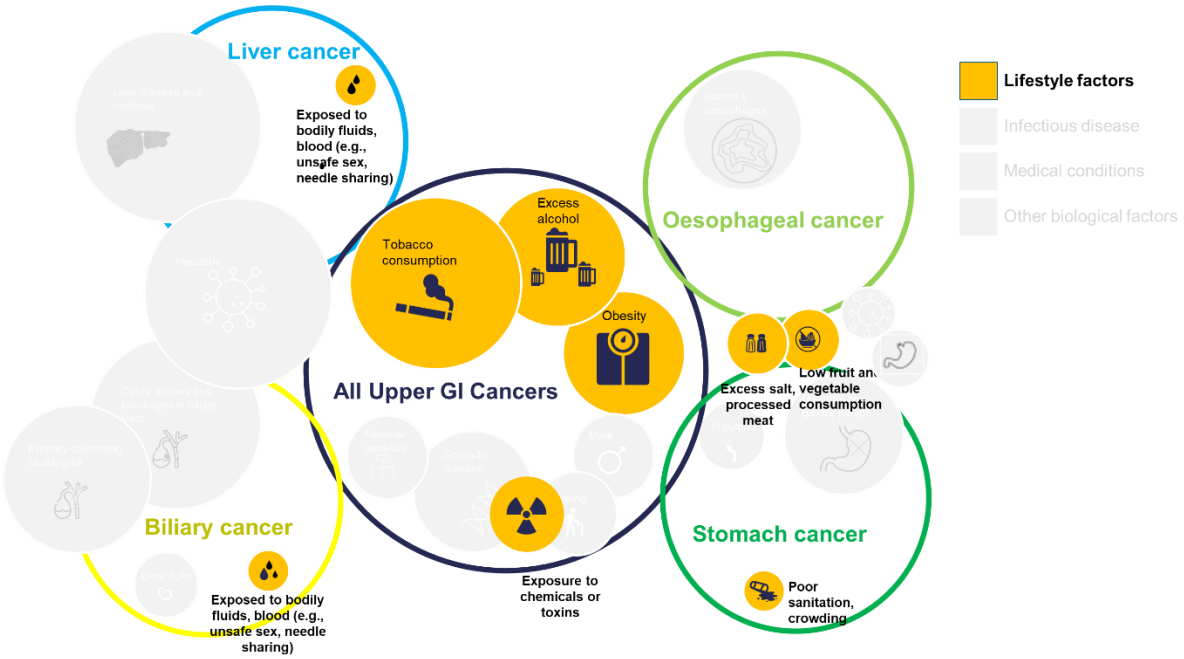
The following sections explain the various key risk factors in turn.

Lifestyle factors

Lifestyle choices including consumption of tobacco and alcohol, and obesity (to the extent that it reflects poor lifestyle choices) are risk factors across upper GI cancers.[18] In addition, there are various other lifestyle factors that increase the risk of developing upper GI cancers. These risk factors are summarised in Figure 2.2 and discussed in additional detail below.

[18] Banales, J.M., Marin, J.J.G., Lamarca, A. et al., 2020, Cholangiocarcinoma 2020: the next horizon in mechanisms and management, Nat Rev Gastroenterol Hepatol, 17, 557–588, https://doi.org/10.1038/s41575-020-0310-z.

Figure 2.2: Summary of lifestyle risk factors for upper gastrointestinal cancers



Obesity

Obesity is defined as having a Body Mass Index (BMI) equal to or in excess of 30 and is a risk factor for a vast array of illnesses, including various upper GI cancers. This relationship has been illustrated across the world:

- In a review of cancer risk factors, the World Cancer Research Fund considered that adult body fatness was a convincing risk factor for developing oesophageal adenocarcinoma (2016) and liver cancer (2015), and a probable risk factor for stomach and gallbladder cancer (2015)[19]
- A US study found excess body weight to be a major, potentially modifiable risk factor for oesophageal adenocarcinoma (population-attributable fraction [PAF] of 32.2 per cent), gastric cancer (17.5 per cent), hepatocellular carcinoma (33.9 per cent) and gallbladder cancer (33.5 per cent)[20]
- A systematic review and meta-analysis found an increased overall risk of 1.14 for iCCA and 1.2 for eCCA for persons that are obese.[21]

Tobacco consumption

Tobacco consumption is a risk factor for a vast array of illnesses, including various upper GI cancers. The relationship between tobacco consumption and upper GI cancers is well supported:

- In 2004, the US Surgeon General's report concluded there to be sufficient evidence for a causal link between smoking and oesophageal, stomach and liver cancer[22]
- A study of social costs of tobacco use in Australia estimated tobacco smoking contributed to approximately 45 cent of years lived with a disability associated with

[19] World Cancer Research Fund / American Institute for Cancer Research, 2018, Continuous Update Project Report: Diet, Nutrition, Physical Activity and Liver Cancer, WCRF International.
[20] Islami, F., Sauer A.G., Miller, K.D., Siegel, R.L., Fedewa, S.A., Jacobs, E.J., et al., 2018, Proportion and number of cancer cases and deaths attributable to potentially modifiable risk factors in the United States, CA Cancer J Clin, 68(1), 31–54, doi: 10.3322/caac.21440.
[21] Clements, O., Eliahoo, J., Kim, J.U., Taylor-Robinson, S.D., Khan, S.A., 2020, Risk factors for intrahepatic and extrahepatic cholangiocarcinoma: a systematic review and meta-analysis, J Hepatol, 72, 95–103, doi: 10.1016/j.jhep.2019.09.007.
[22] US Department of Health and Human Services, 2004, The health consequences of smoking: a report of the Surgeon General.

oesophageal cancer, approximately 10 cent per cent of years lived with a disability associated with stomach cancer and around eight per cent of years lived with a disability associated with liver cancer[23]

- A population cohort study found a hazard ratio of 4.07 for liver cancer and 3.84 for oesophageal cancer[24]
- A systematic review and meta-analysis found an increased overall risk of 1.25 for intrahepatic cholangiocarcinoma and 1.69 for extrahepatic cholangiocarcinoma for persons that smoke.[25]

Excess alcohol consumption

According to the National Health and Medical Research Council (NHMRC) to reduce the risk of harm from alcohol-related disease, healthy men and women should drink no more than 10 standard drinks of alcohol a week. Excess consumption is a risk factor for a vast array of illnesses, including various upper GI cancers.

- In a review of cancer risk factors, the World Cancer Research Fund considered that consumption of alcoholic drinks was a convincing risk factor for developing oesophageal squamous cell carcinoma (2016) and liver cancer (2015), and a probable risk factor for stomach cancer[26]
- A systematic review and meta-analysis found an increased overall risk of 3.15 for iCCA and 1.75 for eCCA for persons that excessively consumed alcohol.[27]

Other dietary issues

While obesity can reflect poor diet, and therefore poor diet is a risk factor for all upper GI cancers, consumption of specific foods and drinks are risk factors for oesophageal and stomach cancer. Possible risks factors relate to inadequate fruit and vegetable consumption as well as the overconsumption of salts and processed foods, smoked foods and hot liquids.

In a review of cancer risk factors, the World Cancer Research Fund considered that consumption of processed meat was a possible (albeit limited) risk factor for developing oesophageal squamous cell carcinoma and stomach cancer; consumption of smoked or chargrilled foods was a possible (but limited) risk factor for stomach cancer; consumption of foods preserved by salting was a probable risk factor for developing stomach cancer; and consumption of meat is a probable risk factor for developing oesophageal squamous cell carcinoma.[28]

Insufficient physical activity

As a possible cause of obesity, insufficient physical activity is a possible indirect risk factor for all upper GI cancers.

Research has found varying evidence of a relationship between levels of physical activity and upper GI cancer. Particularly strong evidence of an inverse relationship between the level of physical activity and both oesophageal adenocarcinoma and stomach cancer has been found, while the evidence pertaining to liver and biliary cancer is limited.[29]

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[23] Whetton, S., Tait, R.J., Scollo, M., et al., 2019, Identifying the social costs of tobacco use to Australia in 2015/16.
[24] Weber, M.F., Sarich, P.E.A., Vaneckova, P., Wade, S., Egger, S., et al., 2021, Cancer incidence and cancer death in relation to tobacco smoking in a population-based Australian cohort study, International Journal of Cancer, doi: 10.1002/ijc.33685.
[25] Clements, O., Eliahoo, J., Kim, J.U., Taylor-Robinson, S.D., Khan, S.A., 2020, Risk factors for intrahepatic and extrahepatic cholangiocarcinoma: a systematic review and meta-analysis, J Hepatol, 72, 95–103, doi: 10.1016/j.jhep.2019.09.007.
[26] World Cancer Research Fund / American Institute for Cancer Research, 2018, Continuous Update Project Report: Diet, Nutrition, Physical Activity and Liver Cancer.
[27] Clements, O., Eliahoo, J., Kim, J.U., Taylor-Robinson, S.D., Khan, S.A., 2020, Risk factors for intrahepatic and extrahepatic cholangiocarcinoma: a systematic review and meta-analysis, J Hepatol, 72, 95–103, doi: 10.1016/j.jhep.2019.09.007.
[28] World Cancer Research Fund / American Institute for Cancer Research, 2018, Continuous Update Project Report: Diet, Nutrition, Physical Activity and Liver Cancer.
[29] NCI website, available: https://www.cancer.gov/about-cancer/causes-prevention/risk/obesity/physical-activity-fact-sheet.

Exposure to harmful substances

Various harmful substances have been identified as possible risk factors for upper GI cancers. These risk factors are summarised in

Table 2.1 below.

Table 2.1: Harmful substances as lifestyle risk factors of upper gastrointestinal cancers

Risk factor	Oesophageal cancer		Stomach cancer	Hepatocellular carcinoma	Biliary cancer	
	AC	SCC			iCCA	eCCA
Thorium dioxide and thorotrast	✓			✓	✓	✓
Ethylene dichloride or 1,2-Dichloropropane					✓	✓
Trichloroethylene (TCE)				✓		
Tetrachloroethylene (perchloroethylene, PCE)				✓		
Vinyl chloride				✓	✓	✓
Asbestos			✓		✓	✓
Anabolic steroids				✓		
Aflatoxins				✓		
Soot		✓				

Note: Cancers include: oesophageal adenocarcinoma (AC), oesophageal squamous cell carcinoma (SCC), stomach cancer, hepatocellular carcinoma (HCC), and biliary cancer – intrahepatic cholangiocarcinoma (iCCA) and extrahepatic cholangiocarcinoma (eCCA).

Other risk factors

Reflecting hepatitis's role as a risk factor for liver cancer in particular, needle sharing, drug use and unprotected sex are recognised risk factors for developing liver cancer.

Likewise, as the *H. pylori* bacteria is a risk factor for gastric cancer, and liver flukes are a risk factor for biliary cancer, poor cleanliness, hygiene, sanitation, and overcrowding act as a risk factor for developing upper GI cancers.[30]

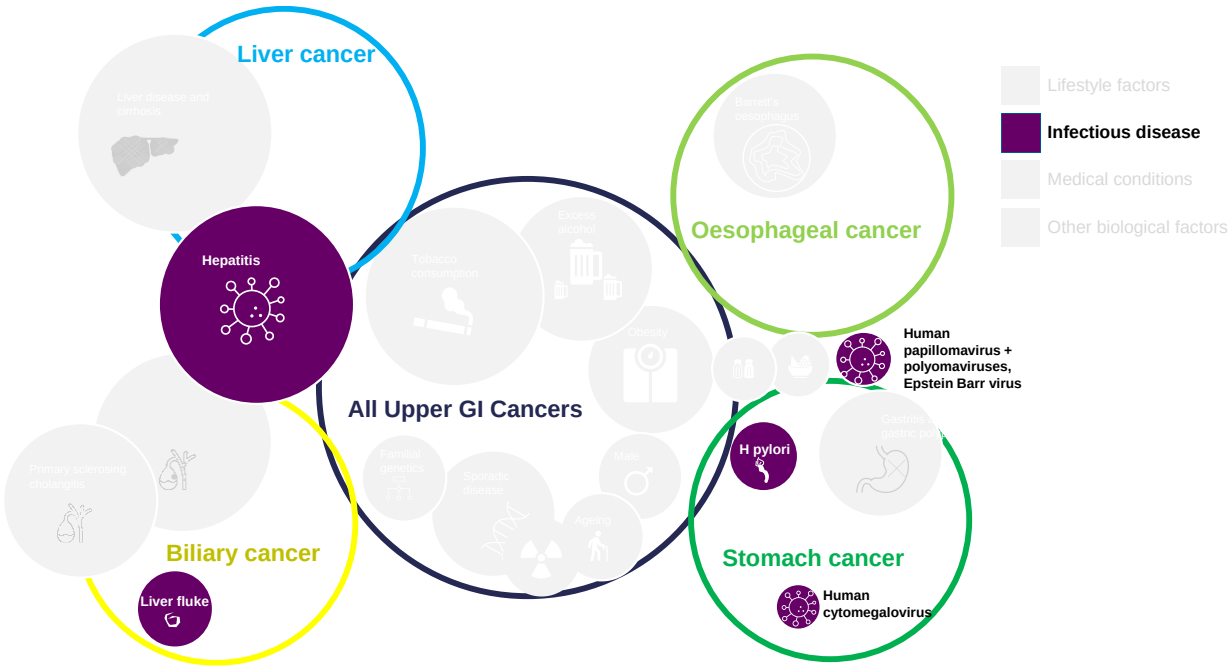
Infectious agents as risk factors

Infectious disease is well recognised as a key risk factor for developing upper GI cancer. Most prominently, these include hepatitis B and C infection for liver cancer and Helicobacter pylori (H. pylori) infection for stomach cancer. These infections can lead to inflammation and cellular damage, which can increase cancer risk.

These risk factors are summarised in Figure 2.3 and discussed in additional detail below.

[30] See, for example: Hu, J., Wang, X., Chua, E.G., He, Y., Shu, Q., Zeng, L., Luo, S., Marshall, B.J., Liu, A., Tay, C.Y., 2020, Prevalence and risk factors of Helicobacter pylori infection among children in Kuichong Subdistrict of Shenzhen City, China, Peer J, doi: 10.7717/peerj.8878; Kotilea, K., Bontems, P., Touati, E., 2019, Epidemiology, Diagnosis and Risk Factors of Helicobacter pylori Infection, Adv Exp Med Biol, 1149, 17-33, doi: 10.1007/5584_2019_357.

Figure 2.3: Summary of infectious agents as risk factors for upper gastrointestinal cancers



Hepatitis B

Hepatitis B (HBV) is transmitted perinatally (mother to child at birth), and through the community as a result of exposure to infected blood and bodily fluids.

Hepatitis B can lead to liver or biliary cancer in two ways:

- Hepatitis B can become chronic hepatitis B (CHB), which means the infection has lasted more than six months. If left untreated, chronic hepatitis B can result in long-term health problems, including liver damage, liver failure and cirrhosis. Cirrhosis then increases the risk of liver cancer.
- Hepatitis B can also lead to liver cancer (HCC) even in non-cirrhotic livers.

While hepatitis B infection acquired in adulthood leads to chronic hepatitis B in less than 5 per cent of cases, infection with hepatitis B in infancy and early childhood leads to chronic hepatitis B in approximately 95 per cent of cases.[31]

There is a safe and effective vaccine for hepatitis B that offers 98-100 per cent protection against infection but there is no cure for hepatitis B once a person has been infected.[32] If diagnosed (through blood test), however, it can be treated with antiviral medication, which can reduce hepatocellular carcinoma risk by 50-70 per cent within five years.[33]

Hepatitis C

Hepatitis C (hepatitis C) is similarly transmitted perinatally (mother to child at birth), and through the community as a result of exposure to infected blood and bodily fluids.

Like hepatitis B, hepatitis C can lead to liver or biliary cancer in two ways:

[31] WHO website, available: https://www.who.int/news-room/fact-sheets/detail/hepatitis-b.
[32] Mayo Clinic website, available: https://www.mayoclinic.org/diseases-conditions/hepatitis-b/symptoms-causes/syc-20366802.
[33] Papatheodoridis, G.V., Chan, H.L., Hansen, B.E., et al., 2015, Risk of hepatocellular carcinoma in chronic hepatitis B: assessment and modification with current antiviral therapy, J Hepatol, 62, 956–967, doi: 10.1016/j.jhep.2015.01.002; Terrault, N.A., Bzowej, N.H., Chang, K.M., Hwang, J.P., Jonas, M.M., Murad, M.H., 2015, AASLD guidelines for treatment of chronic hepatitis B, Hepatology; GESA, Hepatitis B Consensus Statement Working Group, 2022, Australian consensus recommendations for the management of hepatitis B infection.

- hepatitis C can become *Chronic* Hepatitis C (CHC), which, if left untreated, can result in long-term health problems, including liver damage, liver failure and cirrhosis that increases the risk of cancer.
- Infection with hepatitis C, however, can also lead to liver cancer (HCC) even in non-cirrhotic livers.

At present, there is no vaccine for hepatitis C. However, unlike hepatitis B, hepatitis C is curable through the use of antivirals which are Public Benefits Scheme (PBS) listed. People may be reinfected with hepatitis C if they are reinfected.

Liver fluke infection

A liver fluke is a parasitic worm, which infects people after ingestion of contaminated raw or undercooked freshwater fish or watercress. Liver flukes travel from intestines to the bile ducts where they then live and grow.

Liver flukes can live in the biliary tract for 20 to 30 years, and can cause long-lasting chronic inflammation of the bile ducts, which may lead to biliary cancer.

There is no currently available vaccine for liver flukes.

Helicobacter pylori

Helicobacter pylori (H. pylori) is a gram-negative, microaerophilic, spiral bacterium that can enter the human body and live in the digestive tract – particularly the stomach. Although H. pylori often has no signs or symptoms, after many years, H. pylori can cause ulcers in the lining of the stomach, which can eventually develop into gastric cancer. Globally, H. pylori is the most common cause of gastric cancer.[34]

Other viral risk factors

Other viral risk factors are identified in the table below.

Table 2.2: Other infectious agents as factors for developing upper gastrointestinal cancers

Infectious agent	Description
Human papillomavirus (HPV) and polyomaviruses	Viral infections that are passed between people through skin-to-skin contact; HPV is the most common STI and is incurable. Human polyomavirus 2, or the John Cunningham (JC) virus is a common germ which can have negative effects when immunocompromised.
Epstein Barr virus (EBV)	Also known as human herpesvirus 4, EBV spreads most commonly through bodily fluids. While it is common and does not often cause lasting issues, it is an identified carcinogen.
Human cytomegalovirus (HCMV)	HCMV is a beta-herpesvirus that causes lifelong infection in humans. While it is common and does not often cause lasting issues, it is a possible risk factor for gastric cancer.

See, for example: Wang, H. Chen, X.L., Liu, K., Bai, D., Zhang, W.H., Chen, X.Z., Hu, J.K., 2020, Associations Between Gastric Cancer Risk and Virus Infection Other Than Epstein-Barr Virus: A Systematic Review and Meta-analysis Based on Epidemiological Studies, Clinical and Translational Gastroenterology, 11(7), doi: 10.14309/ctg.0000000000000201.

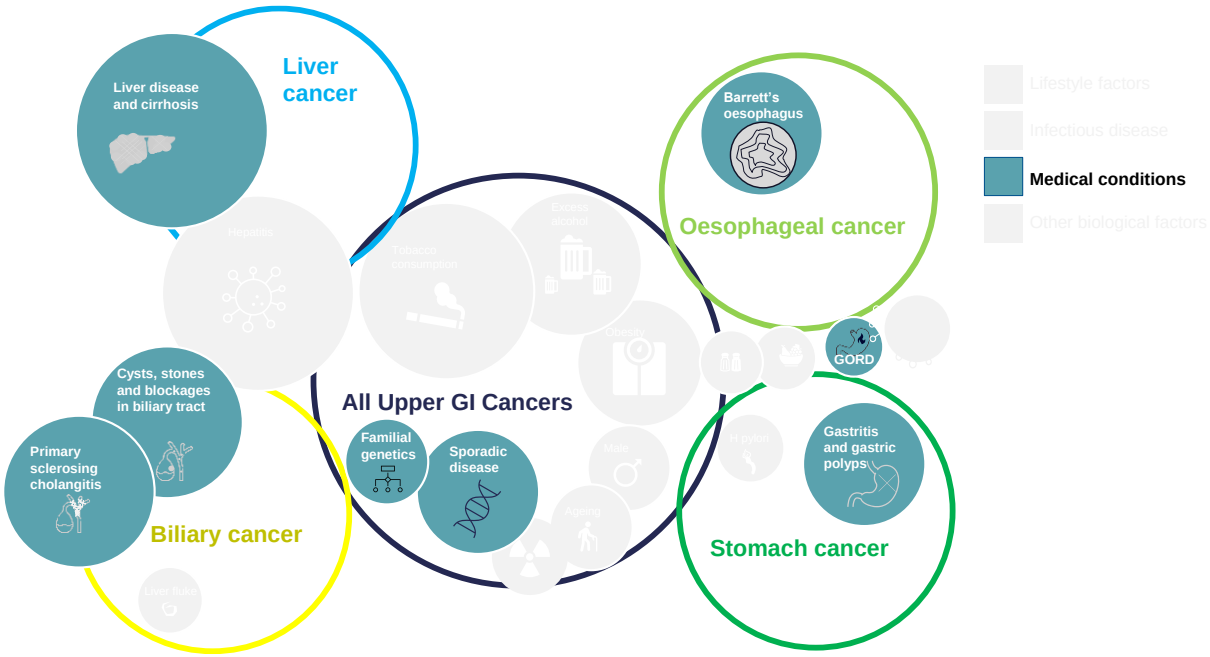
[34] Mitchell, H., Katelaris, P., 2016, Epidemiology, clinical impacts and current clinical management of Helicobacter pylori infection, Med J Aust, 204(10), 376-380, doi: 10.5694/mja16.00104.

Medical conditions as risk factors

There are few medical conditions which are risk factors for all upper GI cancers; however, there is some overlap in risk factors for oesophagogastric and hepatobiliary cancers.

These risk factors are summarised in Figure 2.4 and discussed in additional detail below.

Figure 2.4: Summary of medical conditions as risk factors for upper gastrointestinal cancers



A selection of medical risk factors (excluding infectious diseases) for developing upper GI cancers are addressed in turn below.

Gastro-oesophageal reflux disease and Barrett's oesophagus

Gastro-oesophageal reflux disease (GORD) is a digestive disease in which there are frequent or severe reflux symptoms, such as heartburn, which occurs when stomach acid or bile passes into the oesophagus and irritates its lining. Gastro-oesophageal reflux disease is associated with obesity and can lead to Barrett's oesophagus.

Barrett's oesophagus occurs when damage associated with acid irritation changes the types of cells lining the oesophagus. It is most often diagnosed in people with long-term gastro-oesophageal reflux disease, and often has symptoms including frequent heartburn and chest pain; however, many are asymptomatic.

Progression from Barrett's to oesophageal adenocarcinoma depends on whether the cells are dysphasic (damaged) or not:[35]

- Annual progression from Non dysphasic Barrett's (NDBE) to oesophageal adenocarcinoma is approximately 0.45 per cent per annum
- Annual progression from NDBE to low grade dysplasia (LGD) is approximately 3.18 per cent per annum
- Annual progression from LGD to high grade dysplasia (HGD) is approximately 2.75 per cent per annum

[35] Vissapragada, R., Bulamu, N., & Brumfitt, C., Karnon, J., Yazbeck, R., Watson, D., 2021, Improving cost-effectiveness of endoscopic surveillance for Barrett's esophagus by reducing low-value care: a review of economic evaluations, Surgical Endoscopy, 35, doi: 10.1007/s00464-021-08646-0; Whiteman, D.C., Kendall, B.J., 2016, Barrett's oesophagus: epidemiology, diagnosis and clinical management, Med J Aust, 205(7), 317-24, doi: 10.5694/mja16.00796.

Gastritis and gastric polyps

Gastritis refers to inflammation of the lining of the stomach, and can follow from numerous risk factors including H. pylori infection. Subsequently (via the Correa pathway):[36]

- Chronic gastritis can then develop into chronic atrophic gastritis
- Chronic atrophic gastritis can develop into intestinal metaplasia
- Intestinal metaplasia can develop into dysplasia
- Dysplasia can develop into intestinal type gastric cancer.

Development of cirrhosis

A cirrhotic liver is characterised by excessive liver scarring, vascular alterations, and eventual liver failure. Development progresses from a 'compensated' phase, in which part of the liver remains undamaged and functionally compensates for the damaged regions, to a decompensated phase, in which scar tissue fully envelops the organ.

Cirrhosis is caused by numerous conditions, including:[37]

- Chronic viral hepatitis (e.g., chronic hepatitis B and C)
- Chronic alcohol abuse, which leads to alcoholic liver disease (ALD)[38]
- Nonalcoholic fatty liver disease (NAFLD) which arises when too much fat is stored in liver cells; there are two types of NAFLD:
    - Nonalcoholic fatty liver (NAFL) – in which there is excess fat on the liver, not due to alcohol consumption (simple steatosis)
    - Nonalcoholic steatohepatitis (NASH) – which is an aggressive form of fatty liver disease in which there is liver inflammation and damage, in addition to liver fat.

Specifically, these conditions lead to fibrosis, which is a thickening and scarring of connective tissue.

While hepatocellular carcinoma typically develops in the background of cirrhosis (in approximately 85-90 per cent of cases), this is not always the case:[39] similar to hepatitis infection, nonalcoholic fatty liver disease (NAFLD) which arises when too much fat is stored in liver cells; there are two types can also lead to hepatocellular carcinoma even in non-cirrhotic livers.

Other medical conditions as risk factors

The below table provides an overview of other medical conditions which are risk factors for developing upper GI cancers.

[36] Toh, J.W.T., Wilson, R.B., 2020, Pathways of Gastric Carcinogenesis, Helicobacter pylori Virulence and Interactions with Antioxidant Systems, Vitamin C and Phytochemicals, Int J Mol Sci, 21(17), doi: 10.3390/ijms21176451; Sipponen, P., Maaroos, H.I., 2015, Chronic gastritis, Scand J Gastroenterol, 50(6), 657-67, doi: 10.3109/00365521.2015.1019918.
[37] There are various other causes of cirrhosis, see: https://www.mayoclinic.org/diseases-conditions/cirrhosis.
[38] Osna, N.A., Donohue, T.M., Kharbanda, K.K., 2017, Alcoholic Liver Disease: Pathogenesis and Current Management, Alcohol Res, 38(2),147-161, PMID: 28988570.
[39] Lubel, J.S., Roberts, S.K., Strasser, S.I., Thompson, A.J., Philip, J., Goodwin, M., Clarke, S., Crawford, D.H., Levy, M.T., Shackel, N., 2021, Australian recommendations for the management of hepatocellular carcinoma: a consensus statement, Med J Aust, 214, 475-483, doi: 10.5694/mja2.50885.

Table 2.3: Medical conditions as risk factors for developing upper gastrointestinal cancers

Risk factor	Description	Oesophageal cancer		Stomach cancer	Hepatocellular carcinoma	Biliary cancer	
		AC	SCC			iCCA	eCCA
Oesophagus conditions/diseases							
Gastroesophageal reflux disease (GORD)	Frequent or severe reflux symptoms, e.g., heartburn	✓		✓			
Barrett's oesophagus	Occurs when damage associated with acid irritation changes the types of cells lining the oesophagus	✓					
Familial Barrett's oesophagus	As above	✓					
Family history, genetics, or other conditions	Achalasia, tylosis and Plummer-Vinson syndrome	✓	✓				
Gastric conditions/diseases							
Gastritis, or long-term stomach inflammation	Inflammation of the lining of the stomach			✓			
Gastric polyps	Abnormal growths on the inner lining of the stomach			✓			
Family history, genetics, or other conditions	Hereditary diffuse gastric cancer (HDGC), Gastric adenoma and proximal polyposis of the stomach (GAPPS), Lynch syndrome, familial adenomatous polyposis (FAP)			✓			
Biliary conditions							
Choledochal cyst	Am anomaly of the duct which can lead to blockages					✓	✓
Cholelithiasis	Formation of gallstones					✓	✓
Choledocholithiasis	Presence of gallstones in common bile ducts					✓	✓
Hepatolithiasis	Presence of gallstones in intrahepatic bile ducts					✓	✓
Choledocholithiasis	Bile buildup due to blockage from gallstone					✓	✓
Primary sclerosing cholangitis	Disease that scars and thus narrows the bile ducts					✓	✓

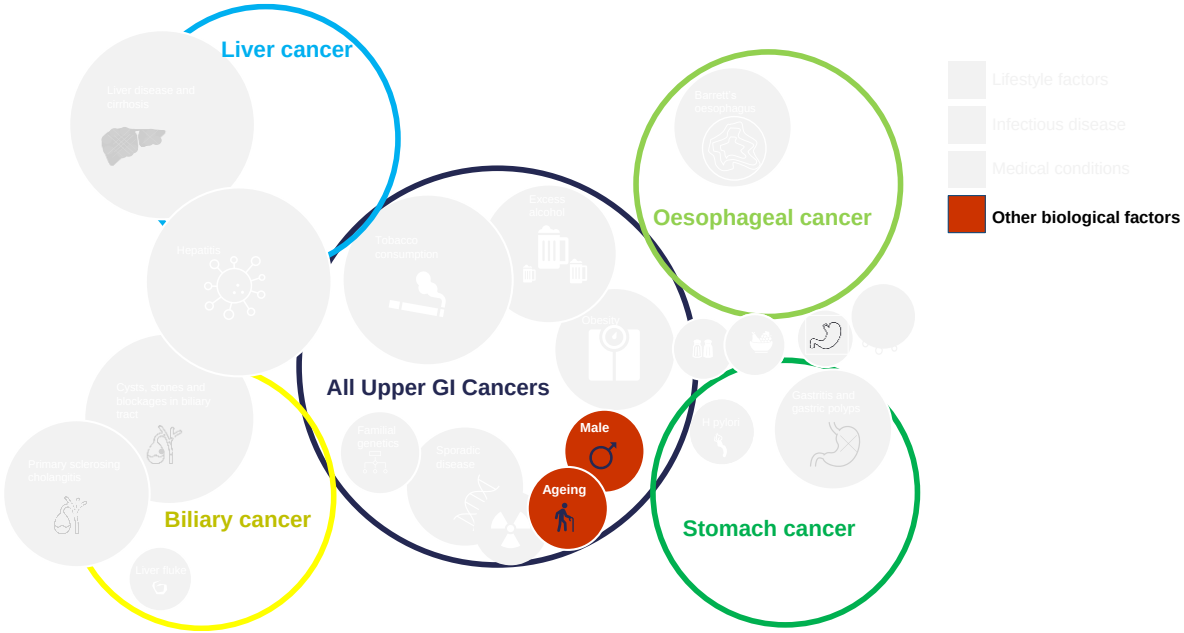
Risk factor	Description	Oesophageal cancer		Stomach cancer	Hepatocellular carcinoma	Biliary cancer	
		AC	SCC			iCCA	eCCA
Primary biliary cirrhosis	Disease that scars and even destroys bile ducts in liver					✓	✓
Family history, genetics, or other conditions	Caroli disease					✓	✓
Liver conditions							
Nonalcoholic fatty (metabolic) liver disease	Presence of excess body fat accumulation in the liver (i.e., hepatic steatosis), not caused by excessive alcohol intake				✓		
Alcoholic liver disease	Damage to liver and its function due to alcohol abuse				✓		
Non-alcoholic steatohepatitis (NASH)	Liver inflammation and damage caused by a buildup of fat in the liver				✓		
Cirrhosis	Permanent liver damage and scarring.				✓	✓	✓
Family history, genetics, or other conditions	Haemochromatosis, Tyrosinemia, Alpha1-antitrypsin deficiency, Porphyria cutanea tarda, Glycogen storage diseases, Wilson disease				✓		
Other diseases as risk factors							
Chronic pancreatitis	Disease of the pancreas in which inflammation has resolved, but with resultant damage to the gland, i.e., fibrosis, calcification and ductal inflammation					✓	✓
Inflammatory Bowel Disease (IBD)	Comprised of ulcerative colitis (inflammation and sores along the superficial lining of the colon and rectum) and Crohn's disease (inflammation of the lining of digestive tract, and can involve deeper layers)					✓	✓
Diabetes	Occurs when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin produced	✓	✓	✓	✓	✓	✓

Note: Oesophageal adenocarcinoma (AC) and oesophageal squamous cell carcinoma (SCC). Source: Mayo clinic, available: https://www.mayoclinic.org/diseases-conditions/; Cancer.Net, available: https://www.cancer.net/cancer-types/.

Other risk factors

Other unmodifable risk factors for upper GI cancers include sex and age. These are summarised in the figure below.

Figure 2.5: Summary of other risk factors for upper gastrointestinal cancers



Secondary prevention is available for some major known risk factors

Many of the risks that contribute to upper GI cancers can be managed to reduce the risk of cancer (Table 2.4). There are no formal screening programs for the listed medical conditions.

Table 2.4: Summary of available secondary prevention of upper gastrointestinal cancers

Upper GI cancer	Available tools
Hepatitis B	Hepatitis B Vaccination available; as well as treatment (no cure) for chronic hepatitis B
Hepatitis C	Curative treatment available for chronic hepatitis C (although, can be reinfected)
H. pylori	Curative treatment (in majority of cases)
Barrett's oesophagus	Ablation of High Grade Dysplastic (HGD) Barrett's oesophagus.
Obesity	Weight loss
Smoking tobacco	Quit smoking
Dietary issues	Improve diet by reducing salt intake, processed foods, etc.
Excess alcohol consumption	Reduced alcohol consumption
Unsafe drug use and sex	Mitigation of needle sharing, encourage safe sex

2.3 Signs and symptoms

Across all upper GI cancers, symptoms of disease are often limited in early stages. When symptoms do show, they are often ambiguous (can be associated with other illnesses) and relate to the digestive processes with which they interfere. For example, if the common bile duct remains blocked, it prompts a buildup of bilirubin in the bloodstream which can lead to jaundice.

The various symptoms of upper GI cancers are summarised in the table below.

Table 2.5: Summary of symptoms of upper gastrointestinal cancers

Symptom	Oesophageal	Stomach	Liver	Biliary
Fever				✓
Hoarseness	✓			
Difficulty swallowing	✓			
Pain in throat	✓			
Long lasting cough	✓			
Gastro-oesophageal reflux disease, Heartburn and reflux	✓	✓		
Chest pain	✓			
Vomiting with/without blood	✓	✓	✓	✓
Nausea	✓	✓	✓	✓
Itching			✓	✓
Jaundice			✓	✓
Pain in back			✓	
Pain, discomfort in tummy / abdomen	✓	✓	✓	✓
Swollen bloated tummy / abdomen		✓	✓	
Enlarged liver			✓	
Enlarged spleen			✓	
Dark stool / blood in stool	✓	✓		
Dark urine and pale stools			✓	✓
Loss of appetite / fullness after small meal		✓	✓	✓
Unexpected weight loss	✓	✓	✓	✓
Weakness or fatigue	✓	✓	✓	✓

Note: Simplification to cancer groups due to relatedness of symptoms.

2.4 Detection and diagnosis of upper GI cancers

Currently, there are no formal population-based screening programs for upper GI cancers. Surveillance strategies are recommended, however, in available clinical guidelines and consensus statements for selected high-risk populations. Identified high-risk groups and current surveillance strategies are summarised in Table 2.6.

Table 2.6: Summary of surveillance and monitoring recommendations for upper gastrointestinal cancers

Upper GI cancer	High risk populations	Surveillance
Oesophageal cancer	There are few people at high-risk for these cancers. For oesophageal AC, the highest risk group are obese men with Barrett's oesophagus. Heavy smokers and drinkers are at relatively high-risk of squamous cell carcinoma.	Surveillance of high-risk populations (Barrett's) with gastroscopy, with differing frequency based on riskiness (e.g., limited frequency if non dysphasic Barrett's). Treatment for people with high grade dysphasic Barrett's oesophagus.
Stomach cancer	There are few people at high-risk of these cancers. Patients with genetic risk factors are an example of high-risk population.	-
Biliary cancer		
Liver cancer	High risk populations include: patients with liver cirrhosis, patients with hepatitis B (depending on background and age: African from 20 years old; Asian males from 40; Asian females from 50; Caucasian patients from 50); patients with chronic hepatitis; patients with a family history of hepatocellular carcinoma.	Surveillance should be carried out by abdominal ultrasound every 6 months, with or without alpha-fetoprotein.

Source: Cancer Council Australia, Barrett's Oesophagus and Early Oesophageal Adenocarcinoma Guidelines, available: https://wiki.cancer.org.au/australia/Guidelines:Barrett%27s/Summary_of_recommendations; Cancer Council, 2021, Optimal care pathway for people with hepatocellular carcinoma; Cancer Council, 2021, Optimal care pathway for people with oesophagogastric cancer.

As stated in Section 2.3, upper GI cancers often present limited or ambiguous symptoms while in earlier stages. That said, for oesophagogastric cancers, there are red flag symptoms that warrant urgent consultation:[40]

- New onset or rapidly progressive dysphagia
- Progressive/new epigastric pain persisting for more than 2 weeks.

Once the disease has progressed sufficiently to produce symptoms, patients typically present to their general practitioner (GP). However, the patient may present to a hospital emergency department (ER) if the cancer produces sufficiently negative symptoms.

Patients with several or suspicious symptoms will be referred to a specialist. The GP and specialist:

- Review the patient's wellbeing, medical history, and nutritional status
- Undertake relevant physical examinations
- Send for relevant blood tests
- Send for relevant diagnostic imaging.

The relevant tests undertaken in diagnoses are described in

Table 2.7.

Table 2.7: Diagnostic tests for detecting upper gastrointestinal cancers

Tests/information	Oesophageal	Stomach	Liver	Biliary
Presentation				

[40] Cancer Council, 2021, Optimal care pathway for people with oesophagogastric cancer.

Tests/information	Oesophageal	Stomach	Liver	Biliary
Medical history	✓	✓	✓	✓
Recent issues	✓	✓	✓	✓
Family history	✓	✓	✓	✓
Nutritional status (weight, appetite, stool and bowel changes)	✓	✓	✓	✓
General wellbeing	✓	✓	✓	✓
Physical examination (Chest, Abdomen, Lymph)	✓	✓	✓	✓
Blood tests (full blood count, liver, kidney and renal function)	✓	✓	✓	✓
Biomarker or tumour tests (CA19-9, CEA, AFP)			AFP	CA19-9, CEA
Diagnostic imaging				
Endoscopy	✓	✓	?	✓
Endoscopic ultrasound (EUS)	✓ (limited)	✓		✓
Ultrasound			✓	✓
Barium swallow	✓			
MRI with or without contrast, magnetic resonance cholangiopancreatography (MRCP)			✓	✓ (+MRCP)
PET scan, CT scan, chest X-ray	✓	✓	✓	CT
Biopsy				
Endoscopic resection; EUS-guided biopsy	✓	✓		
Endoscopic retrograde cholangiopancreatography (ERCP)-guided biopsies				✓
EUS-guided fine needle aspiration (FNA		✓		✓
Laparoscopy	✓ (OGJ)	✓	✓(not often)	
Percutaneous biopsy			✓(not often)	
Peritoneal washing cytology		?		

Note: shorthand adopted for legibility. See glossary for terms and definitions.

Histopathological analysis is used to diagnose upper GI tumours where there remains uncertainty regarding cancer stage, and where there are benefits for cancer management.

Reflecting innovations in targeted therapies and immunotherapies, there is increased emphasis on undertaking biomarker and genetic testing (immunohistochemistry, fluorescence/other in situ hybridisation, polymerase chain reaction, next generation sequencing). Liver cancer is an interesting historical exception to this – because biopsies were previously considered to be unnecessary for diagnosis (unless indeterminant), they are less common.[41]

[41] Lubel, J.S., Roberts, S.K., Howell, J., Ward, J., Shackel, N.A., 2021, Current issues in the prevalence, diagnosis and management of hepatocellular carcinoma in Australia, Intern Med J, 51, 181-188, doi: https://doi.org/10.1111/imj.15184.

Table 2.8: Histopathological and pathological analysis for upper gastrointestinal cancers

Tests/information	Oesophageal	Stomach	Liver	Biliary
Histological type, invasion, grade, etc	✓	✓	✓	✓
Immunohistochemistry (IHC) Fluorescence/other in situ hybridisation (FISH) Polymerase chain reaction (PCR)	✓	✓	✓	✓
Next generation sequencing (NGS)	✓	✓		✓

Incidental discovery of cancer may also arise; for example, gallbladder cancer is frequently diagnosed following gallbladder stones removal surgery.

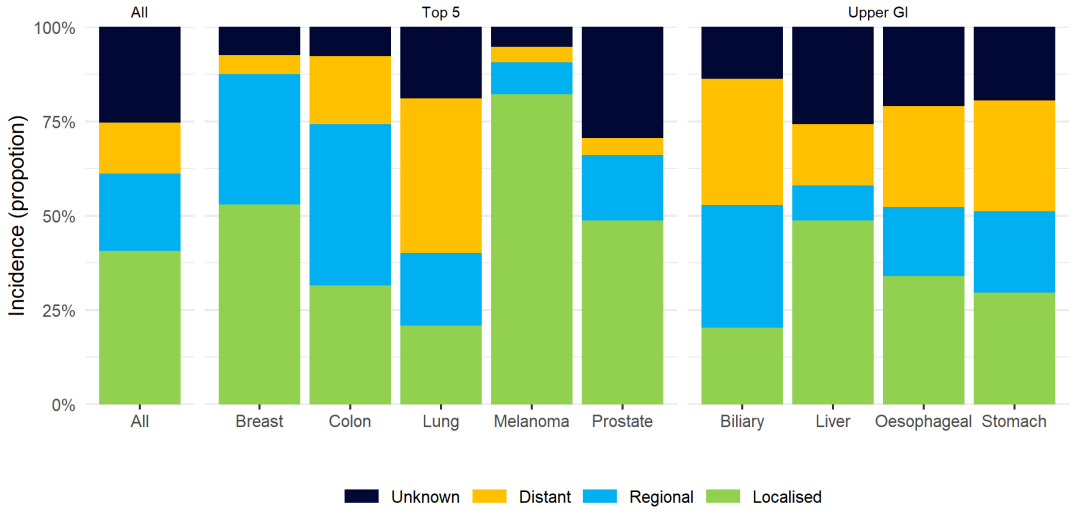
2.5 Stages of Upper GI cancers

Globally, there is limited consistency in staging of upper GI cancers. However, staging can be done according to the tumor (T), nodes (N), and metastases (M) system.

Staging data for upper GI cancer incidence is scarcely available in Australia. The most readily available data captures spread of disease (based on US SEER[42] taxonomy) and is made available by the Cancer Institute of NSW (CINSW).[43]

Figure 2.6 illustrates that liver cancer is more frequently diagnosed while still localised, in contrast to biliary, which is most often either distant or regional when diagnosed.

Figure 2.6: Distribution of incidence, by spread of disease (SEER)

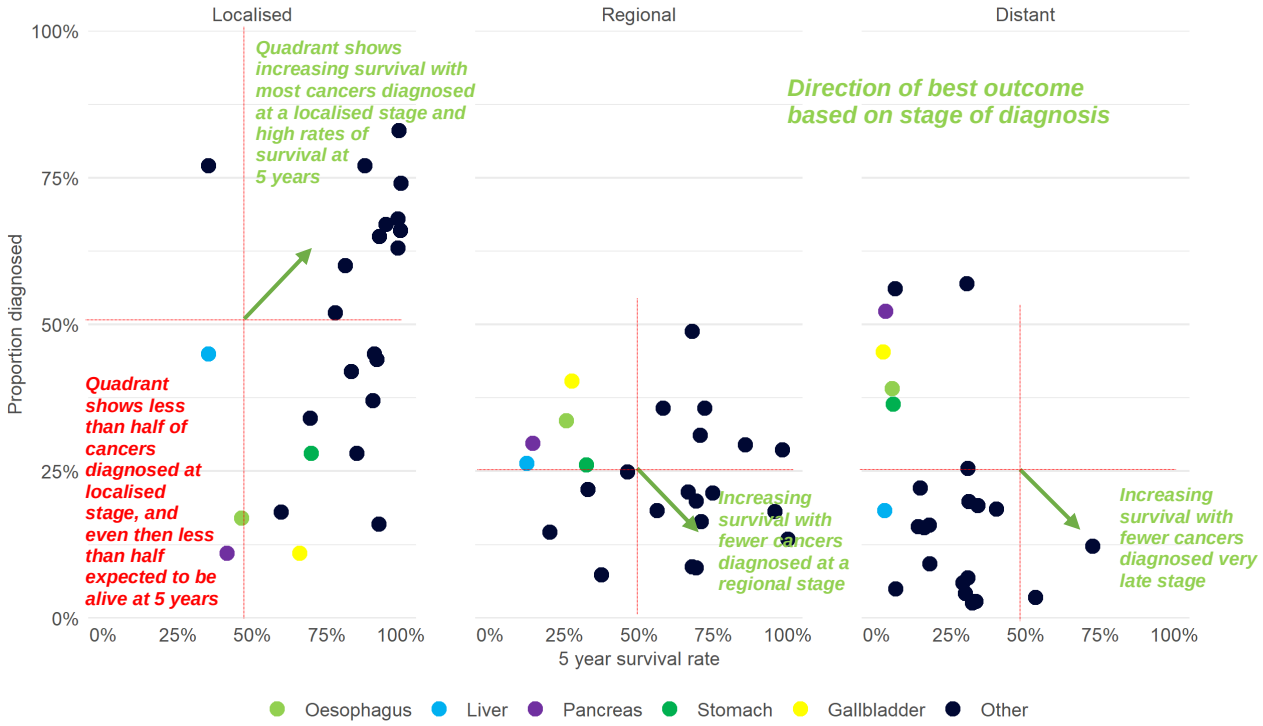


Note: Insight Economics summary of CI NSW data. Source: CI NSW website, available: https://www.cancer.nsw.gov.au/research-and-data/cancer-data-and-statistics/cancer-statistics-nsw.

US data show that earlier diagnosis is better, with a greater proportion of persons diagnosed while the cancer is still localised more likely to be alive at 5 years (Figure 2.7). The data show that less than half of most upper GI cancers are likely to be diagnosed whilist at a localised stage, but even when these cancers are diagnosed early, upper GI cancers still have the among the poorest outcomes across all cancers.

[42] The Surveillance, Epidemiology, and End Results (SEER) Program within the National Cancer Institute (NCI) in the US provides information on cancer statistics in an effort to reduce the cancer burden among the U.S. population.
[43] As part of the SoTN process, Insight Economics sought staging data from all state cancer registries; this data was not available.

Figure 2.8: Five year survival rate by stage of diagnosis (US data)



Source: Insight Economics visualisation of NCI/SEER survival by stage data.

What is not captured in the survival data, however, are the quality of life implications of later stage diagnosis, which can limit treatment options and result in more challenging treatment plans for patients, including for example the need for feeding tubes, which can lead to higher rates of depression and anxiety as part of the end of life treatment and care. Staging considerations for each cancer are considered in turn, and implications for treatment and supportive care needs are considered in Section 2.6.

Staging of oesophageal cancer

Oesophageal cancer can be staged according to TNM staging system, outlined in the 8th edition of the AJCC Cancer Staging Manual. Specifically:

- Stage 1 (early) – tumor is small (7 cm or less across) and limited to the oesophagus.
- Stage 2 (locally advanced) – tumor has grown but still remains within the oesophagus; there is no evidence of spread to lymph nodes or distant sites.
- Stage 3 (locally advanced) – tumor has grown beyond the oesophagus and extends into nearby tissues or organs; may or may not have spread to nearby lymph nodes.
- Stage 4 (metastatic or advanced) – tumor of any size that has grown beyond the oesophagus; may have spread to lymph nodes or distant sites.

In addition, stage 0 tumours are those that contain high-grade dysplasia.

The location of the tumour is used to determine whether it is classified as oesophageal or stomach. This places importance on identifying the OGJ, which is the borderline between the muscular structures of the oesophagus and the stomach. The definition of the histological OGJ varies based on non-Barrett's and Barrett's oesophagus cases.

For OGJ cancer specifically, classifications vary internationally. In Western countries, Siewert's classification is commonly used; this defines oesophagogastric junction

adenocarcinoma as a tumour with centre located within 1cm distal from and 2cm proximal to the oesophagogastic junction.[44]

Staging of stomach cancer

In Western countries, the TNM system is often utilised to stage stomach cancer. Specifically:

- Stage 1 (early) – tumor is either small, small and has spread to few lymph nodes, or larger (growing into muscularis propria) but has not spread into lymph nodes
- Stage 2 (locally advanced) – tumor has grown but still remains within the stomach, there is no evidence of spread to distant sites and limited spread to lymph nodes
- Stage 3 (locally advanced) – tumor has grown beyond the stomach and extends into nearby tissues or organs and may or may not have spread to nearby lymph nodes, but has not spread to distant parts of the body
- Stage 4 (metastatic or advanced) – stomach tumor of any size that has metastasised.

In addition, stage 0 tumours are considered to be those that contain abnormal cells called high-grade dysplasia.

As with lower oesophageal cancer, classification based on anatomic location is relatively difficult for tumours located in the proximal stomach or cardia. This reflects a variety of factors including shared histological features and immunophenotypes between certain gastric cardiac mucosa and certain metaplastic oesophageal mucosa.[45]

Staging of biliary cancer

Biliary cancer is staged using the TNM system, with some variation for intrahepatic, perihilar and distal cholangiocarcinoma, and gallbladder cancer. Biliary cancer is relatively difficult to diagnose. Although TNM provides clinically meaningful classification, it has limitations which raise concerns as to is efficacy when used in isolation. For example:[46]

- It has limited discriminatory ability between T2 and T3 tumours in surgically resected intrahepatic cholangiocarcinoma
- There is evidence supporting a negative effect of multifocal cancer on prognosis, which is not captured by the TNM system
- Size as a factor is relevant and not appropriately accounted for by the TNM system; although it captures cut off size of 5 cm in T1 tumours, some considered that a 2 cm cut off might have merit
- It fails to account for prognostic factors such as symptoms and liver function impairment.

Alternative staging systems have been proposed which better account for performance status, size and other characteristics such as CA19-9 level.

[44] For example, under the Japanese Classification, OGJ cancer includes lesions with a tumour centre location 2cm proximal to and distal from the OGJ, irrespective of histology. A more general difference is that, under the Japanese system, lymph nodes are classified as based on location relative to the tumour, rather than number of lymph node metastases. See: Japan Esophageal Society, 2016, Japanese Classification of Esophageal Cancer, 11th Edition: part II and III.

[45] Hu, B., El Hajj, N., Sittler, S., Lammert, N., Barnes, R., & Meloni-Ehrig, A., 2012, Gastric cancer: Classification, histology and application of molecular pathology. Journal of gastrointestinal oncology, 3(3), 251–261, https://doi.org/10.3978/j.issn.2078-6891.2012.021.

[46] Banales, J.M., Marin, J.J.G., Lamarca, A., et al., 2020, Cholangiocarcinoma 2020: the next horizon in mechanisms and management, Nat Rev Gastroenterol Hepatol, 17, 557–588, doi: 10.1038/s41575-020-0310-z.

Staging of hepatocellular carcinoma

In Australia, the recommended staging system is the Barcelona Clinic Liver Cancer (BCLC) system.[47] The BCLC considers:

- The number and size of tumours
- The patient's performance status or PS
- Liver function, via the Child-Pugh score

Performance status (PS)

PS is a scale of patient health with the following stages:

- PS 0 – Patient is fully active
- PS 1 – Patient can't carry out heavy physical work, but can do anything else
- PS 2 – Patient can do activities more than half the day; can self care but cannot work
- PS 3 – Patient is in bed or a chair for more than half the day; need care
- PS 4 – Patient is in bed or a chair all the time and need complete care.

The Child-Pugh system

The Child-Pugh score is a cirrhosis staging system which measures how well the liver is working via:

- Bilirubin levels in the blood
- Albumin (protein made by the liver) levels in the blood
- How quickly the blood clots (prothrombin time)
- If there is fluid in the abdomen (ascites)
- If the liver disease is affecting brain function (encephalopathy).

There are three possible classes:

- Class A means the liver is working normally
- Class B means mild to moderate damage
- Class C means there is severe liver damage – which can limit potential for treatment.

[47] Lubel, J.S., Roberts, S.K., Strasser, S.I., Thompson, A.J., Philip, J., Goodwin, M., Clarke, S., Crawford, D.H., Levy, M.T., Shackel, N., 2021, Australian recommendations for the management of hepatocellular carcinoma: a consensus statement, Med J Aust, 214, 475-483, doi: 10.5694/mja2.50885.

The BCLC staging system

There are five stages to the BCLC staging system.

Table 2.9: Barcelona Clinic Liver Cancer Staging for hepatocellular carcinoma

Stage	Size	Performance status	Child Pugh score
0 (Very early)	<2cm	PS 0	Class A
A (Early)	1 tumour (any size), or up to 3 tumours (less than 3 cm)	PS 0	Class A or B
B (Intermediate)	Has not spread into blood vessels, lymph nodes or other organs	PS 0	Class A or B
C (Advanced)	Spread into blood vessels, lymph nodes or other organs	PS 1 or 2	Class A or B
D		PS 3 or 4	Class C

2.6 Treatment and care of upper GI cancers

There are various possible therapies utilised in the context of upper GI cancers, including systemic therapies, which include chemotherapy, targeted therapies and immunotherapies, as well as surgical and precision therapies.

Ultimately, therapy decisions should be reviewed by a multidisciplinary team, and reflect numerous considerations including:

- Cancer type
- Staging
- Available expertise
- Patient preferences
- Patient health and comorbidities.

Therapies should be provided by experienced providers at experienced centres (high volume centres).

Clinical trials should be encouraged wherever possible.

Surgical therapy and adjuvant therapies

If the cancer is resectable, surgery remains the preferred option.

For stomach and oesophageal cancer, stage 0 resectable cancers can be removed via less invasive surgery such as endoscopic resection.

For resectable cancers that cannot be removed via endoscopic resection, relatively radical forms of surgery are utilsied.

A summary of first line surgical therapies used for the upper GI cancers is provided in Table 2.10.

Table 2.10: Summary of first line surgical therapies

	Oesophageal	Stomach	Liver	Biliary
Endoscopic resection	Endoscopic mucosal resection	Endoscopic mucosal resection; endoscopic submucosal dissection		
Open or minimally invasive Surgery	Radical resection, open or minimally invasive oesophagectomy, Two-field lymph node dissection	Gastrectomy (distal, subtotal, total) Removal of nearby lymph nodes Removal of spleen (if involved or extensive hilar adenopathy)	Left hepatectomy, extended right or left hepatectomy, segmentectomy	Various (bile duct, liver, gallbladder, lymph nodes) Part or all and lymph nodes Pancreatoduodenectomy
Transplant			✓	? (iCCA)

Note: yes (✓), developing evidence (?).

To promote successful first line resection, surgery is often paired with adjuvant therapy (post-surgery), neoadjuvant therapy (pre-surgery) or perioperative therapy (both). The objective of these therapies is to reduce the size of cancer before resection, or to remove any residual cancer that remains after curative resection.

The options available for adjuvant therapies are summarised in Table 2.11.

Table 2.11: Summary of appropriate neoadjuvant, adjuvant and perioperative therapies

	Oesophageal	Stomach	Liver	Biliary
Chemotherapy				
Adjuvant		✓ >=1B, absent preoperative chemotherapy	✓	✓ (capecitabine)
Neoadjuvant				
Perioperative	✓	✓ >=1B		
Radiotherapy				
Postoperative			✓	
Preoperative				
Perioperative				
Chemoradiation				
Adjuvant		✓ >=1B, absent preoperative chemotherapy	✓	✓
Neoadjuvant	✓			
Perioperative		✓ >=1B		

Non-systemic therapies (excluding surgery)

There are various alternatives to surgery which are not systemic. These therapies are generally used when surgery is not possible, such as due to poor health status, poor organ function, or because the cancer has progressed.

The options available for non-systemic therapies are summarised in Table 2.12.

Table 2.12: Summary of non-systemic therapies (excluding surgery)

	Oesophageal	Stomach	Liver	Biliary
Ablation (thermal)			✓ (radio, or micro wave) Evidence developing for: cryoablation, percutaneous alcohol injection)	
Radiotherapy High dose rate (HDR) brachytherapy External beam radiation therapy (EBRT) Stereotactic body radiotherapy (SBRT) Selective internal radiotherapy (SIRT)			✓ (SIRT)	✓ (EBRT with concurrent fluoropyrimidine)
Brachytherapy	✓			
Transarterial chemoembolisation			✓	

First line systemic therapies

In instances where the cancer has spread such that resection is no longer possible, first line systemic therapies are utilised. These therapies include chemotherapy, chemoradiation, targeted therapies and immunotherapies.

The options available for first line systemic therapies are summarised in Table 2.13.

Table 2.13: Summary of first line systemic therapies

	Oesophageal	Stomach	Liver	Biliary
Chemotherapy	Various, including: cisplatin and 5-fluorouracil	Doublet or triplet: platinum agent, anthracyclines, pyrimidines, taxanes	FOLFOX	Good health: cisplatin (oxaliplatin) and gemcitabine Bad health: gemcitabine, fluorouracil or capecitabine
Chemoradiation	Cisplatin and 5-fluorouracil; 60 Gy and higher			Fluoropyrimidine-based
Targeted therapies	If HER2, Trastuzumab	If HER2, Trastuzumab	Sorafenib, Lenvatinib	Entrectinib, Larotrectinib, Pembrolizumab, Pralsetinib

	Oesophageal	Stomach	Liver	Biliary
Immunotherapy	Nivolumab		Atezolizumab with bevacizumab; nivolumab	

Disease recurrence and management

If first line therapies are unsuccessful, or if the cancer returns after a period of remission, subsequent line therapies are needed.

The options available vary based on the patient's health and performance status, preferences and previous therapies administered. If previous therapy was successful, in certain cases it may be readministered.

Important to management is ensuring that the patient is appropriately surveilled following administration of first line therapy. Specifically, follows ups should be tailored to the individual patient and stage of disease, and occur:

- Every 3-6 months for the first two years
- Every 6-12 months thereafter.

To test whether the cancer has returned, various tests are utilised including blood and organ function tests and diagnostic imaging. These follow ups should also consider clinical history, physical history, and provide opportunities to openly discuss symptoms and side effects.

The options available for subsequent line therapies are summarised in Table 2.14.

Table 2.14: Summary of therapies for management and recurrence

	Oesophageal	Stomach	Liver	Biliary
Chemotherapy		Second-line chemotherapy with a taxane (docetaxel, paclitaxel), or irinotecan, or ramucirumab as single agent or in combination with paclitaxe		FOLFOX
Systemic therapies (chemotherapy, targeted therapies, immunotherapy)	Adenocarcinom carcinoma: Pembrolizumab (MSI or PD-L1) Squamous cell carcinoma: Nivolumab (second line)	Numerous possible targeted therapies, including entrectinib or larotrectinib (NTRK). Pembrolizumab (MSI or PD-L1)	Following sorafenib, regorafenib, cabozantinib and ramucirumab Following atezolizumab + bevacizumab/Lenvatinib, sorafenib, lenvatinib, regorafenib, cabozantinib and ramucirumab	FOLFIR Liposomal irinotecan + fluorouracil + leucovorin Various targeted medicines based on circumstanced (e.g., Entrectinib for NTRK gene funsion positive tumours).
Non-systemic therapies				Radioembolisation

Provision of supportive care

High quality supportive care is needed throughout a patients journey to help mitigate symptoms, side effects of treatment, and broader life impacts of cancer. It may be the only form of therapy provided in instances where the cancer is untreatable.

Options for supportive care should be provided from diagnosis. Specifically, there should be a designated point of contact within the multidisciplinary team (MDT) for advice and support. Support from diagnosis includes:

- Nutritional care from dietitian
- Social and psychological support
- Financial support or discussion of possible financial support options
- Informational support.

Furthermore, supportive care is required to mitigate various side effects of upper GI cancer and therapies, including:

- Biliary obstruction (endoscopic stenting; percutaneous transhepatic drainage)
- Oesophageal obstruction (needle catheter, not endoscopic stenting)
- Oesophageal varices (associated with liver disease)
- Gastric obstruction or bleeding.

Table 2.15: Summary of supportive care provision

	Oesophageal	Stomach	Liver	Biliary
Nutritional care	✓	✓	✓	✓
Social and emotional support, including psychologist appointments, peer support, social prescribing, social worker support	✓	✓	✓	✓
Financial assistance (travel, treatments)	✓	✓	✓	✓
Symptom and physical side effect or pain management	Oesophageal obstruction or bleeding (needle catheter, not endoscopic stenting)	Management of gastric obstruction or bleeding.	Management of oesophageal varices (associated with liver disease)	Biliary obstruction (endoscopic stenting; percutaneous transhepatic drainage)
Information support	✓	✓	✓	✓
Oral hygiene	✓	✓	✓	✓
Exercise	✓	✓	✓	✓
Fertility planning	✓	✓	✓	✓

Chapter 3

Incidence and mortality of upper GI cancers in Australia: international benchmarks, trends and distribution

This chapter benchmarks Australian trends in risk, incidence and mortality against other countries globally.

The data show that Australia overall performs well in relative risk management and incidence trends compared to other international jurisdictions overall, but is a world leader in obesity and alcohol consumption. The data show that the distinct patterns of risk and disease have implications for policy priorities in Australia, which diverge from the priorities observed in many other countries with higher rates of upper GI cancers.

Data also show that while many risk factors are well controlled among Australian communities generally, there are at-risk cohorts within the community with risks at an order of magnitude higher than the general population. For example, Aboriginal and Torres Strait Islanders have substantially higher risks from tobacco, alcohol consumption, and infectious disease, which translates into substantially higher incidence and mortality rates of upper GI cancers in these communities. New migrants, persons from low socioeconomic backgrounds, regional Australians and men are also groups at far higher risks of disease than the wider population.

Key findings:

- **Upper GI cancers are a major cause of global cancer mortality and incidence, enabling screening and surveillance programs**
- **Incidence of Upper GI cancer in Australia reflects a mix of lifestyle factors (tobacco, alcohol and obesity), viral factors (hepatitis), and other risk factors**
- **Risk factors are unevenly distributed across the population; for example, Indigenous Australians face relatively high rates of hepatitis**
- **Incidence and mortality of cancers vary by population subgroup with rates particularly high among Indigenous Australians, people of low socioeconomic status, and culturally and linguistically diverse Australian communities.**

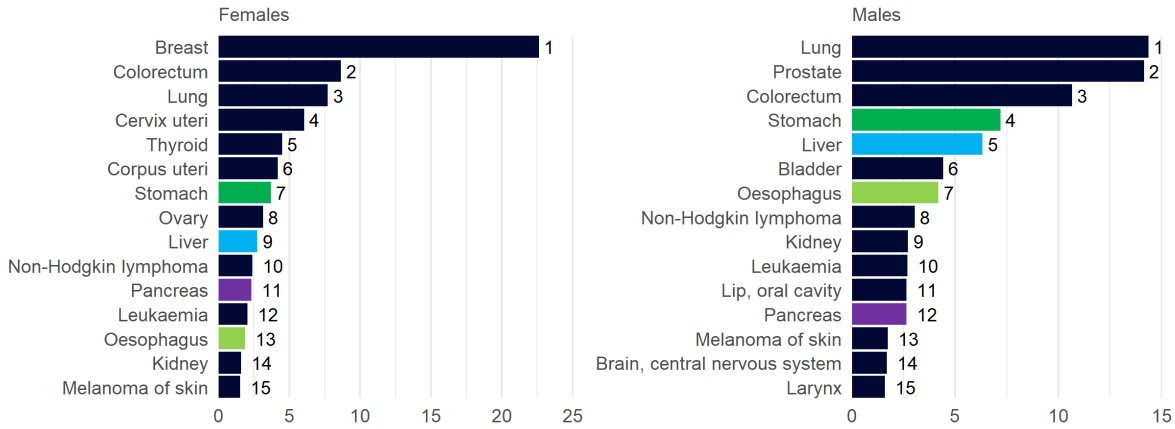
3.1 Understanding global incidence and mortality

Upper GI cancers are some of the highest incidence cancers in the world today – with over 3.2 million diagnosed with upper GI cancers in 2020 (2.7 million if pancreatic cancer is

excluded).[48] Collectively, these cancers account for approximately 18 per cent of all cancers (excluding non-melanoma skin cancer).[49]

Across the world, upper GI cancers are generally more common in men (Figure 3.1).

Figure 3.1: Top 15 cancers by incidence, 2020 (count in 100,000's)

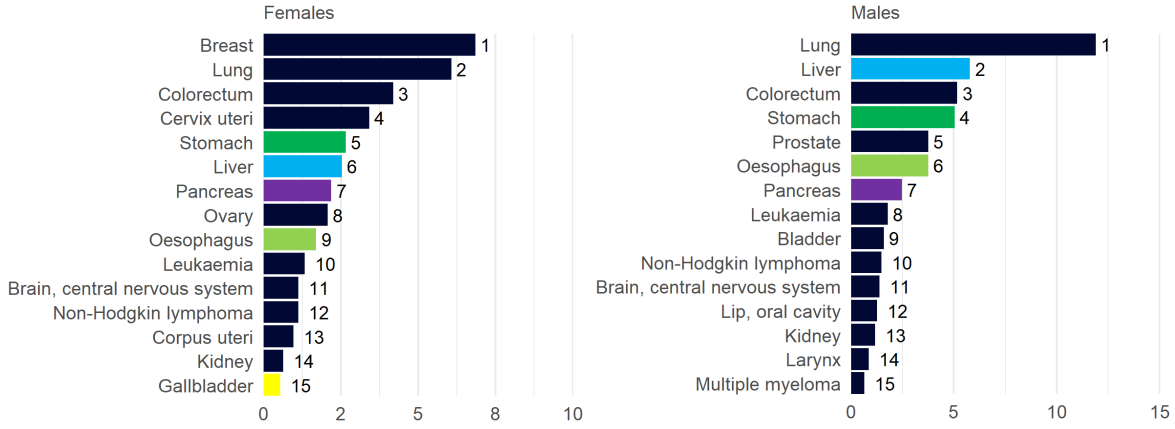


Source: WHO Cancer Today, 2020, available: https://gco.iarc.fr/today.

Likewise, upper GI cancers are some of the highest mortality cancers in the world today – with close to 2.7 million deaths attributed to upper GI cancers in 2020 (2.2 million if pancreatic cancer is excluded).[50] Collectively, these cancers account for approximately 27 per cent of all cancer related deaths (excluding non-melanoma skin cancer).[51]

In line with relatively high incidence, collectively upper GI cancers lead to more male deaths (Figure 3.1Figure 3.2). However, gallbladder cancer deaths are more common in females.[52]

Figure 3.2: Top 15 cancers by mortality, 2020 (count in 100,000's)



Source: WHO Cancer Today, 2020, available: https://gco.iarc.fr/today.

Incidence of these cancers varies considerably across countries (Figure 3.3), which reflects geographic variation in the prevalence of risk factors (Table 3.1).

[48] WHO Cancer Today, 2020, available: https://gco.iarc.fr/today.
[49] Ibid.
[50] Ibid.
[51] 22.5 per cent, if pancreatic cancer is excluded. Source: ibid.
[52] Ibid.

Specifically, geographic variation in risk factors reflects an Asian-Western divide:

- Oesophageal adenocarcinoma is relatively common in Western countries, including for example the UK, US and Australia, as a result of higher rates of obesity; however, oesophageal squamous cell carcinoma is relatively common in China and other countries which see a far greater prevalence of smoking
- Stomach cancer is more common in Asian countries where H. pylori is most common
- Biliary cancer and gallbladder cancer remain relatively uncommon; but are more common in countries exposed to liver flukes
- The relatively high incidence of liver cancer in Asian and African countries corresponds to hepatitis B and hepatitis C infections; however, liver damage associated with alcohol consumption and obesity is a contributing factor in Western countries.

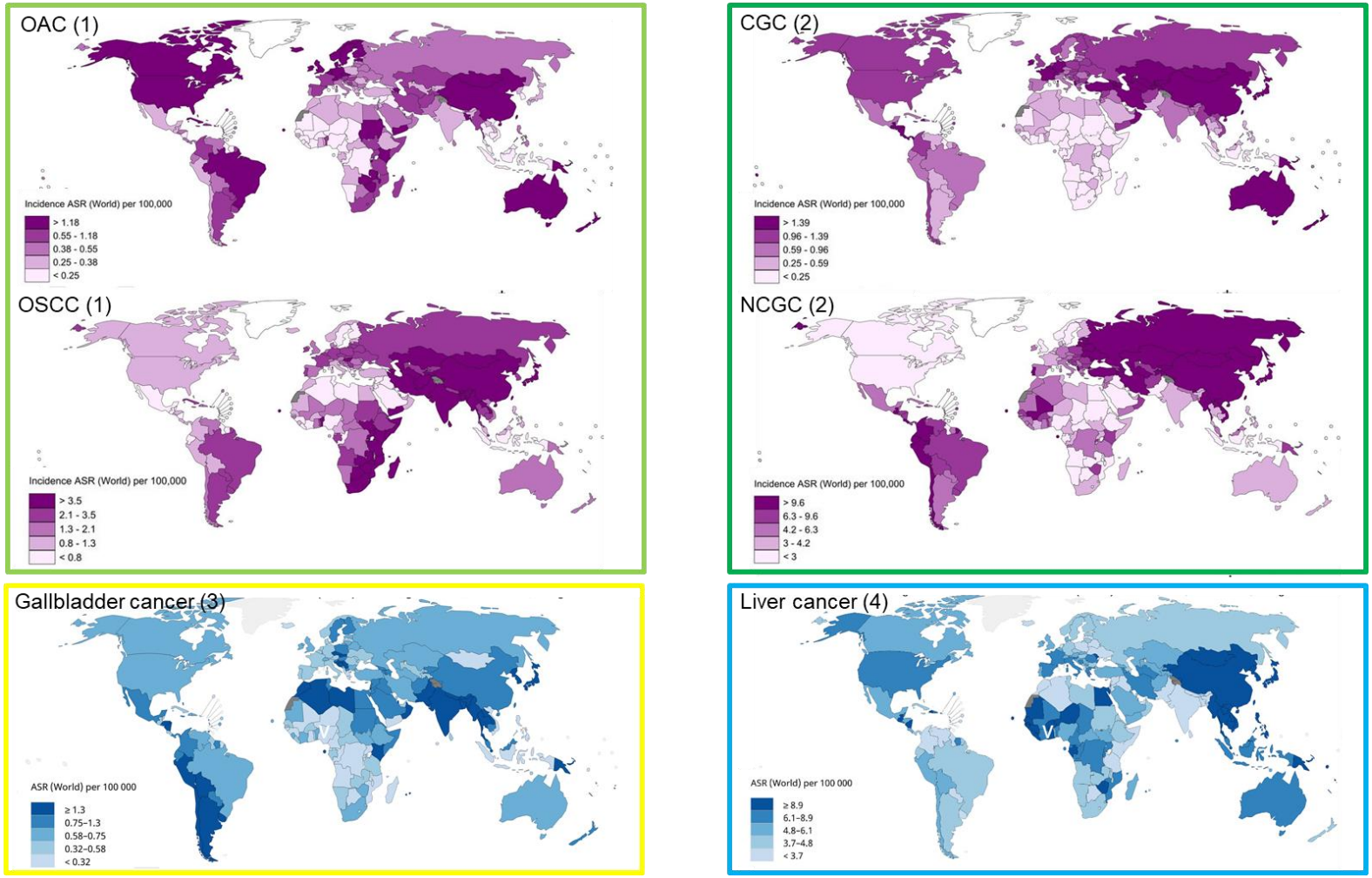
Multiple countries in Eastern Asia have adopted screening and surveillance approaches:

- China has several screening programs for people at high-risk of developing upper GI cancer, i.e., the Cancer Screening Program in Rural Areas (2005) which includes oesophageal, stomach and liver cancers, the Cancer Screening Program in Huaihe River Areas (2007) which includes oesophageal, stomach and liver cancer, and the Cancer Screening Program in Urban Areas (2012) which includes Oesophageal, Stomach and Liver cancer[53]
- Under the National Cancer Screening Program, South Korea screens for stomach cancer (in adults aged 40 and over) and live cancer (in adults aged 40 and over with HBsAg positive or anti- hepatitis C positive or liver cirrhosis)[54]
- Japan has a National Endoscopic Screening Program for people with gastric cancer and a Model of Nationwide Hepatocellular Carcinoma Surveillance (i.e., abdominal ultrasound for high-risk patients, e.g., with cirrhosis and chronic hepatitis B or C).[55]

These approaches are justifiable based on the relatively high levels of incidence in Asian countries. Australia and other Western countries have relatively low levels of incidence, which has led to limited formal screening and surveillance programs.

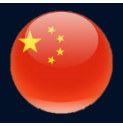
[53] Cao, M., Li, H., et al., 2021, Cancer screening in China: The current status, challenges, and suggestions, Cancer Letters, 506, 120–127, doi:10.1016/j.canlet.2021.02.017.
[54] National Cancer Screening Program, Detecting Cancer, available: https://www.ncc.re.kr/main.ncc?uri=english/sub04_ControlPrograms03.
[55] Note: other models which are potentially more cost effective have been identified. See: Huang, H.L., Leung, C.Y., Saito, E., et al., 2020, Effect and cost-effectiveness of national gastric cancer screening in Japan: a microsimulation modeling study, BMC Med 18, 257, doi: 10.1186/s12916-020-01729-0.

Figure 3.3: Indicative distribution of incidence (ASR), upper gastrointestinal cancers



Note: (1) and (2), oesophageal adenocarcinoma (OAC), oesophageal squamous cell carcinoma (OSCC), cardia gastric cancer (CGC) and non cardia gastric cancer (NCGC). Source: (1) and (2): Arnold, M., Ferlay, J., et al., 2020, Global burden of oesophageal and gastric cancer by histology and subsite in 2018, Gut, 69, 1564-1571; (3) and (4) obtained from GLOBOCAN 2020, WHO / IARC, available: http://gco.iarc.fr/today.

Table 3.1: Distribution of risk factors across countries (scores relative; colours based on relative intensity; green = low, dark orange = high)

								
Oesophageal cancer								
Incidence/100,000 (1)	6.1	5.5	6.6	14.9	7.1	20.8	22.4	5.1
GORD (2)								
Stomach cancer								
Incidence/100,000 (1)	8.9	7.9	9.3	9.7	18.2	109.5	33.1	56
GORD (2)								
H. pylori (3)								
Biliary cancer								
Incidence/100,000 (1)	1.4	1.4	1.6	1.8	1.7	7.7	2	6.7
Liver fluke (4)								
Liver cancer								
Incidence/100,000 (1)	11.5	12.8	11.4	12	11.7	36.1	28.3	28.8
Hepatitis B (5)								
Hepatitis C (6)								
Lifestyle factors								
Obesity (7)								
Tobacco (8)								
Alcohol (9)								

Note: GORD refers to gastroesophageal reflux disease. Source: (1): WHO Cancer Today, 2020, available: https://gco.iarc.fr/today; (2): Nirwan, J.S., Hasan, S.S., Babar, Z.U., Conway, B.R., Ghori, M.U., 2020, Global Prevalence and Risk Factors of Gastro-oesophageal Reflux Disease (GORD): Systematic Review with Meta-analysis, Sci Rep, 10(1), doi: 10.1038/s41598-020-62795-1; (3), (5) and (6): de Martel, C., et al., 2019, Global burden of cancer attributable to infections in 2018: a worldwide incidence analysis, The Lancet, 8(2), doi: 10.1016/S2214-109X(19)30488-7; (7): Global obesity observatory, available: https://data.worldobesity.org/tables/prevalence-of-adult-overweight-obesity-2/ and European Commission – Eurostat, 2021, Over half of adults in the EU are overweight; (8) Selected as smoking among males, Reitsma, M.B., et al., 2021, Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990-2019: a systematic analysis from the Global Burden of Disease Study 2019, The Lancet, 397(10292); (9) GBD 2016 Alcohol Collaborators, 2018, Alcohol use and burden for 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016, The Lancet, 392(10152), doi: 10.1016/S0140-6736(18)31310-2.

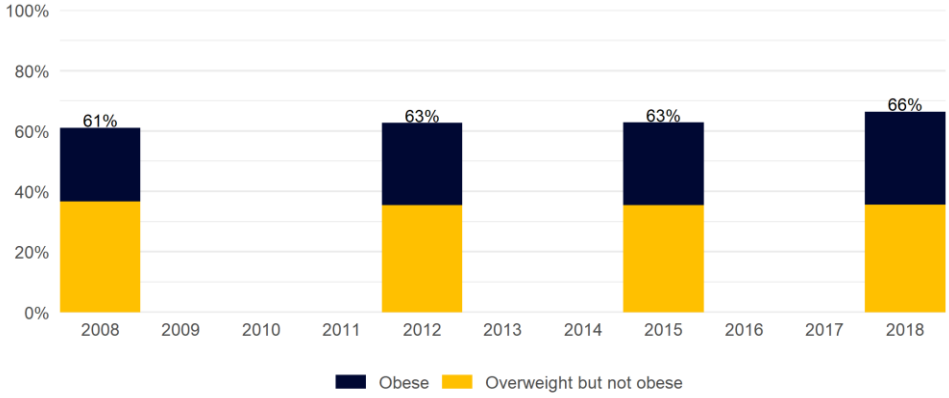
3.2 Risk factor trends in Australian communities

Although there are many risk factors for upper GI cancers, only a subset are relatively prevalent within Australia; these include obesity, tobacco use, alcohol consumption, hepatitis infection, and H. pylori infection. Data show the risks from many factors are in decline for most Australian communities, with the exception of obesity, which is increasing; but remain high for selected at-risk cohorts, including Aboriginal and Torres Strait Islanders and new migrants, as well as persons from a low socioeconomic background.

Obesity high within general population

Australia has high rates of obesity – with approximately 66 per cent of the population overweight or obese. This rate has remained high for the last ten years (Figure 3.4).

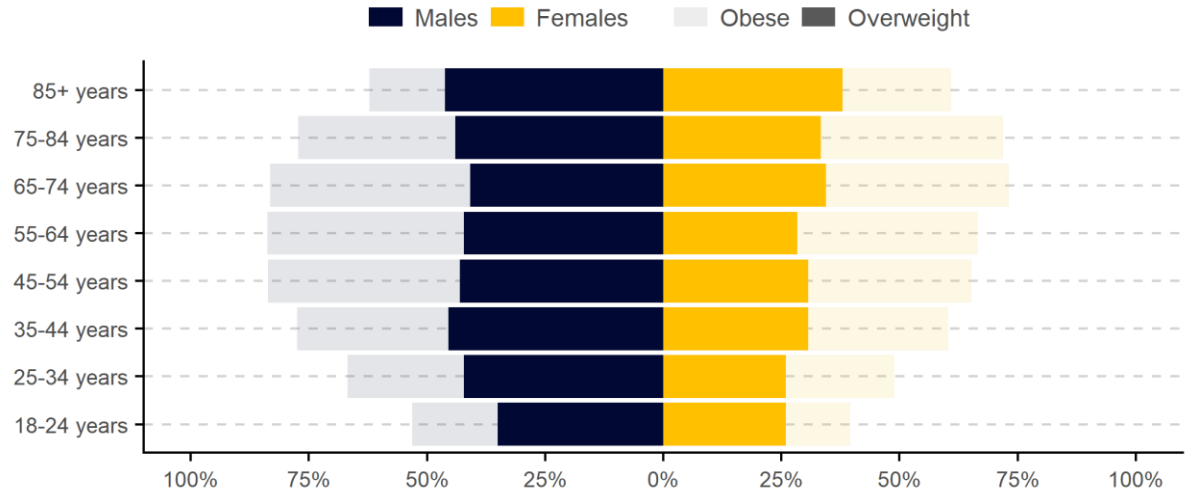
Figure 3.4: Trends in obesity and excess weight in Australia



Source: ABS, 2020, National Health Survey data.

Among adults, overweightness is more common in older populations (Figure 3.5). More than half of Australians aged of 35-44 and above are either overweight or obese; for Australians aged 65-74 years this number approaches three in four.

Figure 3.5: Distribution of obesity by age group

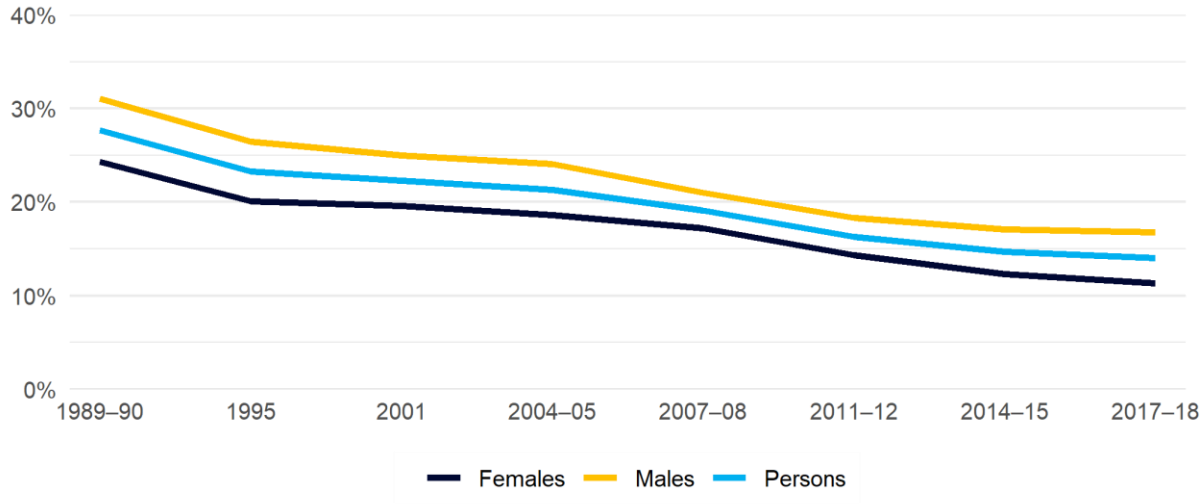


Source: ABS, 2020, National Health Survey.

Tobacco consumption falling amongst broader population, but some resistance

In Australia today, 11.6 per cent to 14 per cent of Australians smoke daily, with rates for men being higher than women; 12.8 per cent to 16.5 per cent of men smoke compared to 10.4 per cent to 11.1 per cent of women.[56] This reflects a steady decline in smoking over the last three decades (Figure 3.6).

Figure 3.6: Trend in proportion of daily smokers (age standardised), since FY90



Source: ABS, 2020, National Health Survey, Figure 1b: National Health Survey, tobacco smoking status by sex, aged 18 and over, 2001 to 2017–18.

However, large differences persist among population subgroups:[57]

- *The proportion of daily smokers among the lowest socioeconomic quintile (20 per cent) is almost 3.7 times the proportion among the highest socioeconomic quintile* (5.4 per cent)
- *The proportion of daily smokers among people who are unable to work (29.5 per cent) is close to 2.7 times the proportion of daily smokers who are employed* (10.3 per cent), and the proportion of daily smokers among unemployed (21.9 per cent) is nearly two times the proportion of daily smokers who are employed (10.3 per cent)
- The proportion of daily smokers among remote and very remote areas is over two times the proportion of daily smokers among people in major cities (10.3 per cent).

Furthermore, according to Australian Bureau of Statistics (ABS) data, smoking rates among Indigenous Australians remain relatively high:[58]

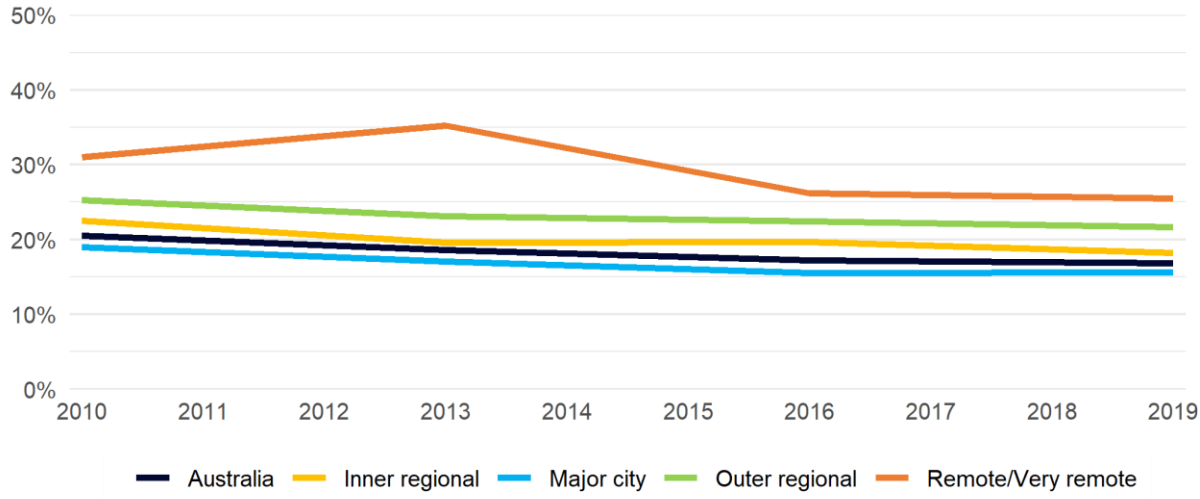
- As at 2018-19, *52 per cent of Indigenous Australians in remote areas smoked* (which is similar to the figure reported in 2004-05)
- As at 2018-19, 37 per cent of Indigenous Australians in non-remote areas smoked (which is lower than the figure reported in 2004-05, i.e., 49 per cent).

[56] AIHW, 2021, Tobacco smoking.
[57] Ibid.
[58] ABS, 2018-19, National Aboriginal and Torres Strait Islander Health Survey.

Exceedance of alcohol lifetime risk guidelines remains

Over the last ten years, the proportion of the population exceeding lifetime risk guidelines for alcohol consumption has trended downwards (Figure 3.7). However, as of 2019, approximately 17.6 per cent of Australian adults exceeded lifetime risk guidelines.[59]

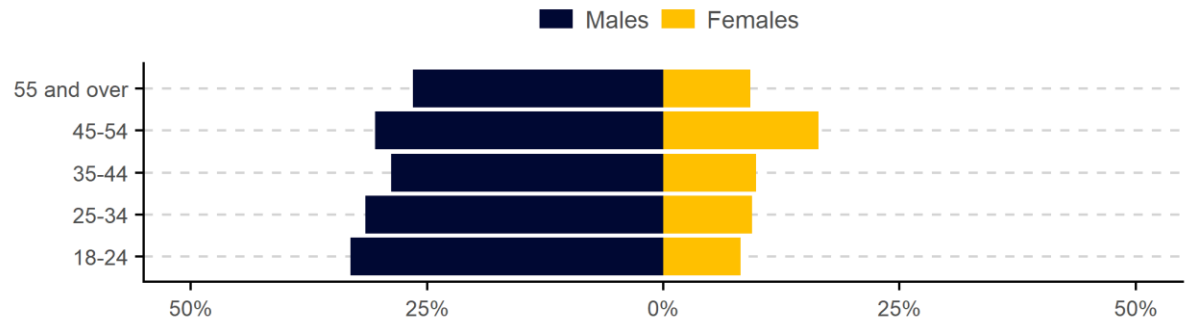
Figure 3.7: Trend in proportion of population exceeding lifetime risk threshold for alcohol consumption



Source: AIHW, 2020, Alcohol risk and harm.

For Indigenous Australians, the proportion of people who exceeded lifetime risk guideline was 20 per cent (which was the same as in 2012-13). However, there is a substantial difference in rates of lifetime risk between Indigenous men and women (Figure 3.8).

Figure 3.8: Distribution of lifetime risky alcohol consumption among Indigenous Australians



Source: ABS, 2018-19, National Aboriginal and Torres Strait Islander Health Survey.

Hepatitis B

To combat hepatitis B, Australia has implemented a comprehensive suite of policies, including universal immunisation of infants. Indeed, following the introduction (early 1980s) and national rollout of hepatitis B vaccines (2000), transmission to infants is reducing, and prevalence of chronic hepatitis B in adults is expected to decrease.[60] In addition, scheduled and catch-up vaccinations for people under 20 are also available through the National Immunization Program.

[59] AIHW, 2020, Alcohol risk and harm.
[60] McCulloch, K., Romero, N., MacLachlan, J., Allard, N., Cowie, B., 2020, Modeling Progress Toward Elimination of Hepatitis B in Australia, Hepatology, 71, 1170-1181, doi: 10.1002/hep.30899.

In addition, policy which attempts to promote safe use of needles and syringes has been implemented to minimise the spread of hepatitis B and hepatitis C. The first Australian Needle and Syringe Program began in Sydney in 1986, with similar programs continuing to be supported until present.

Although these efforts may have prevented a radical increase in hepatitis B prevalence in Australia, in 2019 an estimated 230,154 people were living with chronic hepatitis B in Australia (0.90 per cent of the population) which represents an increase from 0.74 per cent in 2004.[61]

Notably, *people born overseas and Aboriginal and Torres Strait Islander peoples represent three-quarters of those affected*.[62] That is, while vaccines are effective, as migration brings endemic populations the number of Australians living with chronic hepatitis B has increased[63] and cohorts that are relatively more difficult to engage continue to see higher rates of infection than is possible.

The Doherty Institute estimate that, at a national level, in 2019:[64]

- Only 68.8 per cent of people living with chronic hepatitis B in Australia have been diagnosed with chronic hepatitis B
- Only 22.1 per cent of people living with chronic hepatitis B in Australia are receiving care
- Some 316 deaths from hepatocellular carcinoma in 2019 were attributable to chronic hepatitis B.

Hepatitis C

Australia was one of the first countries to introduce government-funded unrestricted access to direct-acting antiviral therapy.[65] Prior to the availability of direct-acting antivirals through Medicare in 2016, the number of people living with Hepatitis C was growing as well as mortality. At end 2020, an estimated 117,810 people were living with chronic hepatitis C, down from an estimate 188,690 people at end 2015.[66]

H. pylori low among general population, but relatively high in Indigenous Australians

While more than 50 per cent of the world's population is estimated to be infected with H. pylori,[67] in Australia, H. pylori prevalence among the general population ranges from around 15 per cent to 30.6 per cent.[68] *In contrast, some studies indicate that prevalence in Aboriginal and Asian communities can be as high as 50–80 per cent*.[69]

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[61] Romero, N., McCulloch, K., Allard, N., MacLachlan, J.H., Cowie, B.C., 2020, National Surveillance for Hepatitis B Indicators: Measuring the progress towards the targets of the National Hepatitis B Strategy – Annual Report 2019, The Doherty Institute.
[62] McCulloch, K., Romero, N., MacLachlan, J., Allard, N., Cowie, B., 2020, Modeling Progress Toward Elimination of Hepatitis B in Australia, Hepatology, 71, 1170-1181, doi: 10.1002/hep.30899.
[63] McCulloch, K., Romero, N., MacLachlan, J., Allard, N., Cowie, B., 2020, Modeling Progress Toward Elimination of Hepatitis B in Australia, Hepatology, 71, 1170-1181, doi: 10.1002/hep.30899.
[64] Romero, N., McCulloch, K., Allard, N., MacLachlan, J.H., Cowie, B.C., 2020, National Surveillance for Hepatitis B Indicators: Measuring the progress towards the targets of the National Hepatitis B Strategy – Annual Report 2019, The Doherty Institute., A.1.
[65] Kwon, J.A., Dore, G.J., Hajarizadeh, B., Alavi, M., Valerio, H., et al., 2021, Australia could miss the WHO hepatitis C virus elimination targets due to declining treatment uptake and ongoing burden of advanced liver disease complications, PLOS ONE 16(9), doi: 10.1371/journal.pone.0257369.
[66] Ibid.
[67] Mobley, H.L.T., Mendz, G.L., Hazell, S.L., 2001, Helicobacter pylori: Physiology and Genetics, Chapter 2, Washington (DC), ASM Press, PMID: 21290711.
[68] Wise, M.J., Lamichhane, B., Webberley, K.M., 2019, A Longitudinal, Population-Level, Big-Data Study of Helicobacter pylori-Related Disease across Western Australia, Journal of clinical medicine, 8(11), 1821, doi: 10.3390/jcm8111821; Tay, A, et al., 2021, Helicobacteriology update, Microbiology Australia, 42, https://doi.org/10.1071/MA21025.
[69] No longitudinal, population wide study has occurred as H. pylori infection is not a notifiable disease, Tay, A, et al., 2021, Helicobacteriology update, Microbiology Australia, 42, https://doi.org/10.1071/MA21025.

Eradication and treatment are plausible preventative stratagem. For example, Tay, Wise and Marshall (2021) write that:[70]

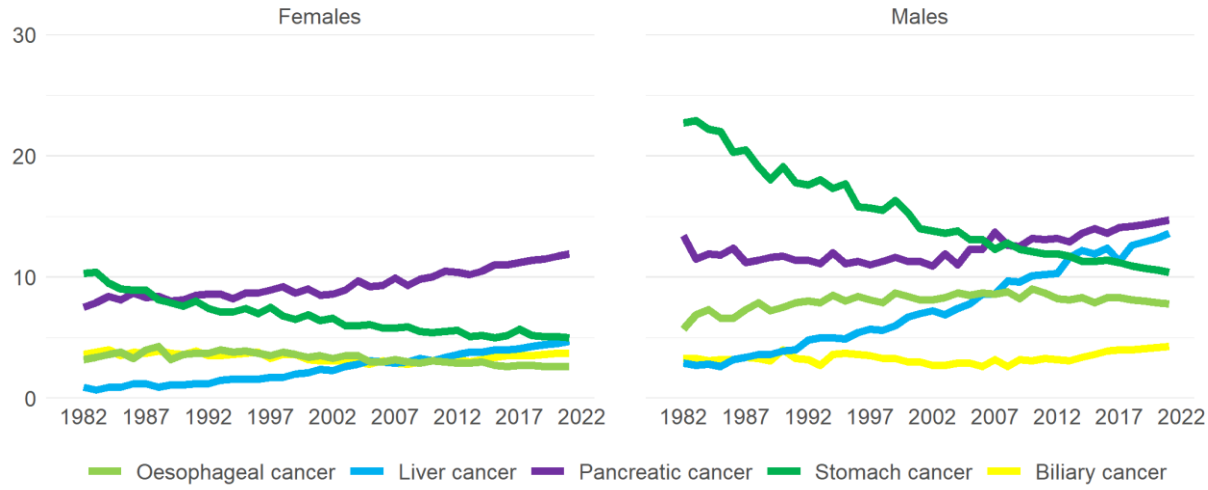
> *New combination therapies show promise and the dream of 100 per cent cure of the infection with minimal side effects from treatment seems achievable.*

3.3 Incidence and mortality in Australia: trends and distribution by cancer

Overview of distribution of upper GI cancers in Australia

While upper GI cancers are grouped for the purposes of this State of the Nation in Upper Gastrointestinal Cancers in Australia report (report), historical trends in incidence vary dramatically (Figure 3.9). For example, while incidence of stomach cancer has decreased precipitously since 1982, incidence of liver cancer has increased: hepatocellular carcinoma is one of Australia's fastest growing cancers.[71]

Figure 3.9: Incidence trends (age standardised rate) since 1982

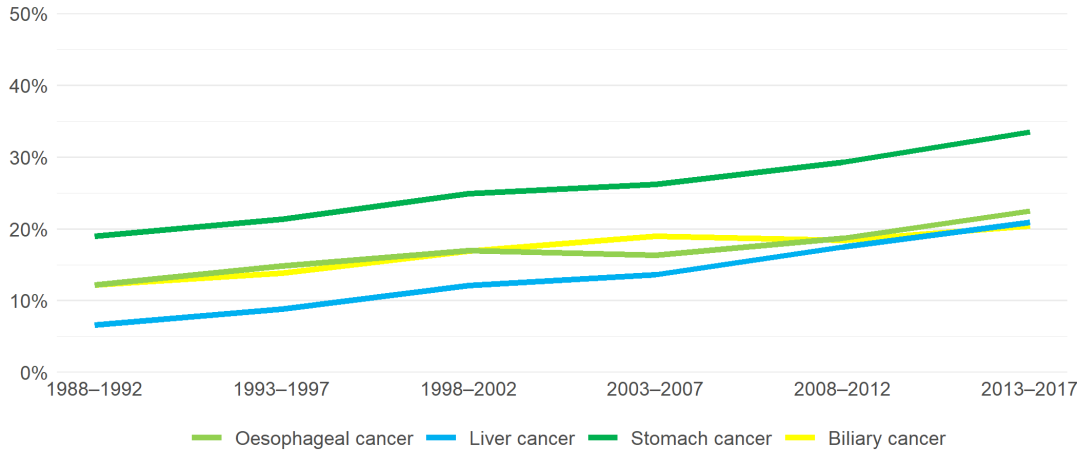


Note: AIHW forecast from 2018 and later. 2021 data adopted due to visual simplicity and consistency with modelling; 2022 data disaggregates biliary cancer into four components (extrahepatic biliary, gallbladder cancer, . Source: AIHW, 2021, Cancer in Australia 2021.

As highlighted in Chapter 1, survival rates remain below 50 per cent across all upper GI cancers. However, this reflects a gradual improvement in five year relative survival rates.

[70] Tay, A, et al., 2021, Helicobacteriology update, Microbiology Australia, 42, https://doi.org/10.1071/MA21025.
[71] Brown, C.R., Allard, N.L., MacLachlan, J.H., Cowie, B.C., 2017, Deaths from liver cancer continue to rise in Australia: is elimination by 2030 possible? Intern Med J, 47, 604-605, doi: 10.1111/imj.13393.

Figure 3.10: Five year relative survival since 1988



Source: AIHW, 2021, Cancer in Australia 2021.

Rates of cancers are higher among population subsets exposed to risk factors.

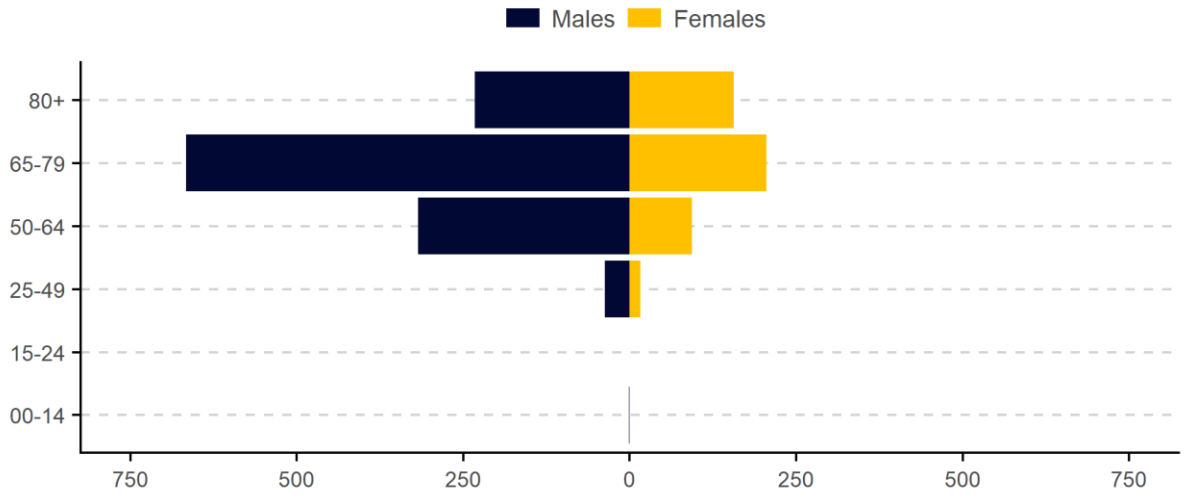
Migrants from countries/regions with higher incidence rates of stomach and liver cancers maintained an increased risk in Australia, with the highest rates being among South American migrants (IRR 2.35) for stomach cancer and among Vietnamese migrants (5.44) for liver cancer.[72]

The subsections below provide a discussion of trends in incidence and mortality in Australia, with breakdowns by regional, socioeconomic, cultural and gender factors.

Factors in Oesophageal cancer incidence and mortality

Reflecting the prevalence of obesity as a risk factor in Australia, oesophageal cancer is most commonly adenocarcinoma rather than squamous cell carcinoma. Across the population, oesophageal cancer is more common in males, especially older males.

Figure 3.11: Oesophageal cancer incidence by age and sex, 2022

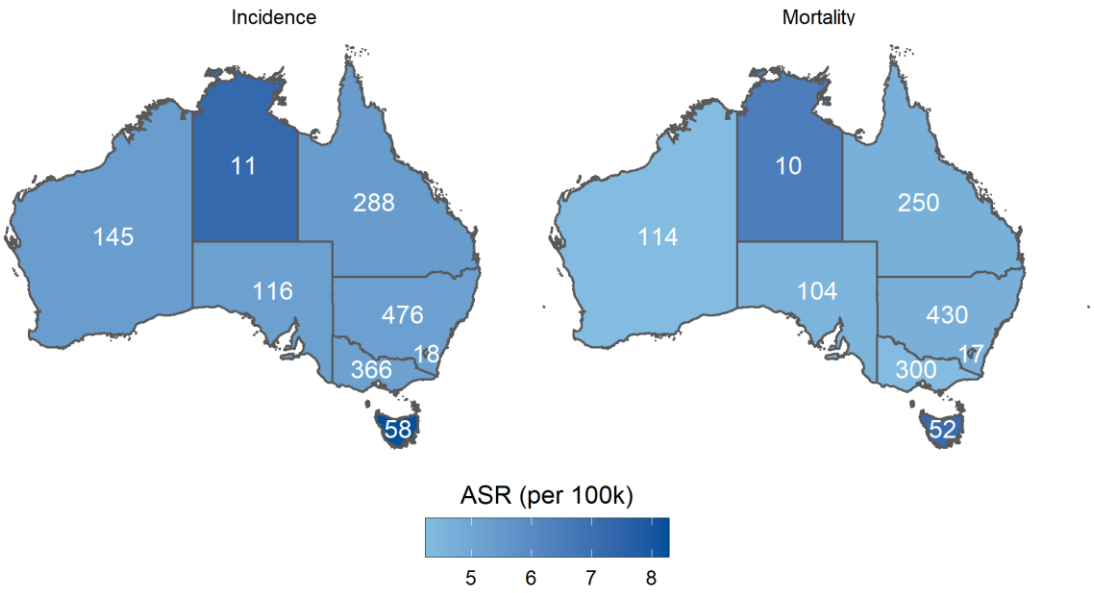


Source: Insights Economics visualisation of AIHW, 2022, Cancer in Australia 2022.

[72] Yu, X.Q., Feletto, E., Smith, M.A., et al., 2022, Cancer Incidence in Migrants in Australia: Patterns of Three Infection-Related Cancers, Cancer Epidemiol Biomarkers Prev, doi: 10.1158/1055-9965.EPI-21-1349.

Oesophageal cancer incidence and mortality is relatively evenly distributed across Australia. However, Tasmania and the Northern Territory have relative high age standardised rates (per 100,000 population, ASR) – noting relatively small sample size.

Figure 3.12: Average oesophageal cancer incidence and mortality over the 2013-2017 period

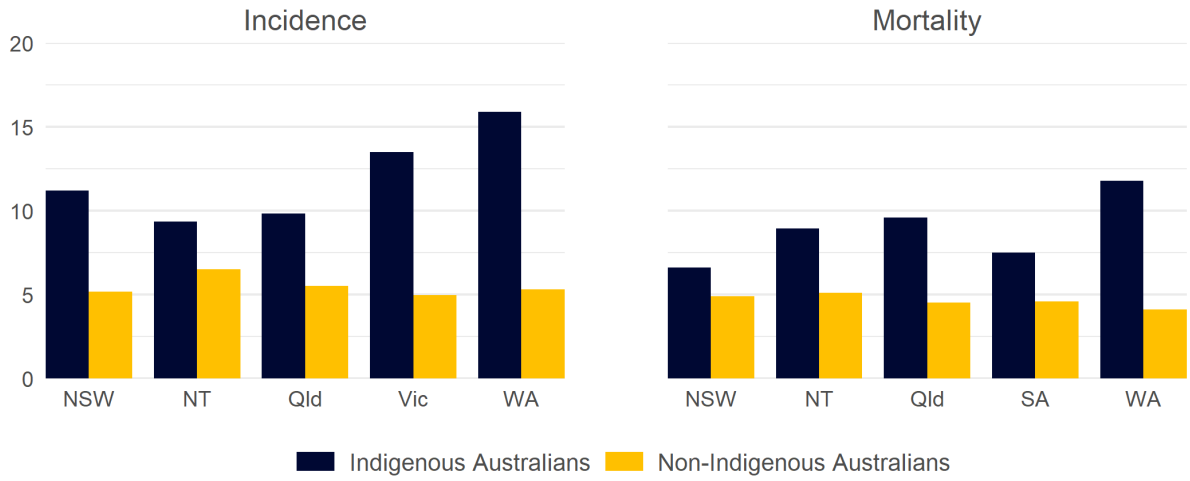


Source: Insight Economics analysis of AIHW state level data; shading reflects average age standardised rate over the 2013-2017 period, while numbers reflect average count over the 2013-2017 period.

According to AIHW data, regardless of state, Indigenous Australians have higher average ASRs of oesophageal cancer than non-Indigenous Australians. For example, data indicates that Indigenous Australians are between 1.4 and 3 times more likely to be diagnosed with oesophageal cancer, on an age standardised basis. The distribution of oesophageal adenocarcinoma and squamous cell carcinoma among Indigenous Australians may differ to others – for example, a study of oesophageal cancer in North Queensland indicates that squamous cell carcinoma may be relatively common in Indigenous Australian populations, and that it is more likely to be metastatic upon diagnosis.[73]

[73] Ho, V., Whiteman, D., Miller, M., Raulli, A., Ombiga, J., Boyd, P., 2009, Esophageal cancer in Indigenous Australians in Far North Queensland, J Gastroenterol Hepatol, 24(10), 1683-6, doi: 10.1111/j.1440-1746.2009.05897.

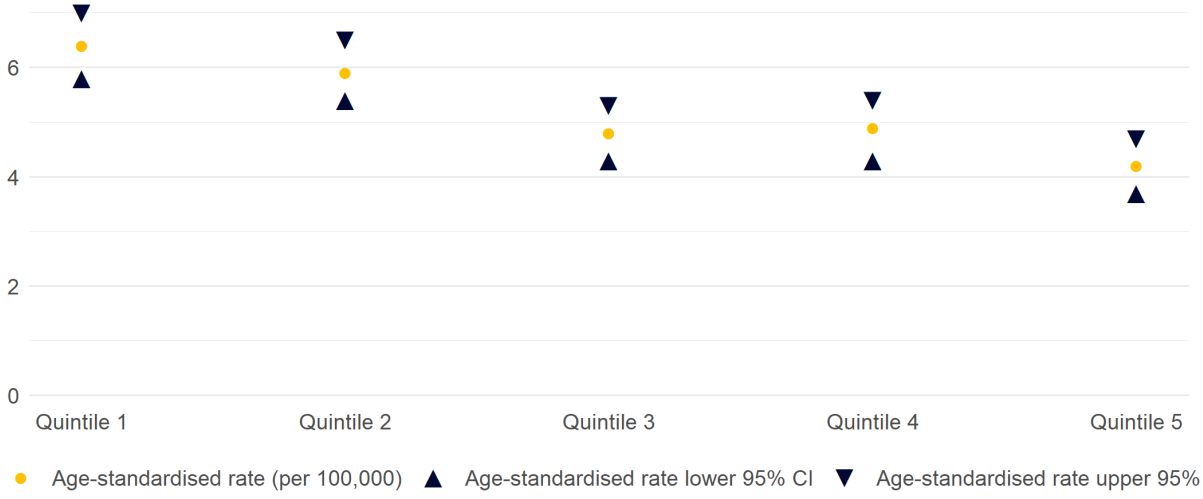
Figure 3.13: Oesophageal cancer incidence and mortality, Indigenous and Non-Indigenous, by state



Source: Insights Economics visualisation of AIHW, 2018, Cancer in Aboriginal and Torres Strait Islander people of Australia; incidence is reported over the period spanning 09–13 and mortality over the period spanning 11-15.

Comparing the point estimate of age standardised rate by socioeconomic status (NSW data), the rate of incidence of oesophageal cancer in the lowest quintile is approximately 1.5 times that in the highest quintile.

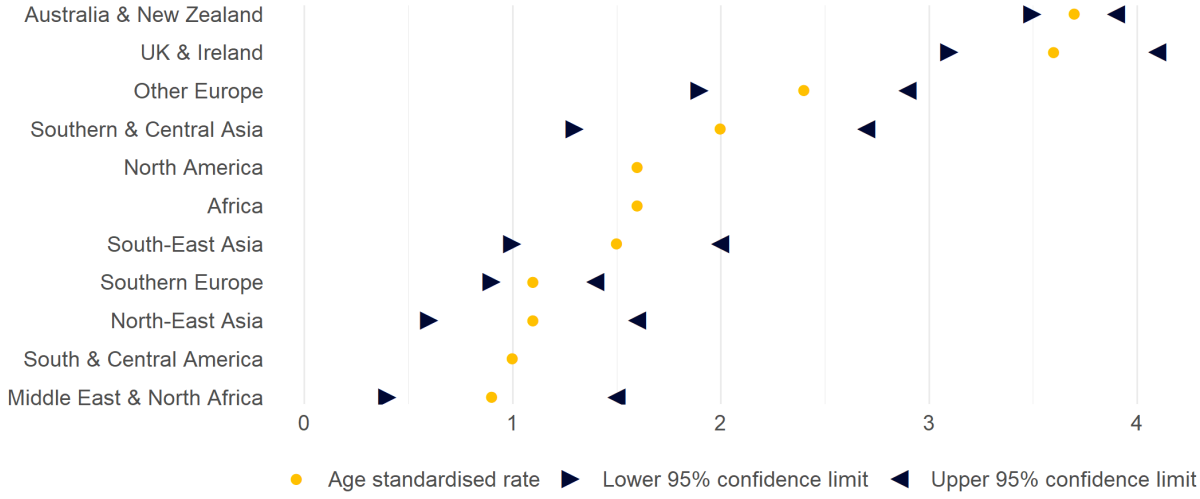
Figure 3.14: Oesophageal cancer incidence by socioeconomic status



Source: Insights Economics visualisation of CI NSW data, 2014-2017, available: https://www.cancer.nsw.gov.au/research-and-data/cancer-data-and-statistics.

Observing the distribution of oesophageal cancer diagnosed by country of birth in Victoria, those born in Australia and New Zealand, as well as UK and Ireland have the highest rates of oesophageal cancer.

Figure 3.15: Country of birth related variation in oesophageal cancer incidence

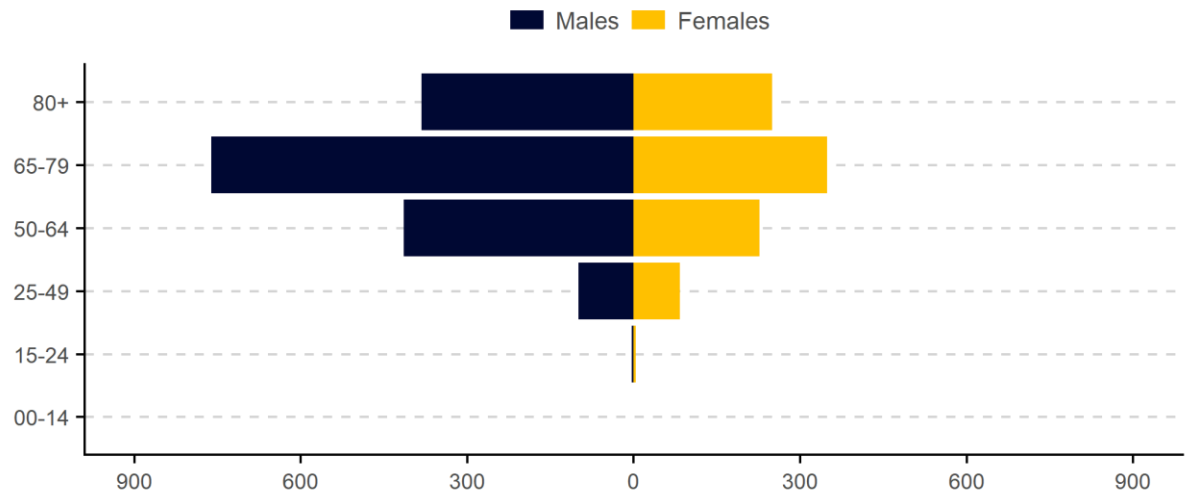


Note: Age standardized rate per 100,000. Source: Victorian Cancer Registry data, available: http://vcrdata.cancervic.org.au/.

Factors in Stomach cancer incidence and mortality

Analysis of AIHW data indicates that, in Australia, stomach cancer is most common in older males.

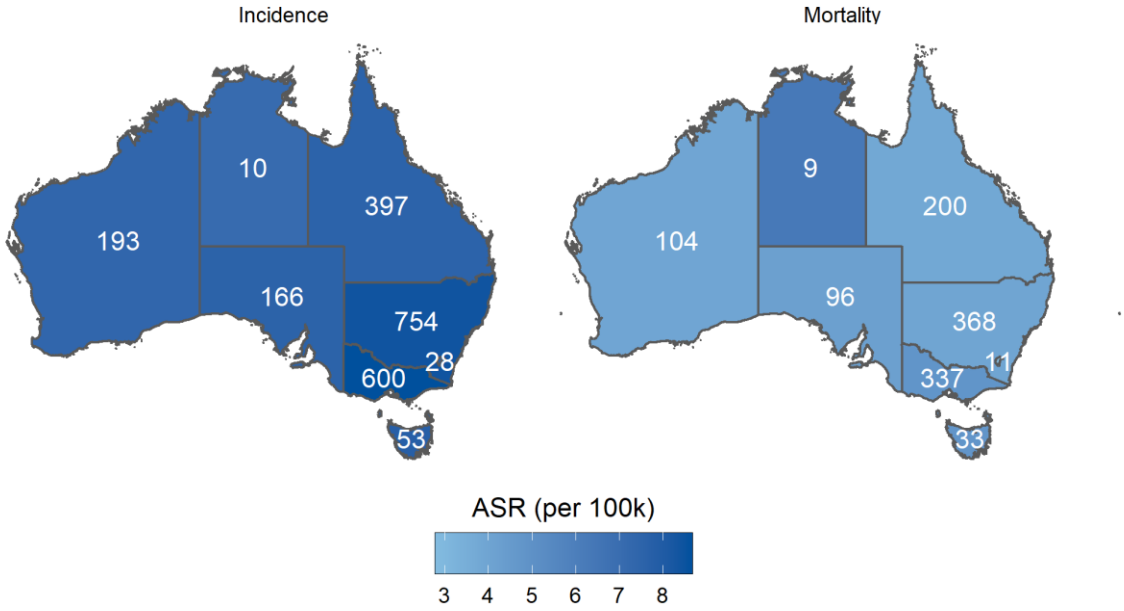
Figure 3.16: Stomach cancer incidence by age and sex, 2022



Source: Insights Economics visualisation of AIHW, 2022, Cancer in Australia 2022.

Incidence and mortality of stomach cancer is relatively evenly distributed across Australia, with relatively high incidence arising in the eastern states and territories (excluding Queensland) – Figure 3.17.

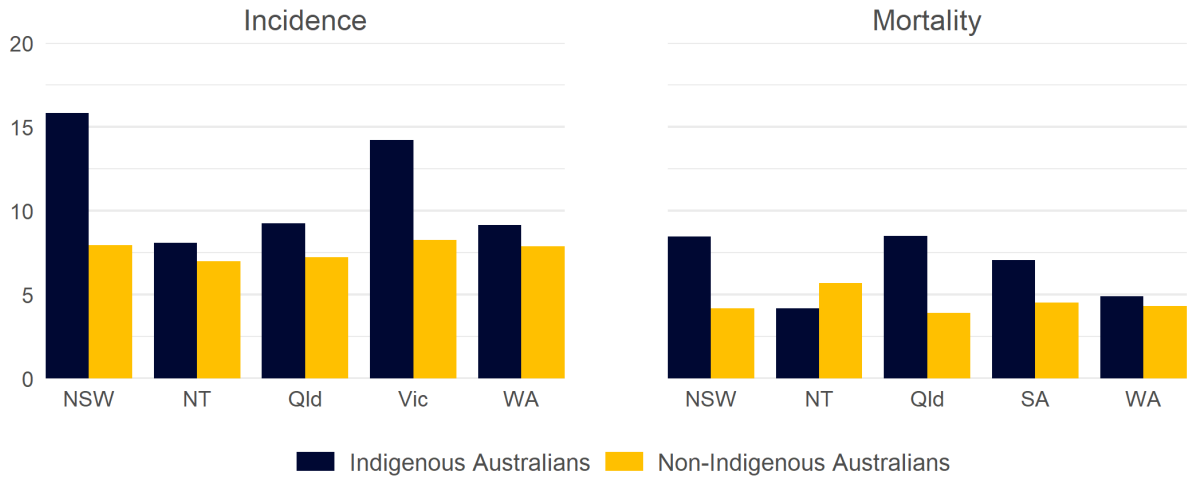
Figure 3.17: Average stomach cancer incidence and mortality over the 2013-2017 period



Source: Insight Economics analysis of AIHW state data; shading reflects average age standardised rate over the 2013-2017 period, while numbers reflect average count over the 2013-2017 period.

AIHW data indicates incidence (on an age standardised basis) of stomach cancer is either similar or relatively high in indigenous populations across Australia. This is consistent with research that describes higher burden of stomach cancer in indigenous populations globally, and rising (or, flat) incidence in indigenous groups, in contrast to the decreasing global trends.[74]

Figure 3.18: Stomach cancer incidence and mortality, Indigenous and Non-Indigenous, by state

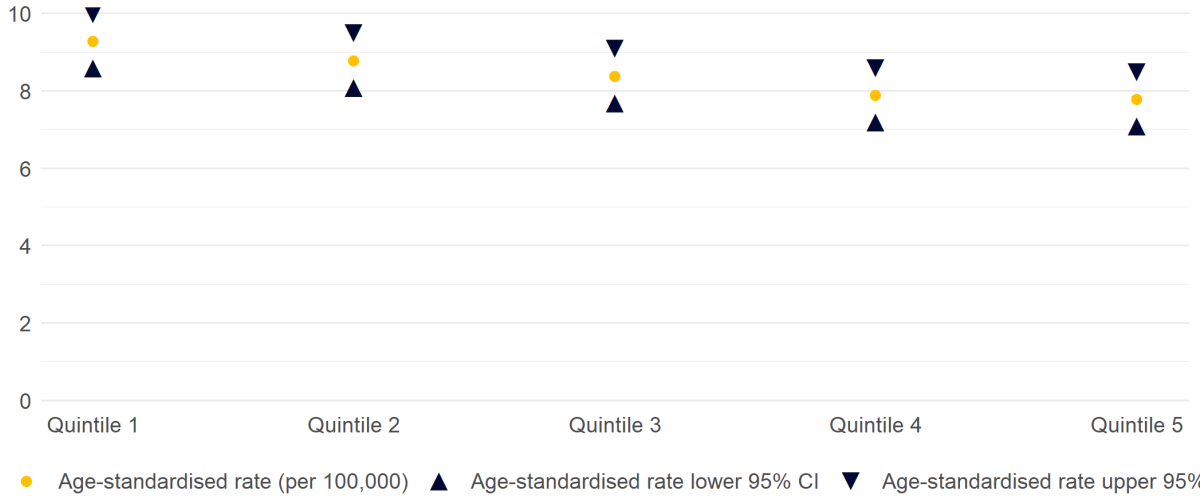


Source: Insights Economics visualisation of AIHW, 2018, Cancer in Aboriginal and Torres Strait Islander people of Australia; incidence is reported over the period spanning 09–13 and mortality over the period spanning 11-15.

Comparing the point estimate of age standardised rate by socioeconomic status (NSW data), there is limited indication that incidence of stomach cancer varies between quintiles.

[74] Arnold, M., Moore, S.P., Hassler, S., Ellison-Loschmann, L., Forman, D., Bray, F., 2014, The burden of stomach cancer in indigenous populations: a systematic review and global assessment, Gut, 63(1), 64-71, doi: 10.1136/gutjnl-2013-305033; AIHW, 2018, Cancer in Aboriginal and Torres Strait Islander people of Australia data.

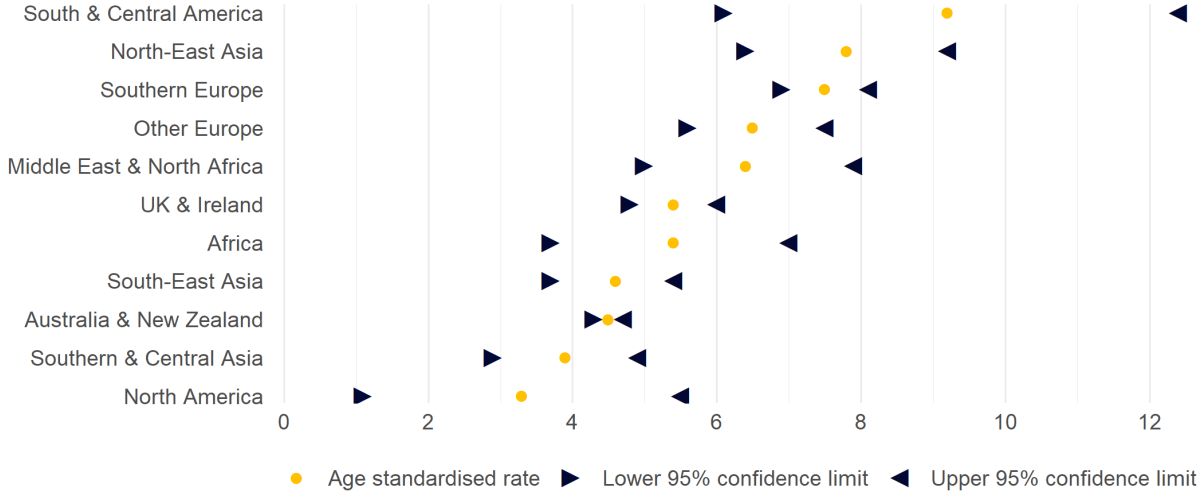
Figure 3.19: Stomach cancer incidence by socioeconomic status



Source: Insights Economics visualisation of CI NSW data, 2014-2017, available: https://www.cancer.nsw.gov.au/research-and-data/cancer-data-and-statistics.

Observing the distribution of stomach cancer diagnosed by country of birth in Victoria, those born in South and Central America, North-East Asia, and Southern Europe had relatively high rates of incidence.

Figure 3.20: Country of birth related variation in stomach cancer incidence



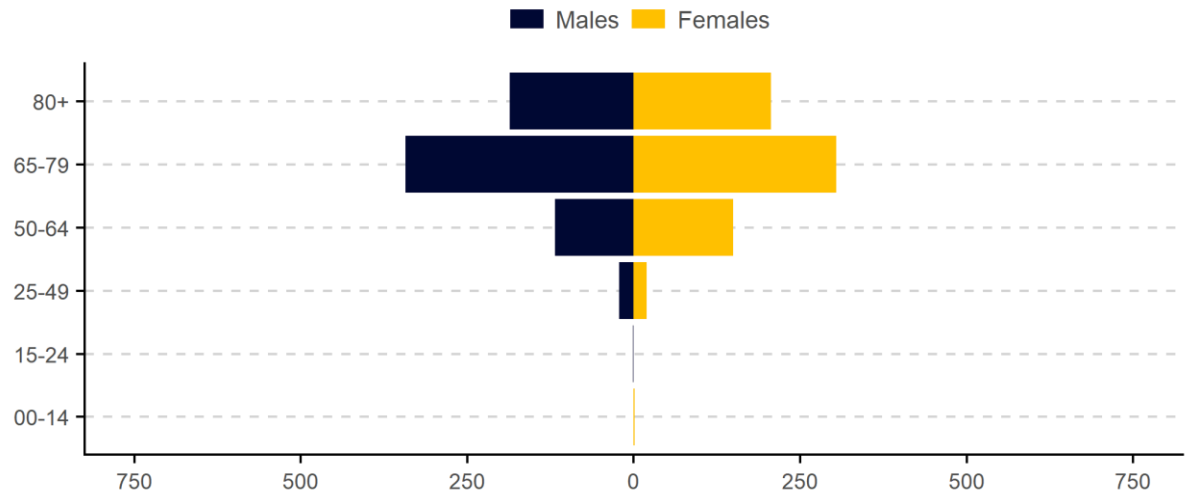
Note: Age standardized rate per 100,000. Source: Victorian Cancer Registry data, available: http://vcrdata.cancervic.org.au/.

Factors in Biliary cancer incidence and mortality

Because liver cancer is presented as including intrahepatic cholangiocarcinoma, analysis of biliary cancer data is limited to a partial picture.

Analysis of AIHW data illustrates that incidence is similar across sexes and that incidence increases with age – Figure 3.11.

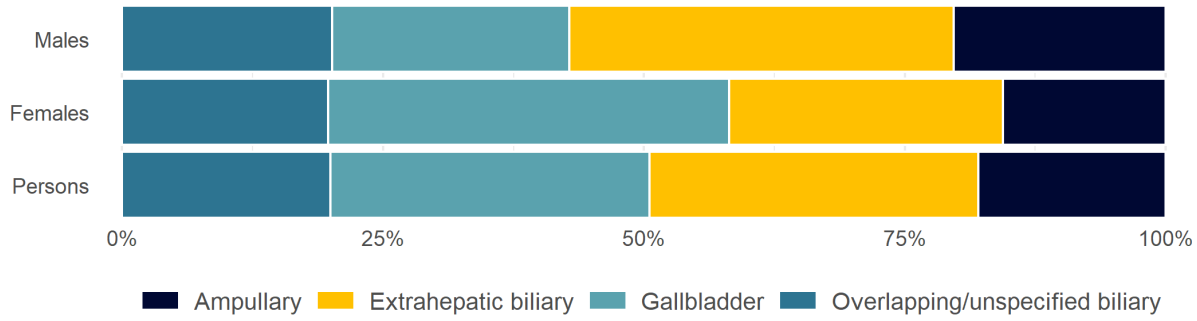
Figure 3.21: Biliary cancer incidence by age and sex, 2022



Note: Aggregation of extrahepatic bile duct cancer, gallbladder cancer and cancer of overlapping and unspecified sites in biliary tract. Source: Insights Economics visualisation of AIHW, 2022, Cancer in Australia 2022.

In July 2022, AIHW released data pertaining to incidence of biliary cancer subtypes (ampullary, extrahepatic, gallbladder and overlapping). AIHW's 2022 forecasts indicate that it is expected that men more frequently suffer extrahepatic bile duct cancer and ampullary cancer, while women more frequently suffer from gallbladder cancer. Collectively, the AIHW forecasts a similar number of men and women with biliary cancer in 2022 (670 and 679, respectively).

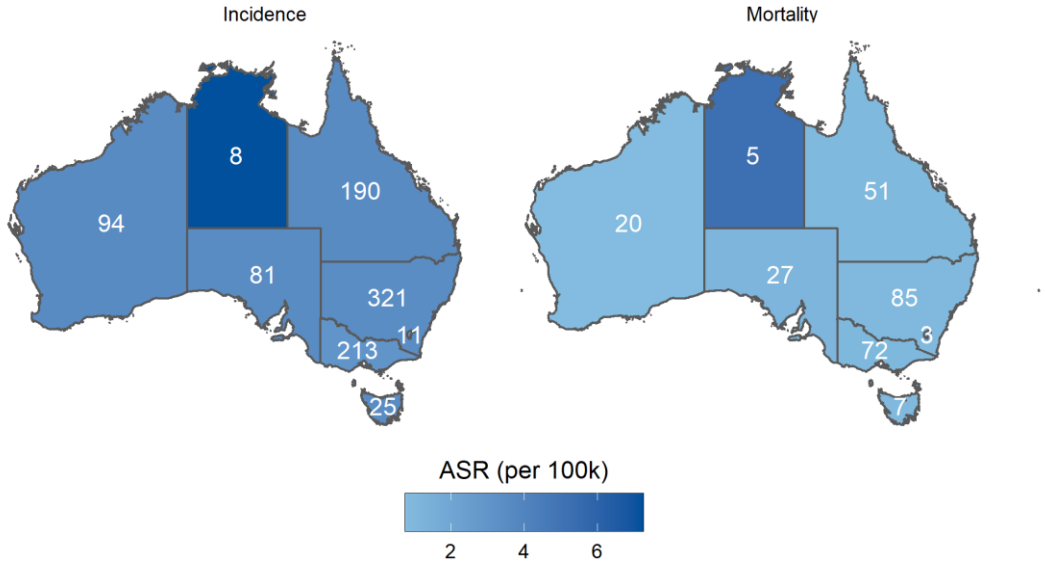
Figure 3.22: Proportion by biliary incidence by subgroup



Source: AIHW, 2022, Cancer in Australia data.

Incidence and mortality of biliary cancer is relatively evenly distributed across Australia, on an age standardised basis.

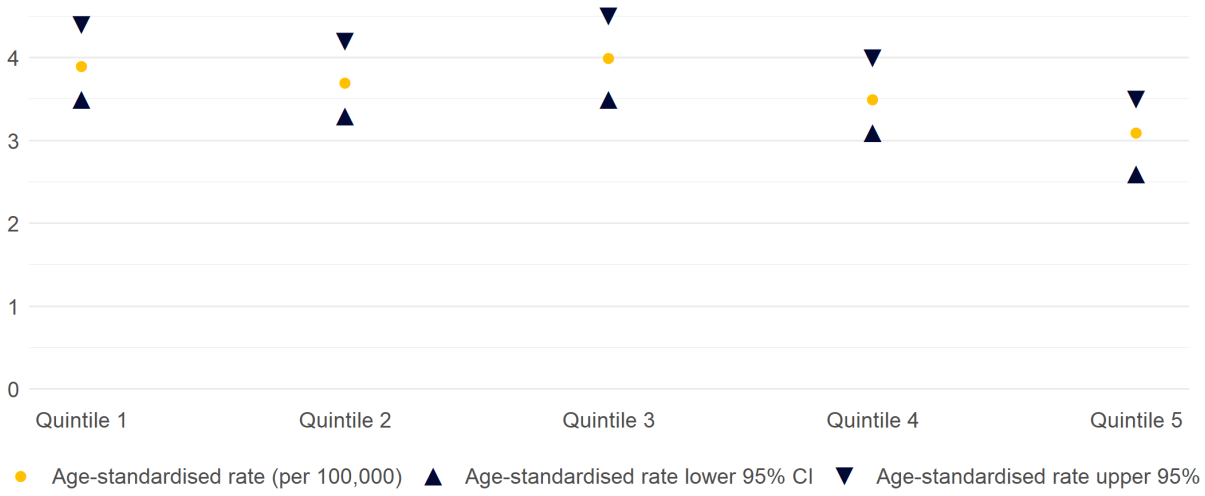
Figure 3.23: Average biliary cancer incidence and mortality over the 2013-2017 period



Source: Insight Economics analysis of AIHW state data; shading reflects average age standardized rate over the 2013-2017 period, while numbers reflect average count over the 2013-2017 period.

Comparing the point estimate of age standardised ratevby socioeconomic status (NSW data), there is limited indication that incidence of biliary cancer varies between quintiles.

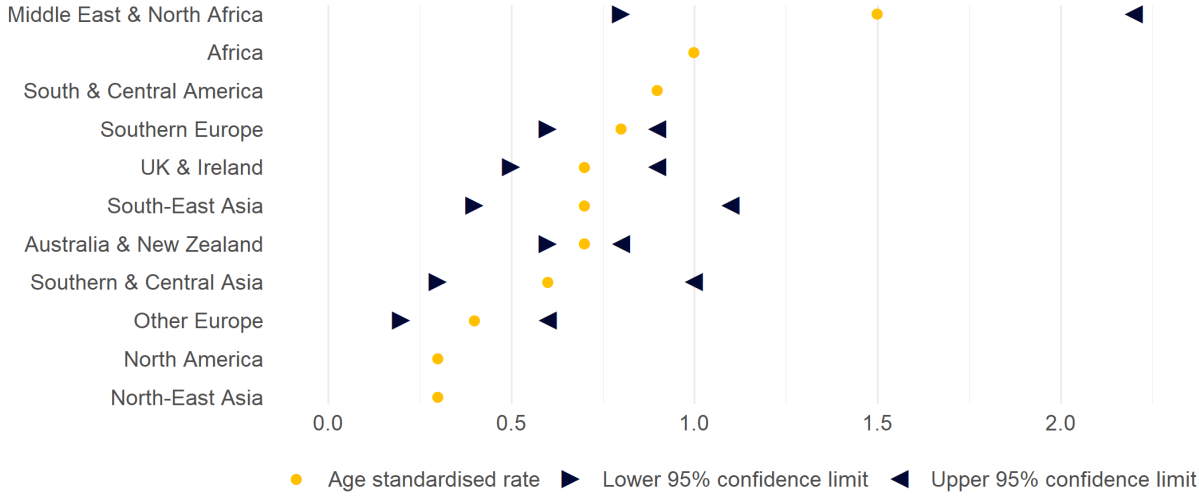
Figure 3.24: Biliary cancer incidence by socioeconomic status



Source: Insights Economics visualisation of CI NSW data, 2014-2017, available: https://www.cancer.nsw.gov.au/research-and-data/cancer-data-and-statistics.

Observing the distribution of biliary cancer diagnosed by country of birth in Victoria, there is limited sign of strong variation in biliary cancer incidence by country of birth.

Figure 3.25: Country of birth related variation in biliary cancer incidence

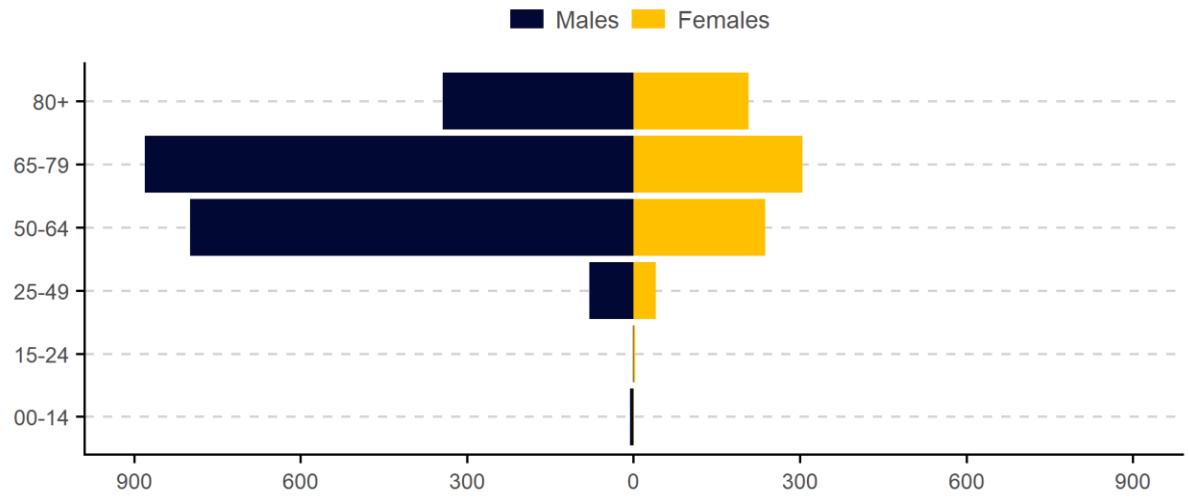


Note: Age standardized rate per 100,000. Note: Coded as gallbladder data. Source: Victorian Cancer Registry data, available: http://vcrdata.cancervic.org.au/.

Factors in Liver cancer incidence and mortality

In accordance with other demographic risk factors for liver cancer, AIHW data indicate that primary liver cancer is more common in older Australians and males, as illustrated in Figure 3.26. This corresponds with Lubel et al (2020), who highlight that liver cancer is three to four times more common in males than females.[75]

Figure 3.26: Liver cancer incidence by age and sex, 2022

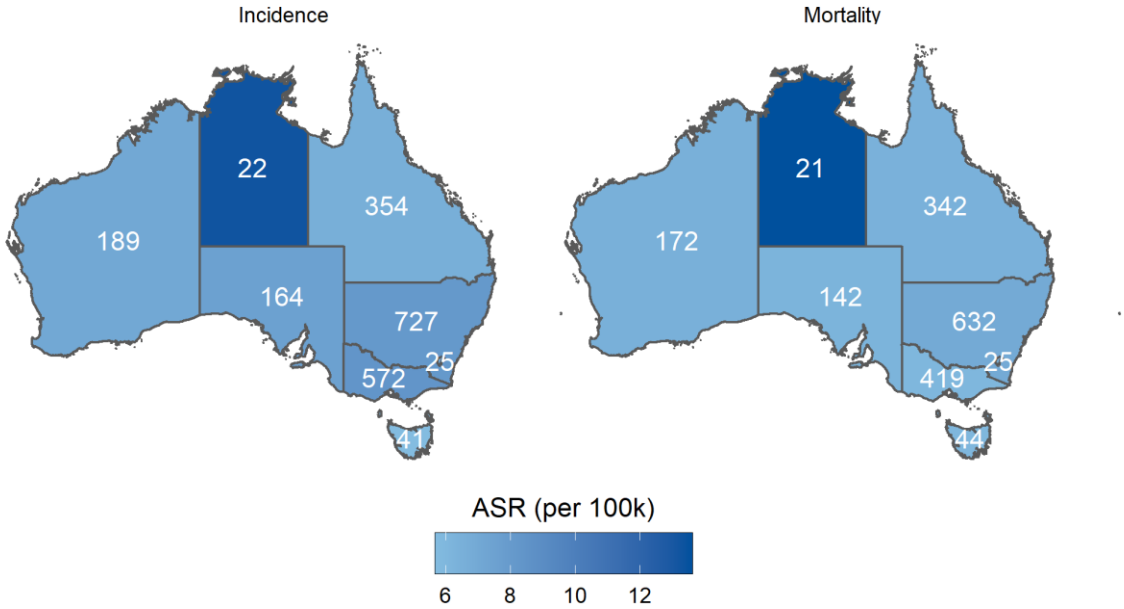


Source: Insights Economics visualisation of AIHW, 2022, Cancer in Australia 2022.

The incidence and mortality patterns across Australia correspond with the distribution of risk factors and use of preventative measures. The Northern Territory is highlighted as having a relatively higher age standardised rate.

[75] Lubel, J.S., Roberts, S.K., Strasser, S.I., Thompson, A.J., Philip, J., Goodwin, M., Clarke, S., Crawford, D.H., Levy, M.T., Shackel, N., 2021, Australian recommendations for the management of hepatocellular carcinoma: a consensus statement, Med J Aust, 214, 475-483, doi: 10.5694/mja2.50885.

Figure 3.27: Average liver cancer incidence and mortality over the 2013-2017 period



Source: Insight Economics analysis of AIHW state data; shading reflects average age standardised rate over the 2013-2017 period, while numbers reflect average count over the 2013-2017 period.

The pattern is further explained by the relative age standardised rate of Indigenous and non-Indigenous-Australians. As highlighted in Figure 3.28, incidence of liver cancer in Indigenous Australians is up to 4 times incidence in non-Indigenous Australians. The relatively substantial burden of liver cancer on Indigenous Australians is well noted by the literature.

For instance, in a 2020 consensus statement and a 2021 call to action, Lubel et al (2020) and Howell et al (2021) highlight that Indigenous Australians have considerably higher rates (up to 6 times higher incidence) of diagnosis and mortality compared with non-Indigenous populations, noting a range or possible contributors including:[76]

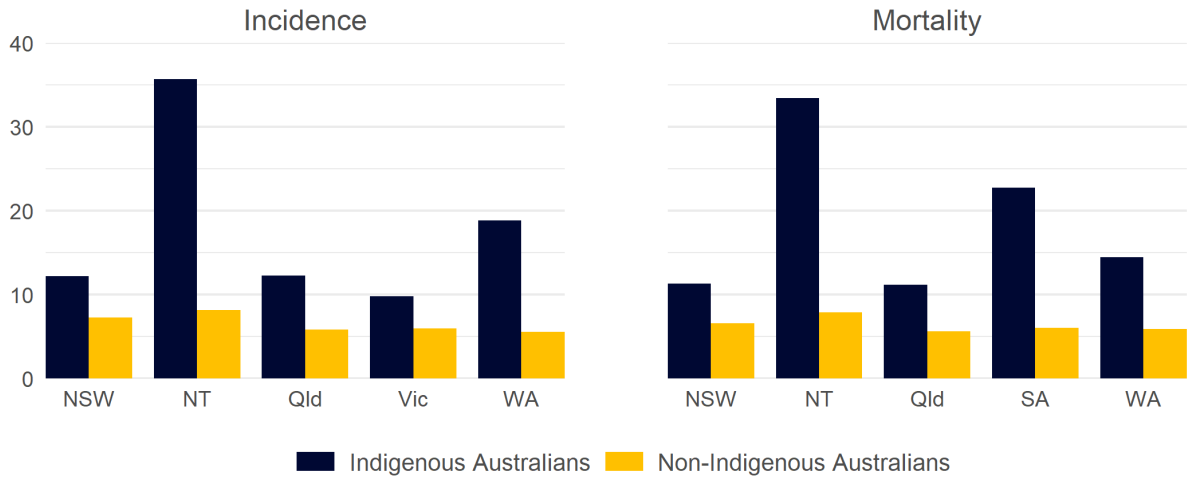
- Inequalities in health service access, which lead to delays in presentation; for example, only 14 per cent are detected through surveillance programs
- Risk factors such as hepatitis B and hepatitis C, smoking, obesity alcohol and diabetes
- Social economic disadvantage and barriers
- Geographical remoteness.

Reflecting the urgency of this issue, Howell et al (2021) issued a call to action on this issue demanding investment in culturally informed and Indigenous-led programs.[77]

[76] Lubel, J.S., Roberts, S.K., Strasser, S.I., Thompson, A.J., Philip, J., Goodwin, M., Clarke, S., Crawford, D.H., Levy, M.T., Shackel, N., 2021, Australian recommendations for the management of hepatocellular carcinoma: a consensus statement, Med J Aust, 214, 475-483, doi: 10.5694/mja2.50885.

[77] Howell, J., Ward, J.S., Davies, J., Clark, P.J., Davis, J.S., 2021, Hepatocellular carcinoma in Indigenous Australians: a call to action, Med. J. Aust., 214, doi: 10.5694/mja2.5096; Lubel, J.S., Roberts, S.K., Strasser, S.I., Thompson, A.J., Philip, J., Goodwin, M., Clarke, S., Crawford, D.H., Levy, M.T., Shackel, N., 2021, Australian recommendations for the management of hepatocellular carcinoma: a consensus statement, Med J Aust, 214, 475-483, doi: 10.5694/mja2.50885.

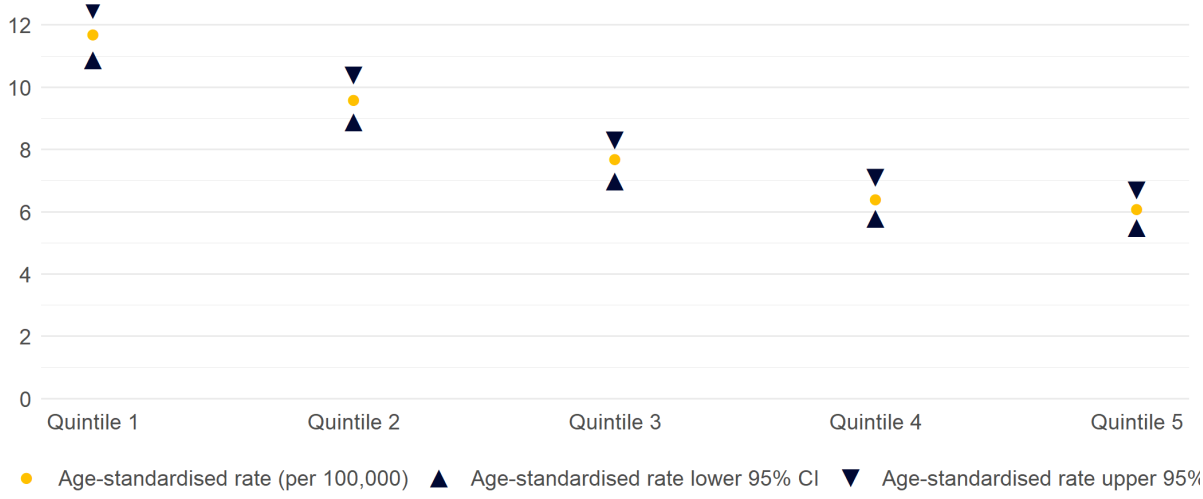
Figure 3.28: Liver cancer incidence and mortality, Indigenous and Non-Indigenous, by state



Source: Insights Economics visualisation of AIHW, 2018, Cancer in Aboriginal and Torres Strait Islander people of Australia; incidence is reported over the period spanning 09–13 and mortality over the period spanning 11-15.

Comparing the point estimate of age standardised rate by socioeconomic status (NSW data), people from the lowest socioeconomic quintile have nearly times higher rates of incidence than people from the highest quintile.

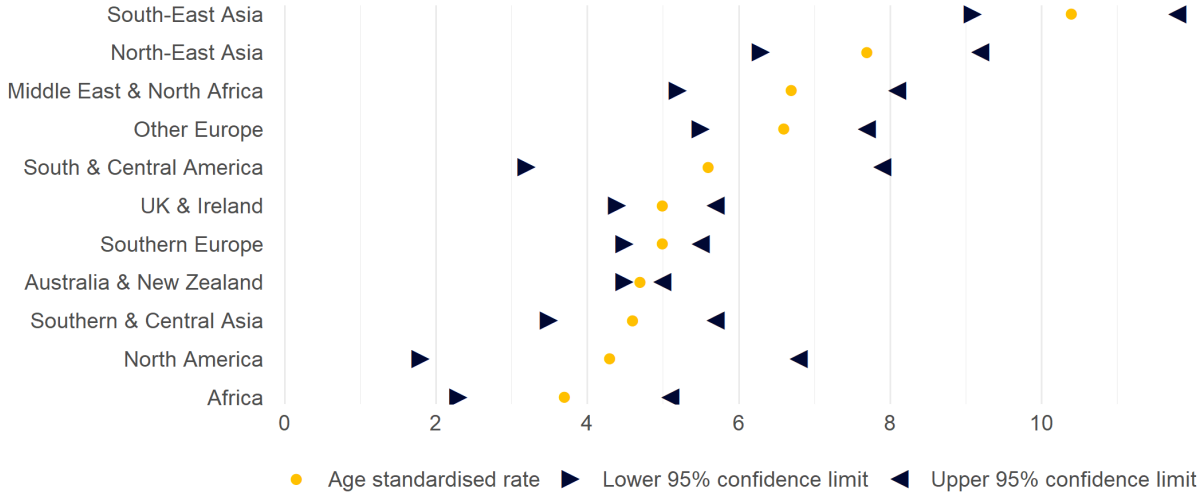
Figure 3.29: Liver cancer incidence by socioeconomic status



Source: Insights Economics visualisation of CI NSW data, 2014-2017, available: https://www.cancer.nsw.gov.au/research-and-data/cancer-data-and-statistics.

Observing the distribution of liver cancer diagnosed by country of birth in Victoria, people from South-East and North-East Asia, followed by people from Middle East and North Africa, have relatively high incidence rates.

Figure 3.30: Country of birth related variation in liver cancer incidence



Note: Age standardised rate per 100,000. Source: Victorian Cancer Registry data, available: http://vcrdata.cancervic.org.au/.

Chapter 4

Existing and emerging challenges in upper GI cancers

While Australians enjoy access to a high quality, globally-leading healthcare system, Australian patients and carers face a range of challenges associated with the risk, treatment and care of upper GI cancers. This chapter systematically identifies the range of challenges or barriers that exist or are emerging to improve survival outcomes and quality of life for people living with upper GI cancers and their families.

Key findings:

- **There is mixed success in risk prevention; for example, although aggregate rates of smoking have declined, obesity is rising within Australia**
- **Modifiable risk is high among Indigenous Australians, migrant communities, people of culturally and linguistically diverse backgrounds and Australians from low socioeconomic backgrounds**
- **Limited implementation of best practice means that improvements have not been consistently translated across Australia; for example, MDTs are inconsistently utilised and secondary prevention is not taken up**
- **Despite high cancer burden, supportive care is inconsistently provided**
- **Funding for research is historically limited and infrastructure barriers and inefficiencies exist, which limit capacity of Australian researchers to improve survival.**

4.1 Overview of the challenges to improved outcomes for Upper GI cancers

Today, upper GI cancers collectively result in close to 1 in 5 cancer deaths. Reflecting mixed success in preventable risk factors, growth in upper GI cancer incidence varies; for example, although aggregate rates of smoking have declined, obesity is rising within Australia. Despite the possibility of secondary prevention, especially for liver cancer, this is inconsistently utilised with limited identification of at-risk groups prior to cancer diagnosis.

Poor outcomes for those with cancer are in part due to late detection, with limited early symptoms and inconsistent surveillance where possible. Furthermore, these cancers are complex and difficult to treat, with some of the most severe curative surgeries and limited effectiveness of current drug therapies. Severity of treatment and low survival rates necessitate multidisciplinary care, with provision of allied health and peer support; however, adequate provision is limited.

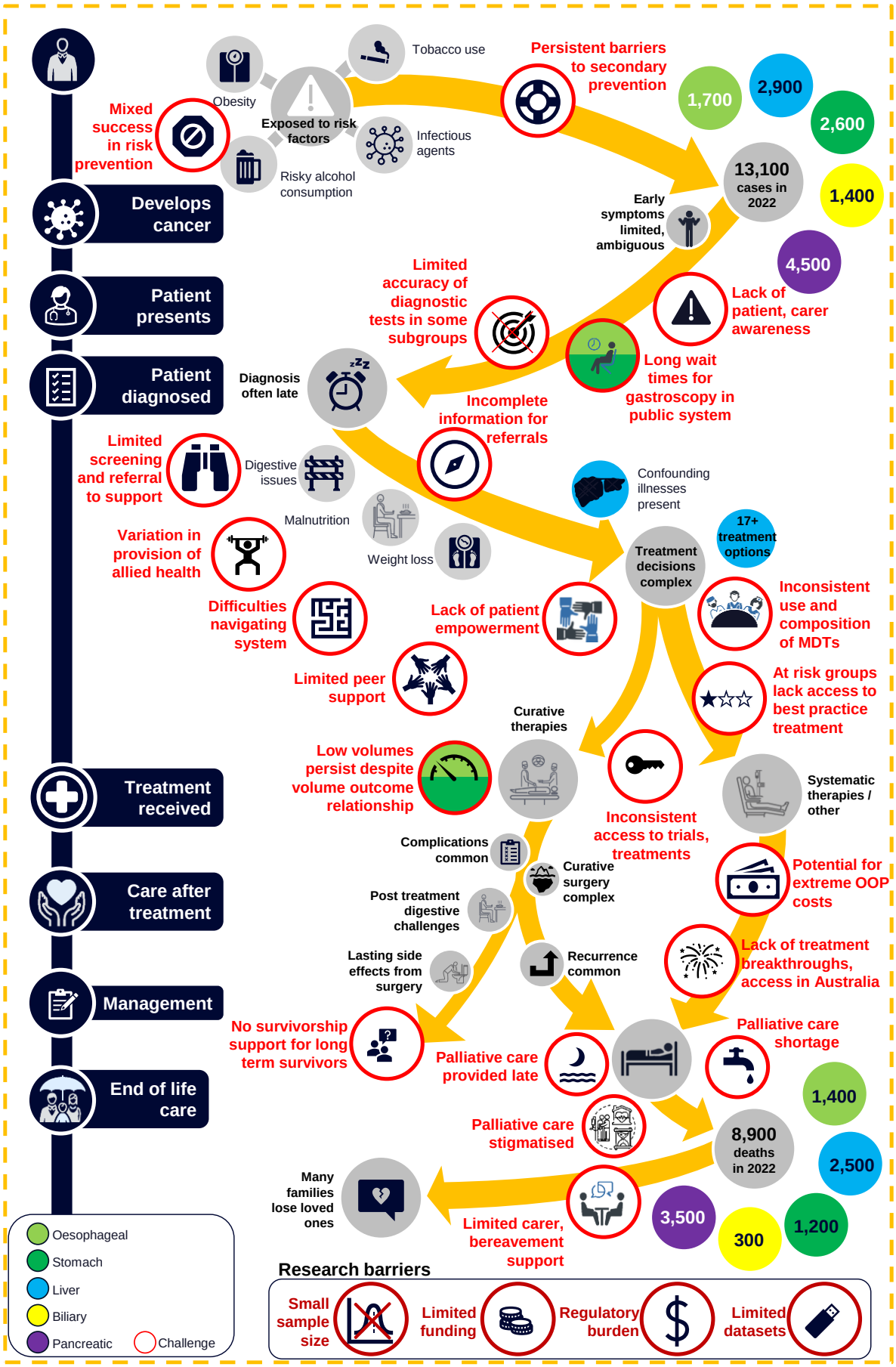
Reducing deaths from upper GI cancers will require stakeholders to address a complex set of issues encompassing health system reforms and investments in research for cures. Figure 4.1 below summarises the existing and emerging challenges that exist to improving the survival outcomes and quality of life for people impacted by upper GI cancers including:

- Mixed success in risk prevention and early detection

- Persistent barriers in secondary prevention: liver disease and Barrett's oesophagus
- Difficulties in early detection
- Issues in timely diagnosis and referral
- Variation in treatment
- Need to develop a workforce of the future
- Significant variation and barriers to palliative and end of life care
- Inconsistent access to supportive care
- Limited funding for research, absence of enabling infrastructure

These issues are explored in turn, drawing on survey evidence of people living with upper GI cancers, consultations with more than 50 stakeholders and a secondary research review of available literature and data.

Figure 4.1: Challenges in upper GI cancer prevention, detection, diagnosis, treatment and supportive care today



4.2 Mixed success in primary prevention

As highlighted in Chapter 2, there are a variety of common risk factors for developing upper GI cancers, including lifestyle risk factors and infectious agents. Where opportunities for primary or secondary prevention exist, Australian preventative efforts have been of varying success. Stakeholders asserted that preventable lifestyle factors are large national issues:

> *Lifestyle factors are huge standouts. Australia has a huge problem. I'm not pointing the finger at anyone; it's just ingrained within our culture. These are big, national issues (obesity, excess alcohol, tobacco).*

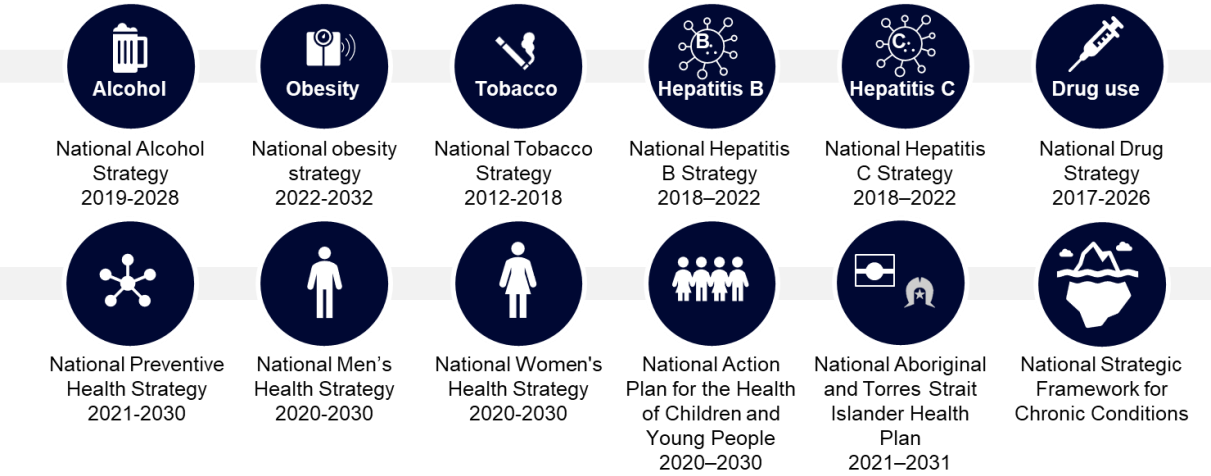
There are a large variety of challenges associated with primary prevention of lifestyle risk factors, involving promoting positive behavioural change. Stakeholders noted that these issues are difficult to solve:

> *They are tricky issues; if they were easy to solve, we would have solved them. They're even more tricky for Indigenous Australians, culturally and linguistically diverse and socially disadvantaged.*

The implication is that these issues are not upper GI cancer specific; they are far reaching and complex, with issues including stigma and basic health literacy. To date, broad national policies addressing these issues exist; however, the extent of historical effort and success of these policies has been variable.

An overview of the challenges in primary risk prevention for upper GI cancers in Australia is discussed below.

Figure 4.2: Sample of national preventative policies targeting risk factors



Promising reduction in tobacco use but remains high among some groups

Tobacco consumption is associated with a vast array of illnesses; chronic obstructive pulmonary disease (COPD) was the leading cause of death and illness due to smoking, followed by lung cancer and coronary heart disease. Smoking also contributes to upper GI cancers:[78]

- Oesophageal cancer is the fifth largest cause of death and illness due to smoking
- Pancreatic cancer is the seventh largest cause of death and illness due to smoking

[78] Greenhalgh, E.M., Scollo, M.M., Winstanley, M.H., 2021, Tobacco in Australia: Facts and issues, Cancer Council Victoria, available: https://www.tobaccoinaustralia.org.au/chapter-3-health-effects/3-30-total-burden-of-death-and-disease-attributable-to-tobacco-by-disease-category.

- Liver cancer is the ninth largest cause of death and illness due to smoking.

Reflecting the vast array of consequences of tobacco smoking, numerous preventative policies have been implemented in Australia, including broad policies such as the Tackling Indigenous Smoking (TIS) program and QUIT program, plain packaging and health warnings, bans on advertising and promotions, subsidised substitute products, regulatory restrictions on use (including the prohibition of sale or supply of nicotine e-cigarettes) and media campaigns, such as 'Don't make smokes your story'.

Reflecting combined efforts, since 1990 smoking has generally decreased in prevalence. For example, the proportion of Australian adults consuming cigarettes on a daily basis has decreased from 28.4 per cent (1989-90) to 10.7 per cent (2020-21).[79]

In light of this downwards trend, Australian anti-smoking policy was considered broadly successful by stakeholders and the wider community. However, tobacco control in Australia is often considered an 'unfinished success story' – tobacco use remains the leading risk factor contributing to disease burden, contributing to 8.6 per cent of total burden. Furthermore, daily smoking remains prominent in some subsets of the population, including:[80]

- The proportion of male smokers (12.6 per cent) exceeds females (8.8 per cent)
- The proportion of smokers from the outer regional (21.2 per cent) and inner regional (19.1 per cent) exceeds that in major cities (10.3 per cent)
- The proportion of smokers from the lowest socioeconomic quintile (20 per cent) is close to four times that of the highest socioeconomic quintile (5.4 per cent)
- 37 per cent of Indigenous Australians aged 15 years or more smoke daily.

One concern is that investment in tobacco control within Australia has fallen short of international benchmarks, with limited continued investment in mass media antismoking (educational) campaigns despite previous cost effectiveness.[81]

Risky consumption of alcohol difficult to address

Alcohol has a complex role in Australian society, with Australia's drinking culture extending as early as colonisation.[82] However, in 2018, 4.5 per cent of the total disease burden in Australia was estimated to be the result of alcohol use. Liver cancer is the third largest cause of death and illness due to alcohol use, while oesophageal cancer is the 14th largest cause of death and illness due to alcohol use.[83]

To encourage health alcohol consumption, various strategies and initiatives have been developed in Australia, e.g.:

- National Alcohol Strategy 2019-2028
- Legislation, including restrictions on drinking age and laws against drink driving

[79] AIHW, Tobacco Smoking, available: https://www.aihw.gov.au/reports/australias-health/tobacco-smoking; ABS, 2022, Smoking, available: https://www.abs.gov.au/statistics/health/health-conditions-and-risks/smoking/latest-release.
[80] AIHW, Tobacco Smoking, available: https://www.aihw.gov.au/reports/australias-health/tobacco-smoking; AIHW, Health of Prisoners, 2019; Grogan, P., Banks, E., 2020, Far from 'mission accomplished': time to re-energise tobacco control in Australia. Public Health Res Pract, 30(3), e3032016.
[81] Grogan, P., Banks, E., 2020, Far from 'mission accomplished': time to re-energise tobacco control in Australia. Public Health Res Pract, 30(3), e3032016.
[82] The Conversation, 2013, A brief history of alcohol consumption in Australia; Australian Government, 2019, National Alcohol Strategy 2019-2028.
[83] AIHW, 2018, Australian Burden of Disease Study, available: https://www.aihw.gov.au/reports/burden-of-disease/abds-2018-interactive-data-risk-factors/contents/alcohol-use.

- Various campaigns, such as 'No Excuse Needed', 'Alcohol think again', and 'Break the habit'
- Dry July, Sober October, and charity initiatives
- Funded research (National Drug and Alcohol Research Centre, National Drug Research Institute, National Centre for Education and Training on Addiction).

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However, there are concerns regarding the efficacy of these initiatives. For example, it has previously been noted that 'the most successful strategies are often not implemented or enforced for political and economic reasons'.[84] Risky levels of alcohol consumption continue; ABS data (National Health Survey, 2020-21) indicates that:

- 19.9 per cent of the Australian population consumed more than 10 drinks in the last week prior to survey
- 26.8 per cent of adult men consumed more than 10 drinks in the last week prior to survey, compared to 13.4 per cent of women
- the proportion of people consuming more than 10 drinks in the last week prior to survey was 18.6 per cent in major Australian cities, and 24.6 per cent in outer regional and remote Australia.

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One challenge with promoting healthy consumption of alcohol is public awareness; only 55.5 per cent of participants in a survey of New South Wales residents were aware that alcohol is a risk factor for cancer. This contributes to a difficult policy setting, with mixed support for policy which restricts alcohol consumption and/or promotes healthy consumption:[85]

> *Overall, support for alcohol policies in NSW is not increasing. Initiatives to raise awareness about the health consequences of alcohol use, together with effective alcohol policies, are needed to counter industry influence on decision makers and negative public discourse.*

Obesity in Australia is a rising concern

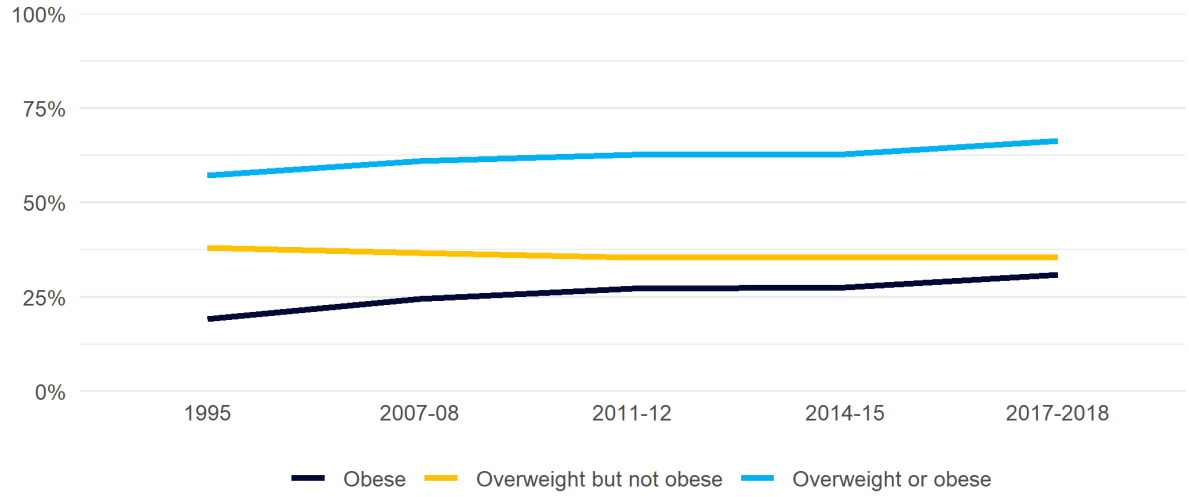
Historically, there has been limited national effort to mitigate levels of obesity, reflecting a variety of issues including limited awareness of the extent of consequences of obesity.

However, the severe consequences of obesity are increasingly recognised: in 2018, 8.4 per cent of the disease burden in Australia was due to overweight and obesity, making it the second largest risk factor contributing to disease burden after tobacco use (8.6 per cent). Among consequences, liver cancer is the 11th largest cause of death and illness due to obesity use and overweightness, while oesophageal cancer is the 12th largest cause of death and illness due to obesity and overweightness.[86]

Reflecting various factors, including limited policy effort, prevalence of obesity and overweightness is increasing; in 2017-18, an estimated 67 per cent of Australians aged 18 and over were overweight or obese.

[84] Pennay, A., et al., Alcohol: prevention, policy and primary care responses, 2014, AFP, 43(6).
[85] Watson, W.L., Stapleton, N., Buykx, P., Hughes, C., Dessaix, A., 2021, Changes in public support for alcohol policies in NSW, Australia, 2013–2019, Public Health Res Pract, doi: 10.17061/phrp31452118.
[86] AIHW, 2018, Australian Burden of Disease Study, available: https://www.aihw.gov.au/reports/burden-of-disease/abds-2018-interactive-data-risk-factors/contents/alcohol-use.

Figure 4.3: Trend in obesity and overweightness, 1995 to present



Source: ABS National Health Survey.

Increasing rates of obesity and particularly observable in disadvantaged groups. For example:[87]

- In NSW, between 2002 and 2020, rates of obesity in outer regional and remote areas, inner regional areas and major cities have increased to 39.2 per cent (from 20 per cent), to 28.4 per cent (from 15.8 per cent) and to 20 per cent (from 13.9 per cent)
- In NSW, between 2002 and 2020, rates of obesity for Indigenous Australians increased to 37.6 per cent (from 19.4 per cent) and for Non-Indigenous Australians increased to 22.1 per cent (from 14.6 per cent)
- In 2017-18, 71.8 per cent of adults living in areas of most disadvantage were overweight and obese compared to 62.6 per cent of adults living in areas of least disadvantage
- In 2015, 35.2 per cent of children and teenagers in areas of most disadvantage were overweight and obese compared to 22.5 per cent in areas of least disadvantage.

Relatedly, people frequently fail to meet activity and diet guidelines. For example, in 2020-21, 71.9 per cent of adults failed to meet age-relevant activity guidelines, with 13.5 per cent reporting zero minutes of physical activity within the last week. Furthermore, in 2020-21, 55.2 per cent reported inadequate fruit consumption and 91.2 per cent reported inadequate vegetable consumption.

Stakeholders raised concerns that obesity has not been adequately addressed in Australia, due to a myriad of issues including stigma, a lack of political and health system willingness to address obesity and overweightness, and a lack of systemic approach to implementing and evaluating obesity policies.

The strength of stakeholder concern varied by cancer type; for example, while one stakeholder noted that the relationship between obesity and oesophageal cancer is still not necessarily well understood (warranting further research to allow fair evaluation and accurate communication of risk), hepatocellular carcinoma stakeholders expressed strong concern that obesity will proceed to overwhelm present risk factors (Figure 4.4).

[87] ABS, National Health Survey, 2020-21; NSW Health, Overweight and obesity in adults.

Figure 4.4: Obesity as a risk factor – stakeholder perspectives

Mixed success in primary prevention of infectious diseases

Australia has implemented numerous policies which leverage the hepatitis B vaccine, including universal immunisation of infants, scheduled and catch-up vaccinations for people under 20 through the National Immunisation Program. Simultaneously, additional programs have been implemented which encourage reduced spread of hepatitis, i.e., programs which promote reduced or safe drug use and programs which promote safe sex.

While stakeholders generally viewed these programs positively, particular challenges for at-risk groups remain; for example, hepatitis B is four times more common in Australia's Indigenous people than in the rest of the country's population, which may reflect:[88]

- Discrepancies in system access for those in remote areas and Indigenous Australians, including health literacy and broader health
- Variations in type of hepatitis, with a strain that may be more aggressive than those in other populations – a 2019 study observed that the progression rate to cirrhosis in Indigenous Australians was two and a half times the rate observed in studies following populations that have other subtypes
- Varied antenatal vaccination of Indigenous Australian children.

Simultaneously, overcrowding and hygiene may contribute to spread within disadvantaged community. Importantly, it is not possible to prevent all cases of infection (e.g., reflecting migration from endemic areas, populations with illness). In these cases, secondary prevention is necessary.

[88] Plackett, B., 2022, Why hepatitis B hits Aboriginal Australians especially hard, Nature, 603, S62-S63, doi: 10.1038/d41586-022-00820-1.

4.3 Persistent barriers in secondary prevention and early detection

There are limited early symptoms of upper GI cancers, and at early stages these are often ambiguous. For example, patients highlighted that:

I think with my type of cancer [biliary cancer], it's a sleeping giant.

I was fit and well [prior to diagnosis]. Just did 100 kms (Around the Bay) cycling event in Melbourne. Same month as diagnosis.

However, upper GI cancers can arise in the background of known diseases:

- Oesophageal cancer develops in a background of Barrett's oesophagus
- Liver cancer frequently occurs in a background of liver disease
- Stomach cancer may occur in the background of H. pylori. [89]

These diseases are often treatable; therefore, if these diseases are detected adequately early, the risk of developing relevant cancers can be mitigated through treatment (secondary prevention). Furthermore, where secondary prevention is unsuccessful or not possible, surveillance of those at-risk of developing cancer can lead to detection of cancers at a relatively early stage without needing symptoms to be displayed.[90] Therefore, secondary prevention and early detection can be decomposed into three steps:

- Identification of precursor disease
- Treatment of precursor disease, if possible
- Surveillance of patients at with precursor disease (including following treatment).

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Stakeholders indicated an array of challenges to secondary prevention and early detection of hepatocellular carcinoma and oesophageal cancer, including:

- Inconsistent identification of patients with liver disease
- Inconsistency of access and adherence to treatment of liver disease.
- Inconsistency of access and adherence to liver cancer surveillance
- Limited cost effectiveness of current approach to surveillance of Barrett's oesophagus.

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These are addressed by cancer.

[89] However, this is a matter for future research, especially considering the possibility of H pylori reducing risk of oesophageal cancer. See: Xie, F.J., Zhang, Y.P., Zheng, Q.Q., Jin, H.C., Wang, F.L., Chen, M., Shao, L., Zou, D.H., Yu, X.M., Mao, W.M., 2013, Helicobacter pylori infection and esophageal cancer risk: an updated meta-analysis, World J Gastroenterol, 19(36), doi: 10.3748/wjg.v19.i36.6098.

[90] Although cancer screening is adopted in a subset of foreign countries with high cancer incidence, these are not presently recommended in Australia due to relatively low incidence and lack of cost effective technologies.

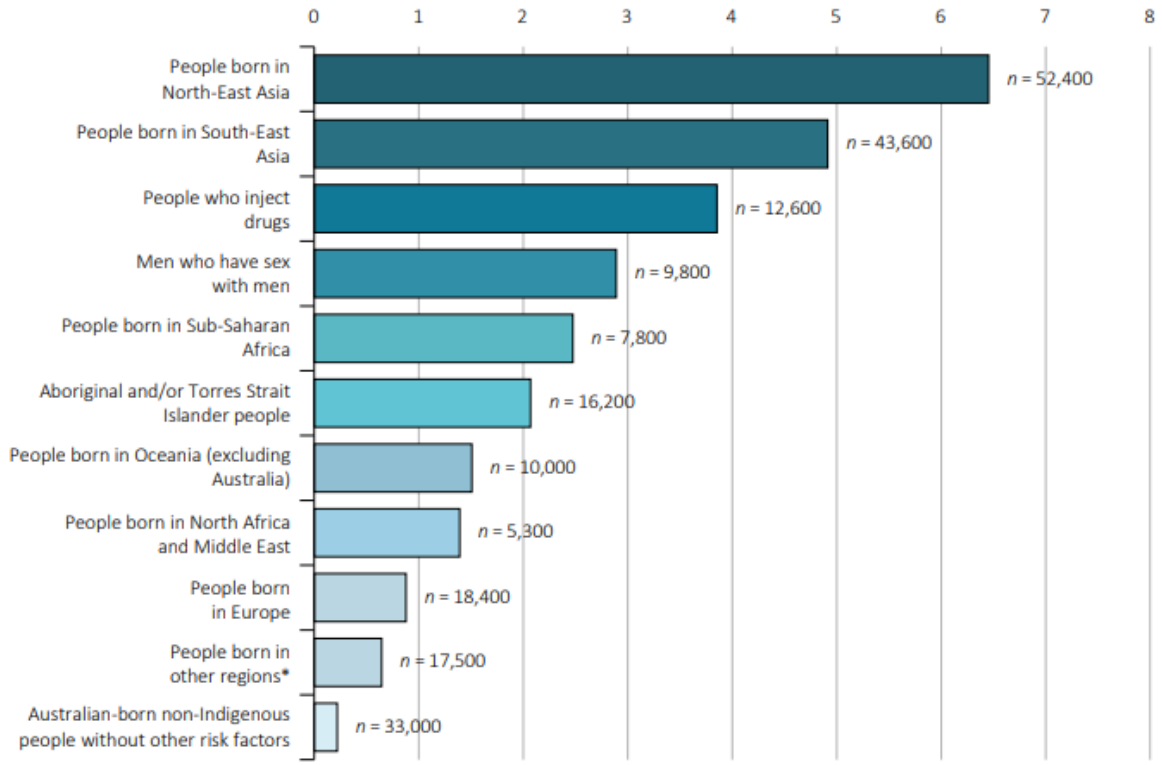
Barriers to secondary prevention and early detection of hepatocellular carcinoma for people with liver disease

Over 90 per cent of hepatocellular carcinoma cases occur in the setting of chronic liver disease, with 85-90 per cent of hepatocellular carcinoma arising in the background of cirrhosis. However, patients are infrequently screened for liver disease, limited treatment of chronic hepatitis is provided, and surveillance is inconsistently undertaken.[91]

Secondary prevention via treatment of chronic hepatitis B

Today, close to one per cent (approximately 225,000) of the Australian population live with chronic hepatitis B, with people born overseas and Aboriginal and Torres Strait Islander peoples representing three-quarters of those affected.[92] While vaccines have proven effective, migration brings endemic populations which contributed to increasing chronic hepatitis B prevalence; Vietnamese and Chinese-born people represent close or above one third of people with chronic hepatitis B (Viral Hepatitis Mapping Project, 2020; MacLachlan et al, 2018).

Figure 4.5: Prevalence ratio and total number of people living with chronic hepatitis B infection in Australia, by population subgroup, 2018



Source: Lubel, J.S., Strasser, S.I., Thompson, A.J., Cowie, B.C., MacLachlan, J., Allard, N.L., Holmes, J., Kemp, W.W., Majumdar, A., Iser, D., Howell, J., Matthews, G.V., 2022, Australian consensus recommendations for the management of hepatitis B, Med J Aust, doi: 10.5694/mja2.51430.

These prevalence patterns strongly point to the need for new strategies to engage with at-risk populations which comprise the vast majority of Australians living with hepatits B.

Although there is no cure for hepatits B, if diagnosed (i.e., through blood test), chronic hepatitis B can be treated through antiviral treatment which can reduce hepatocellular

[91] Llovet, J.M., Kelley, R.K., Villanueva, A., et al., 2021, Hepatocellular carcinoma, Nat Rev Dis Primers, doi: 10.1038/s41572-020-00240-3.
[92] Lubel, J.S., Strasser, S.I., Thompson, A.J., Cowie, B.C., MacLachlan, J., Allard, N.L., Holmes, J., Kemp, W.W., Majumdar, A., Iser, D., Howell, J., Matthews, G.V., 2022, Australian consensus recommendations for the management of hepatitis B, Med J Aust, doi: 10.5694/mja2.51430.

carcinoma risk by up to 75 per cent.[93] However, in Australia, approximately 27 per cent of people living with hepatitis B infection remain undiagnosed.[94]

In Australia, to reduce the impact of chronic hepatitis B, the Federal Government most recently developed its third National Hepatitis B Strategy. Recent reviews report that Australia is not on track to meet local and global targets regarding chronic hepatitis B:[95]

- Approximately 73 per cent of people living with chronic hepatitis B in Australia were diagnosed (target, 80 per cent)
- Only 22.6 per cent were receiving care (target, 50 per cent)
- Only 10.7 per cent of all those with chronic hepatitis B were receiving treatment (target, 20 per cent).

Secondary prevention via cure and treatment of chronic hepatitis C

Hepatitis C is curable via treatment with direct acting antivirals; the listing of new treatments for hepatitis C was associated with a commitment of more than $1 billion by the federal government for five years of unlimited direct acting anti-virals (March 2016 to February 2021).

There are numerous benefits from curing hepatitis C: it may reduce the liver-related mortality rate among people living with decompensated cirrhosis and hepatocellular carcinoma by 50 per cent.[96] An evaluation of the economic impact of the unlimited supply of direct acting anti-virals over March 2016 to February 2021 found that the current response is on track to become cost saving from a societal perspective by 2021 and generate a net economic benefit of $5.70 billion by 2030.[97]

However, despite the benefits offered by this program, concerns have been raised regarding whether enough is being done:

- There is a large population with Hepatitis C who are not identified (approximately 23 per cent); the identification and testing of people exposed to Hepatitis C must be increased by at least 50 per cent for Australia to reach global elimination targets (World Health Organisation).[98]
- While treatment numbers were initially high (in 2016), numbers have fallen since with estimated uptake of treatment in Australia equal to 49 per cent; a 28 per cent reduction in treatment uptake was observed in 2020 compared to 2019[99]

[93] Cabrie, T., Wheeler, E., et al., 2017, The challenge of liver cancer surveillance in general practice: Do recall and reminder systems hold the answer? Australian Journal for General Practitioners, 46(11).
[94] Lubel, J.S., Strasser, S.I., Thompson, A.J., Cowie, B.C., MacLachlan, J., Allard, N.L., Holmes, J., Kemp, W.W., Majumdar, A., Iser, D., Howell, J., Matthews, G.V., 2022, Australian consensus recommendations for the management of hepatitis B, Med J Aust, doi: 10.5694/mja2.51430.
[95] Lubel, J.S., Strasser, S.I., Thompson, A.J., Cowie, B.C., MacLachlan, J., Allard, N.L., Holmes, J., Kemp, W.W., Majumdar, A., Iser, D., Howell, J., Matthews, G.V., 2022, Australian consensus recommendations for the management of hepatitis B, Med J Aust, doi: 10.5694/mja2.51430; McCulloch, K., Romero, N., MacLachlan, J., Allard, N. and Cowie, B., 2020, Modeling Progress Toward Elimination of Hepatitis B in Australia. Hepatology, 71, 1170-1181, doi: 10.1002/hep.30899.
[96] Kwon, J.A., Dore, G.J., Hajarizadeh, B., Alavi, M., Valerio, H., et al., 2021, Australia could miss the WHO hepatitis C virus elimination targets due to declining treatment uptake and ongoing burden of advanced liver disease complications, PLOS ONE, 16(9), doi: 10.1371/journal.pone.0257369.
[97] Scott, N., Palmer, A., et al., 2022, Assessment of the cost-effectiveness of Australia's risk-sharing agreement for direct-acting antiviral treatments for hepatitis C: a modelling study, Lancet Regional Health, 18, doi: 10.1016/j.lanwpc.2021.100316.
[98] Scott, N., Sacks-Davis, R., Wade, A.J., Stoove, M., Pedrana, A., Doyle, J.S., Thompson, A.J., Wilson, D.P. and Hellard, M.E., 2020, Australia needs to increase testing to achieve hepatitis C elimination, Med. J. Aust., 212, 365-370, doi: 10.5694/mja2.50544.
[99] Kwon, J.A., Dore, G.J., Hajarizadeh, B., Alavi, M., Valerio, H., et al., 2021, Australia could miss the WHO hepatitis C virus elimination targets due to declining treatment uptake and ongoing burden of advanced liver disease complications, PLOS ONE, 16(9), doi: 10.1371/journal.pone.0257369.

- It is projected that the incidence of hepatitis C in 2030 would be 59 per cent lower than in 2015, short of the World Health Organisation (WHO) target of an 80 per cent reduction.[100]

By consequence, the literature calls for innovation and simplification of Australia testing policy to reach people unaware of their risk, encourage clinicians to test, and reduce stigma and discrimination associated with questioning people about risk factors.[101] Furthermore, an uptick in treatment of hepatitis C is needed to reach WHO targets by 2030; it is estimated that Australia would need to treat at least 16,790 people living with chronic hepatitis C per year, representing a 107 per cent increase relative to 2020 levels.[102]

However, achieving an uptick in hepatitis C treatment is not straight forward. Issues relating to stigma and promoting continued follow-up exist, for example, almost one-third of patients eligible for antiviral treatment in a South Western Sydney sample were lost to follow-up.[103]

Surveillance and early detection of liver disease

Benefit from hepatocellular carcinoma surveillance arises from reduce mortality associated with allowing patients to access curative therapy through earlier detection.[104]

A successful surveillance program is often defined as one whereby there exist easily identified populations that are at high-risk and there are acceptable, low-risk diagnostics which enable curative treatments if diagnosed at early stage.

Australian and international researchers have identified several target populations for which these criteria are fulfilled:[105]

- People with cirrhosis
- Subsets of the population with chronic hepatitis B virus infection without cirrhosis:
  - Asian men older than 40 years
  - Asian women older than 50 years
  - People born in sub-Saharan Africa older than 20 years
  - Aboriginal and Torres Strait Islander people older than 50 years

Despite this, evidence indicates that Australian surveillance is of limited success:

- A prospective population-based study in Melbourne (Australia) observed that only 40 per cent of patients participated in hepatocellular carcinoma surveillance at the time of diagnosis. Most of those that were not participating in surveillance had guideline indications for surveillance; 76 per cent had cirrhosis and 11 per cent had chronic hepatitis B but no cirrhosis.[106]

[100] Scott, N., Sacks-Davis, R., Wade, A.J., Stoove, M., Pedrana, A., Doyle, J.S., Thompson, A.J., Wilson, D.P., Hellard, M.E., 2020, Australia needs to increase testing to achieve hepatitis C elimination, Med. J. Aust., 212, 365-370, doi: 10.5694/mja2.50544.
[101] Allard, N.L., MacLachlan, J.H., Tran, L., Yussf, N., Cowie, B.C., 2021, Time for universal hepatitis B screening for Australian adults, Med J Aust, 215, doi: 10.5694/mja2.51114.
[102] Kwon, J.A., Dore, G.J., Hajarizadeh, B., Alavi, M., Valerio, H., et al., 2021, Australia could miss the WHO hepatitis C virus elimination targets due to declining treatment uptake and ongoing burden of advanced liver disease complications, PLOS ONE, 16(9), doi: 10.1371/journal.pone.0257369.
[103] O'Brien, E.R., Whelan, M.C., Lama, T., Levy, M., 2021, Public Health Unit notifications of hepatitis C and their follow-up in South Western Sydney, Australia, Public Health Res Pract, doi: 10.17061/phrp30342010.
[104] Bruix, J., Sherman, M., Llovet, J.M., et al., 2001, Clinical management of hepatocellular carcinoma: Conclusions of the Barcelona-2000 EASL conference, J Hepatol, 35, 421–430.
[105] Matthews, G., Robotin, M., Allard, N., 2014, B positive – All you wanted to know about hepatitis B: A guide for primary care providers, Australasian Society for HIV Medicine; Lockart, I., Danta, M., 2019, Future directions in cancer screening in Australia, Public Health Research & Practice, 29(2), doi: 10.17061/phrp2921910.
[106] Hong, T.P., et al., 2018, Surveillance improves survival of patients with hepatocellular carcinoma: a prospective population-based study, Med J Aust, 209(8), doi: 10.5694/mja18.00373.

- Among Indigenous Australians, only 14 per cent of hepatocellular carcinoma is detected through surveillance programs.[107]

There are numerous challenges which limit the effectiveness of surveillance.

Firstly, patients may be unaware of their underlying liver disease. This is most salient in the population with cirrhosis.[108]

Secondly, surveillance requires adherence once an at-risk patient is identified. However, literature indicates that adherence to hepatocellular carcinoma surveillance is highly variable:

- In a GP based surveillance program of people living with chronic hepatitis B, adherence to surveillance was considered good in 27 per cent of patients (N=18), suboptimal in 43 per cent of patients (N=29) and poor in 30 per cent of patients (N=20).[109]
- A study of hepatocellular carcinoma surveillance in at-risk Australia patients found that patients were up-to-date with their surveillance for 84.2 per cent of the study time period, with poorer adherence for younger people, those of African ethnicity, and those from culturally and linguistically diverse backgrounds[110]
- A study of hepatocellular carcinoma surveillance in at-risk Australia patients found that less than half (40.8 per cent) of patients spent at least 90 per cent of their surveillance period up-to-date with screening[111]
- Global meta-analyses of adherence to hepatocellular carcinoma surveillance indicate high variability and poor adherence.[112]

Finally, challenges may relate to suboptimal performance of available modalities, i.e., relating to:[113]

- The sensitivity of ultrasound is relatively low for early hepatocellular carcinoma
- Diagnostic accuracy is influenced by operators' expertise and patient factors such as metabolic syndrome (obesity and nonalcoholic fatty liver disease) and nodular liver disease or cirrhosis.

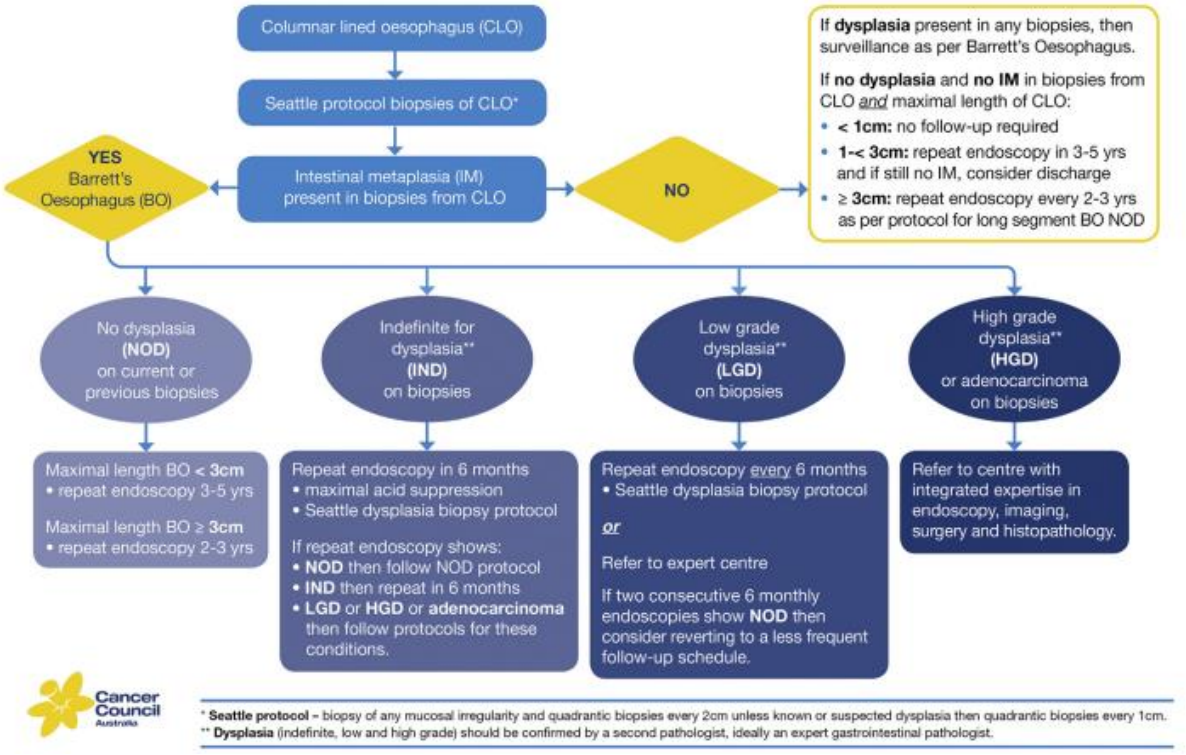
[107] Parker, C., Tong, S.Y., Dempsey, K., et al., 2014, Hepatocellular carcinoma in Australia's Northern Territory: high incidence and poor outcome, Med J Aust, 201, 470–474.
[108] Lubel, J.S., Roberts, S.K., Strasser, S.I., Thompson, A.J., Philip, J., Goodwin, M., Clarke, S., Crawford, D.H., Levy, M.T., Shackel, N., 2021, Australian recommendations for the management of hepatocellular carcinoma: a consensus statement, Med J Aust, 214, 475-483, https://doi.org/10.5694/mja2.50885.
[109] Cabrie, T, et al., 2017, The challenge of liver cancer surveillance in general practice: Do recall and reminder systems hold the answer? AFP, 46(11).
[110] Low, E.S., Apostolov, R., Wong, D., Lin, S., Kutaiba, N., Grace, J.A., Sinclair, M., 2021, Hepatocellular carcinoma surveillance and quantile regression for determinants of underutilisation in at-risk Australian patients, World J Gastrointest Oncol, 13(12), 2149-2160, doi: 10.4251/wjgo.v13.i12.2149.
[111] Low, E.S., Apostolov, R., Wong, D., Lin, S., Kutaiba, N., Grace, J.A., Sinclair, M., 2021, Hepatocellular carcinoma surveillance and quantile regression for determinants of underutilisation in at-risk Australian patients, World J Gastrointest Oncol, 13(12), 2149-2160, doi: 10.4251/wjgo.v13.i12.2149.
[112] Zhao, C., Jin, M., Le, R.H., et al., 2018, Poor adherence to hepatocellular carcinoma surveillance: A systematic review and meta-analysis of a complex issue, Liver Int, 38, 503– 514, doi: 10.1111/liv.13555; Wolf, E., Rich, N.E., Marrero, J.A., Parikh N.D., Singal, A.G., 2021, Use of Hepatocellular Carcinoma Surveillance in Patients With Cirrhosis: A Systematic Review and Meta-Analysis, Hepatology, 73(2), 713-725, doi: 10.1002/hep.31309.
[113] Lockart, I., Danta, M., Future directions in cancer screening in Australia, 2019, Public Health Research & Practice; 29(2), doi: 10.17061/phrp2921910.

Barriers to secondary prevention and early detection of oesophageal cancer for people with Barrett's

Gastroesophageal reflux disease (GORD), which typically presents with heartburn and acid regurgitation, afflicts an estimated 10-15 per cent of the Australian population.[114] In five per cent to 15 per cent of chronic gastroesophageal reflux disease, oesophageal mucosa can transform from to columnar mucosa with intestinal characteristics (intestinal metaplasia or Barrett's oesophagus).[115] Other estimates suggest Barrett's oesophagus may affect approximately five per cent of the general population.[116] Barrett's oesophagus may confer a 30-120 times greater risk of developing oesophageal adenocarcinoma, and can be treated through endoscopic ablative therapy.[117]

Australian guidelines recommend that people with Barrett's oesophagus undergo repeat gastroscopy every three to five years, with more frequent surveillance if risk factors are present. This reflects variations among Barrett's oesophagus, with progression rates from Barrett's oesophagus to oesophageal adenocarcinoma varying by subtype. For example, approximately 80 per cent to 90 per cent of patients who have non dysplastic Barrett's oesophagus will never progress to dysplasia or cancer.[118]

Figure 4.6: Algorithm for recommended endoscopic surveillance schedule for Barrett's oesophagus



Source: Whiteman, D.C., Kendall, B.J., 2016, Barrett's oesophagus: epidemiology, diagnosis and clinical management, Medical Journal of Australia, 205, 317-324, doi: 10.5694/mja16.00796.

[114] Keung, C., Hebbard, G., 2016, The management of gastro-oesophageal reflux disease, Aust Prescr, 39,36-9.
[115] Rex, D.K., Cummings, O.W., Shaw, M., et al., 2003, Screening for Barrett's esophagus in colonoscopy patients with and without heartburn, Gastroenterology, 125, 1670-1677; Sharma, P., 2004, Review article: prevalence of Barrett's oesophagus and metaplasia at the gastro-oesophageal junction, Aliment Pharmacol Ther, 20, 48-54, discussion 61-62; Johansson, J., Håkansson, H.O., Mellblom, L., et al., 2005, Prevalence of precan-cerous and other metaplasia in the distal oesophagus and gastro-oesophageal junction, Scand J Gastroenterol, 40, 893-902.
[116] Australian Commission on Safety and Quality in Health Care, 2021, Fourth Australian Atlas of Healthcare Variation.
[117] Vissapragada, et al., 2021, Improving cost-effectiveness of endoscopic surveillance for Barrett's esophagus by reducing low-value care: a review of economic evaluations, Surgical Endoscopy, 35, doi: 10.1007/s00464-021-08646-0.
[118] Hvid-Jensen, F., Pedersen, L., Drewes, A.M., Sorensen, H.T., Funch-Jensen, P., 2011, Incidence of adenocarcinoma among patients with Barrett's esophagus, N Engl J Med, 365(15), 1375–1383.

However, there is uncertainty about the effectiveness and value of gastroscopic surveillance for people at low-risk of developing cancer.[119] For example, a recent review of economic evaluations found that guideline specified endoscopic surveillance for Barrett's absent dysplasia was not cost-effective, necessitating a modified strategy removing individuals with lowest risk for progression from Barrett's absent dysplasia to adenocarcinoma (dependent on risk profiles).[120] As one stakeholder noted:

> *What Australia does in clinical practice is not cost effective, this has been shown. There's a lot of waste; endoscopy is done on people that will never get cancer.*

Simultaneously, one stakeholder highlighted uncertainty regarding the quality of endoscopy in Australia:

> *High quality upper endoscopy has never really been on anyone's radar. Are we picking up Barrett's oesophagus, or Barrett's oesophagus with precancerous dysplasia? Are we good at picking up squamous oesophageal changes in smokers? Are we good at picking up minor mucosal changes that arise in gastric cancer? The Japanese are incredibly attuned to it, but are we? When we look at all the work we've done in colonoscopy detection (e.g., identifying subtle changes and removing them properly), we haven't done that in upper GI.*

4.4 Delayed presentations, referral, and variable diagnostics

When symptoms of upper GI cancers do emerge, challenges reduce the ability of a patient with symptoms to swiftly receive diagnosis and proceed to optimal therapy. Respondents to the Patient and Carer survey highlight various issues which contribute to delayed referral, diagnosis, and treatment.[121] For example:

- 21 per cent and 37 per cent of hepatobiliary and oesophageal patients, respectively, waited longer than two weeks between first referral and seeing a specialist
- 30 per cent and 50 per cent of hepatobiliary and oesophageal patients, respectively, waited longer than four weeks between first referral and treatment.

The issues identified by patients include:

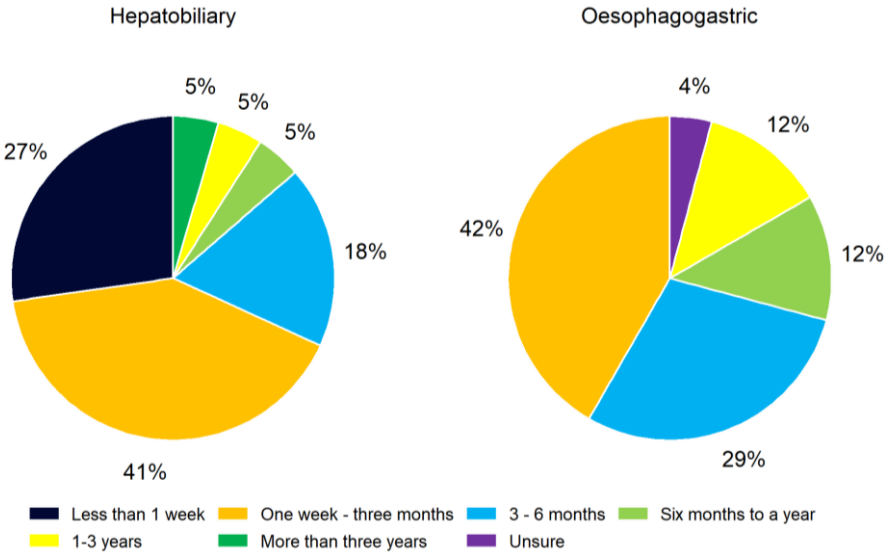
- Low patient and GP awareness of symptoms
- Variation in timely access to diagnostic tools.

Limited patient awareness can delay diagnosis

When symptoms do emerge, timely diagnosis relies upon patients presenting to GP for initial investigation, and for GPs to appropriately escalate. However, respondents to the Patient and Carer survey indicated variable length of symptoms prior to diagnosis.

[119] Australian Commission on Safety and Quality in Health Care, 2021, Fourth Australian Atlas of Healthcare Variation.
[120] Vissapragada, et al., 2021, Improving cost-effectiveness of endoscopic surveillance for Barrett's esophagus by reducing low-value care: a review of economic evaluations, Surgical Endoscopy, 35, doi: 10.1007/s00464-021-08646-0.
[121] The remainder of respondents reported as being unsure.

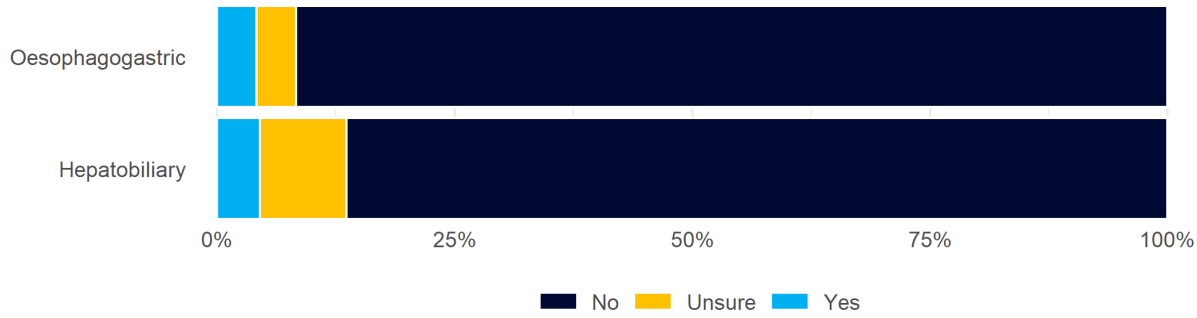
Figure 4.7: Length of symptoms prior to first diagnosis (Patient and Carer Survey)



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Few respondents to the Patient and Carer survey considered that patients were aware that symptoms experienced were association with upper GI cancers (Figure 4.8).

Figure 4.8: Patient awareness of symptom association with upper GI cancer (Patient and Carer Survey)



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Patient awareness of symptoms is complicated by ambiguity, with symptom overlap with other conditions and dismissiveness (Table 4.1). Low symptom awareness and late presentation may also reflect stigma regarding illnesses, inequalities in health system access, and limited health education, all of which can contribute to worse outcomes amongst the Indigenous Australian community.[122]

[122] Hepatocellular Carcinoma Consensus Statement Working Group, 2020, Australian recommendations for the management of hepatocellular carcinoma: a consensus statement.

Table 4.1: Example commentary on patient awareness (Patient and Carer survey)

Oesophagogastic	Hepatobiliary
"I have had stomach ulcers for 40 years. I just thought they were more severe than usual."	*"I never thought that my symptoms might be a larger problem."*
"We thought the weight loss was due to healthier eating habits."	*"I thought I had gallbladder problems (not necessarily cancer); these are not uncommon for middle aged women"*
"There was blood in my partner's stool, but he did not tell me nor anyone. Then he coughed up blood at the doctors and tests were done."	*"I thought it was food poisoning."*
	"I thought it was a pulled muscle. When I presented to the GP for what I thought was a muscle strain he suggested an ultrasound 'just to check it out'. I was astonished to learn it was cholangiocarcinoma as I had no other symptoms"

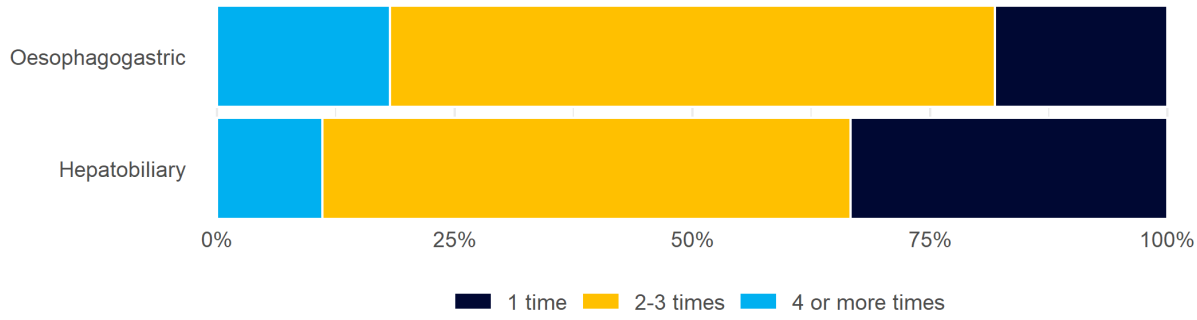
Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Low GP awareness and misdiagnosis of upper GI cancers

Following patient presentation, timely diagnosis is impaired by a lack of health care practitioner (HCP) awareness of upper GI cancer symptoms and screening criteria. This missed opportunity can result in failure to identify cancers early or limited ability to engage in secondary prevention.[123]

Respondents to the Patient and Carer Survey indicated that, where they presented with symptoms prior to diagnosis, they often did so multiple times.

Figure 4.9: Presentations to doctor with symptoms of upper GI cancer (Patient and Carer Survey)



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Corresponding commentary from consultations and the Patient and Carer survey indicated variation in the quality of patient interactions with health care professionals: while some patients were sent for tests after presentation, others presented multiple times prior to successful diagnosis. As one stakeholder noted:

> *I know so many people that have been diagnosed with upper GI cancer at a late stage but have been going to see a GP for months before they are sent to see a specialist. It's a huge issue.*

[123] Jeffrey, G.P., Gordon, L., Ramm, G., 2020, Hepatocellular carcinoma surveillance in Australia: time to improve the diagnosis of cirrhosis and use liver ultrasound, The Medical journal of Australia, 212(7), 297–299, doi: 10.5694/mja2.50521.

Table 4.2: Example commentary on patient awareness (Consultation and Patient and Carer survey)

Oesophagogastic	Hepatobiliary
"Referral was delayed due to COVID-19."	*"It started with intermittent severe pain followed by vomiting. I visited GP's many times. By the time I was diagnosed, I had constant nausea."*
"We've been talking with a patient who was passed around between GPs for four or five months, eventually he was diagnosed with stage four cancer."	*"Pain was under my LEFT rib cage. In March 2021 this was misdiagnosed as a desiccated disk."*
"My mother-in-law was misdiagnosed for as long as six months. By the time she was diagnosed it was very serious."	*"My symptoms were investigated further because I wasn't happy with the inaction of my long-term doctor and sought a second opinion."*
"Excellent GP. After assessment, [he/she] advised us that it may be oesophageal cancer and urgent referral was made."	*"The tumour ruptured less than 30 days after the second misdiagnosis."*
	"It was the 3rd GP that I went to that took action."
	"I went to the doctor around the corner with symptoms; he had a look and couldn't quite work out what was going on and sent me home. I went back again and pushed him to do a scan. I don't know whether he was reluctant because scans cost money, or something else. What I do know is that I probably wouldn't be here today if I didn't go and have that scan."
	"Even the GP didn't quite know what cholangiocarcinoma was."
	"Eventually had an ultrasound. On the previous two visits (3-4 months before, and the day before) no investigation was completed and reflux medications were recommended."
	"I was misdiagnosed by two GPs on FOUR occasions and by an ED doctor once. RE-EDUCATE THE doctors on how to diagnose correctly: do an AFP and an ultrasound. After diagnosis, don't make patients WAIT, we simply don't have the time."
	"Given my normal good health and fitness, I was alarmed by my symptoms and saw my GP after 4-5 days of no improvement. I had tests and was admitted to hospital ASAP and was diagnosed within a week of symptoms appearing."

Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Stakeholders suggested that failed general practitioner (GP) referral and misdiagnosis reflects vagueness of symptoms, combined with lack of understanding of the relevant risk factors which reflects low incidence of these cancers. However, as noted by one stakeholder, low incidence is not an excuse for slow/mis diagnosis:

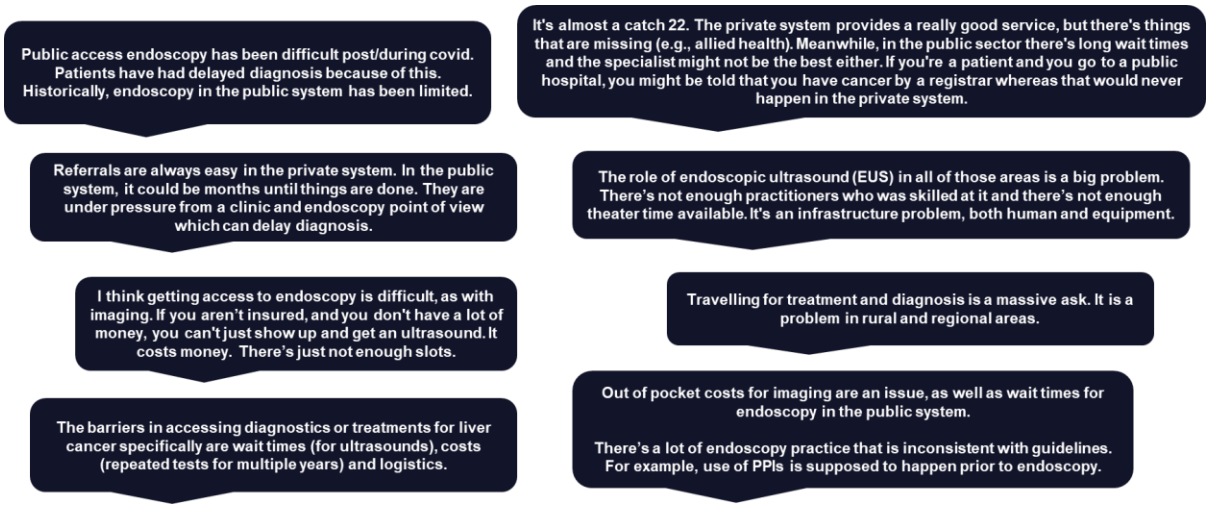
> *While low incidence is a problem for GPs, at the same time, accurate and fast diagnoses could mean life or death for patients – they could be 30 with children! In the end, all the GP needs to do is to refer the patient to the specialist, but they need to have that education to do that. It's critical.*

A related issue highlighted by stakeholders is that patients lack empowerment to question GP decisions; that is, to say "no, something is wrong with me, you need to check me further".

Variable access to diagnostic tools by populations

After receiving referral, patient access to effective diagnostics varies. A range of issues were identified by stakeholders and respondents to the Patient and Carer survey, including discrepancies in access based on location (rural and regional with limited access) and wealth, and long wait times for diagnostic tests at public hospitals.

Figure 4.10: Availability of diagnostics – stakeholder perspectives



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Long wait times for gastroscopy in public healthcare system

Gastroscopy is used to diagnose a variety of oesophagogastric conditions, including:

- If reflux does not respond to a trial of acid suppression therapy
- If 'alarm features' suggestive of cancer are present, such as difficulty swallowing, bleeding, weight loss, recurrent vomiting and anaemia
- If diagnosis is unclear or there are complications.[124]

Gastroscopy remains the gold standard tool for diagnosing oesophagogastric cancer in Australia. Therefore, timely diagnosis is impaired to the extent that patients cannot access timely gastroscopy. The current optimal care pathway (OCP) for oesophagogastric cancer recommends that if a patient presents with red flag symptoms, they should be referred for urgent gastroscopy.[125] Specifically, there should be no more than two weeks (14 days) between referral and gastroscopy.[126]

However, consultations and the Patient and Carer survey indicated that patients with oesophagogastric cancer experienced waiting times for gastroscopy within the public sector in excess of two weeks. This corresponds with findings from the literature, which highlight that delays from symptom onset to referral occur for most patients with timeframes over four times the recommended two week timeframe.[127]

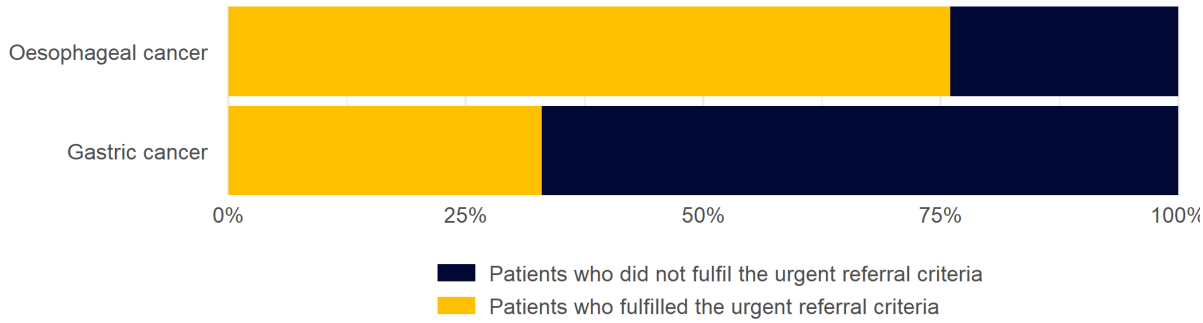
[124] Australian Commission on Safety and Quality in Health Care, 2021, Fourth Australian Atlas of Healthcare Variation.
[125] Defined as: new-onset or rapidly progressive dysphagia and/or progressive/new epigastric pain persisting for more than two weeks.
[126] Cancer Council and Department of Health, 2021, Optimal care pathway for people with oesophagogastric cancer.
[127] Kumar, L., Kholmurodova, F., Bull, J., Bright, T., Watson, D.I., Shenfine, J., 2021, Comparison of oesophageal and gastric cancer in the evaluation of urgent endoscopy referral criteria, ANZ J Surg, 91(7-8), 1515-1520, doi: 10.1111/ans.16984.

Relatedly, some Patients and Carers noted issues including being categorised as low priority and therefore receiving delayed gastroscopy (in one example, leading to a two year wait). One patient lamented their lack of access to private gastroscopy:

> *It took too bloody long [to obtain diagnostics], if I had the money, we would've seen someone privately. It is not fair!*

This may follow from historically poor sensitivity of urgent referral criteria. Australia urgent endoscopy referral guidelines have been reported to have a 76 per cent sensitivity for oesophageal cancer detection compared with a 33 per cent sensitivity for gastric cancer.

Figure 4.11: Proportion who met urgent referral criteria, South Australia



Source: Kumar, L., Kholmurodova, F., Bull, J., Bright, T., Watson, D.I., Shenfine, J., 2021, Comparison of oesophageal and gastric cancer in the evaluation of urgent endoscopy referral criteria, ANZ J Surg, 91(7-8), 1515-1520, doi: 10.1111/ans.16984.

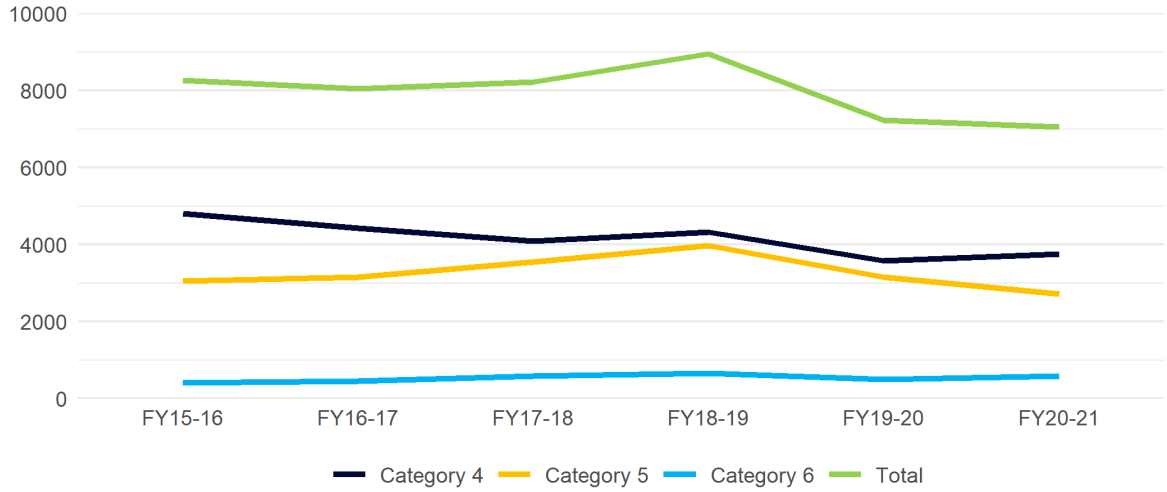
Analysis of Queensland gastroscopy data provides some evidence of possibly long waiting times for gastroscopy in the public system. Three categories are adopted in Queensland:[128]

- Category 4 (priority): Completion of an endoscopy within 30 days is desirable for a condition that has the potential to deteriorate quickly to the point that it might become an emergency.
- Category 5 (semi-urgent): Completion of an endoscopy within 90 days is desirable for a condition that is likely to deteriorate significantly if left untreated beyond 90 days.
- Category 6 (not urgent): Completion of an endoscopy within 365 days is acceptable for a condition that is unlikely to deteriorate quickly and does not have the potential to become an emergency.

The total number of gastroscopies in Queensland declined by 21 per cent between FY18-19 and FY20-21, the greatest reduction being in category 5 (by 31 per cent).[129]

[128] This presents an issue; there is inconsistency between state government indicators for timely urgent gastroscopy (30 days) and the two week window suggested within the OCP for oesophagogastric cancers.
[129] In addition, the average count in the first four years (FY16 through to FY19) was compared with the FY21 count. The number of category 4 gastroscopies declined by 15 per cent, the number of category 5 gastroscopies decreased by 20 per cent and the total number of gastroscopies decreased by 16 per cent.

Figure 4.12: Number of gastroscopies

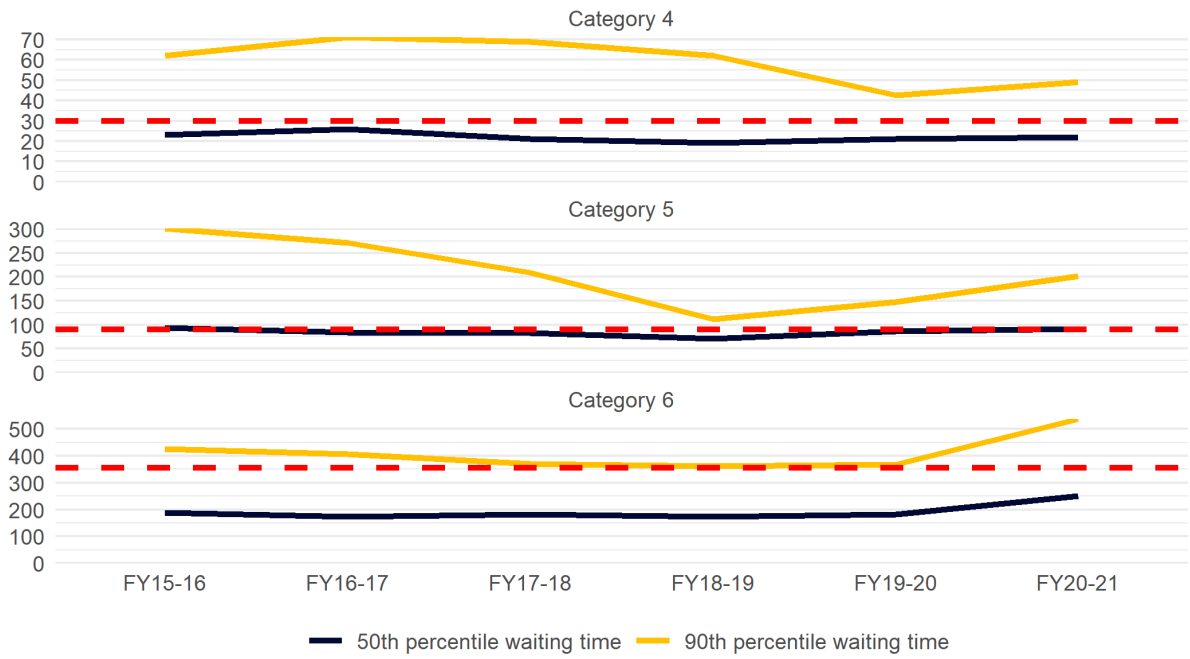


Source: Queensland Health.

The median waiting time for all categories exceeds the two-week recommendation within the oesophagogastric optimal care pathway (OCP). Despite this, for urgent gastroscopies (category 4), the median wait time is below Queensland's 30 day target. While the median waiting time sits below the 30 day target, the longest waiting 10 per cent of patients wait at least 49 days. Category 5 and category 6 patients waiting the median (90th percentile) wait time wait 91 days (202) and 250 days (537.5).

Notably, median wait times have trended upwards over the covid pandemic period, despite decreasing volume of gastroscopies.

Figure 4.13: Gastroscopy waiting times (days) in Queensland, median and longest 10 per cent



Source: Queensland Health.

Issue relating to access to gastroscopy are highlighted within the Fourth Australian Atlas of Healthcare Variation 2021,[130] and include wide variation in gastroscopy use, probably involving overuse in some areas and underuse in others:

- Variation in adherence with available clinical guidelines
- Gastroscopy and colonoscopy performed on the same day
- Referral practice
- Consumer expectations
- Access to services and number of clinicians providing services
- Financial incentives.

COVID related delays to diagnosis

A consequence of COVID policies highlighted by stakeholders is the potential for delayed diagnosis due to covid related restrictions.

International research highlighted that delayed endoscopy prompted increased emergency presentations, and advanced cancer diagnosis. For example:

- A UK based study highlighted that COVID-19 resulted in a 17.5 per cent increase in emergency presentations of upper GI cancers and nearly 10 per cent increase in advanced cancer diagnosis.[131]
- An international survey of institutions indicated a decline of 26.7 per cent in new hepatocellular carcinoma cases reported during the pandemic compared to the pre-pandemic, with sizable proportions of institutions reporting delays in diagnosis (48.2 per cent in BCLC 0/A/B and 51.9 per cent in BCLC C).[132]

4.5 Variation in treatment

Growing knowledge of best practice has the potential to improve outcomes for patients with upper GI cancers. However, evidence indicates that best practice is not uniformly implemented, resulting in variation in quality of treatment provided. Simultaneously, there are few resources available to promote patient selection and clinician referral into hospitals providing high quality service.

Even in cases where best practice is implemented, the effectiveness of treatment continues to be limited by late diagnosis. For example, while treatment outcomes for patients with gastric and gastroesophageal junction cancer managed across South Australia met contemporary evidence-based practice, longer-term survival remains poor.[133]

Numerous challenges exist regarding the quality of treatment of patients with upper GI cancers in Australia, including:

- Limited means of identifying low volume services despite volume outcome relationship

[130] Australian Commission on Safety and Quality in Health Care, 2021, Fourth Australian Atlas of Healthcare Variation.
[131] He T, MacIsaac MB, Hume SJ, et al., 2021, COVID-19 and its impact on endoscopy services: what is the threshold for missed malignant diagnosis?, Gut, doi: 10.1136/gutjnl-2020-322769.
[132] Gandhi, M., Ling, W. H., Chen, C. H., Lee, J. H., Kudo, M., Chanwat, R., Strasser, S. I., Xu, Z., Lai, S. H., Chow, P. K., 2021, Impact of COVID-19 on Hepatocellular Carcinoma Management: A Multicountry and Region Study. Journal of hepatocellular carcinoma, 8, 1159–1167, doi: 10.2147/JHC.S329018.
[133] Abbas, M.N., Bright, T., Price, T., Karapetis, C., Thompson, S., Connell, C., Watson, D., Barnes, M., Bull, J., Singhal, N., Roy, A., 2021, Patterns of care and outcomes for gastric and gastro-oesophageal junction cancer in an Australian population, ANZ Journal of Surgery, 91, 2675-2682, doi: 10.1111/ans.17249.

- Inconsistent use and composition of multi-disciplinary teams (MDTs)
- Inconsistent use of best practice imaging
- Limited and inconsistent access to clinical trials
- Lack of data to support complex referrals
- Variable support for patient engagement and empowerment in treatment decisions
- Lack of treatment breakthroughs
- Potential for extreme out of pocket costs
- at-risk groups less likely to receive best practice treatment
- COVID policies adversely impacted care.

These are discussed in turn below.

Low volume services are associated with poor health outcomes for oesophagogastric patients

While decentralised, low volume treatment is not necessarily problematic for all forms of oesophagogastric treatment, there is evidence that high volume hospitals provide better outcomes for oesophagogastic surgery.[134] For example, Australian evidence indicates benefits of receiving surgery at high volume hospitals:

- Improved operative mortality for total gastrectomy[135]
- More frequent occurrence of high quality surgery for gastrectomy and oesophagectomy[136]
- Improved 3- and 5-year overall survival for oesophagectomy[137] and improved 5-year absolute survival for patients undergoing gastroscopy.[138]

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There are more measures of quality of surgery than volume alone; for example, measures include appropriate levels of expertise, infrastructure and availability of specialist nursing staff.[139] Notwithstanding, a Queensland based study (2020), which accounts for service quality in addition to volume, found that high volume high service capability centres resulted in better delivery of high quality service following oesophagogastric cancer resection and better long-term survival following oesophagectomy.[140]

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[134] Meng, R., Bright, T., Woodman, R.J. and Watson, D.I., 2019, Hospital volume versus outcome following oesophagectomy for cancer in Australia and New Zealand, ANZ Journal of Surgery, 89, 683-688, doi: 10.1111/ans.15058; Narendra, A, 2020, An assessment of the impacts of centralising complex upper-gastrointestinal surgery in Queensland, MPhil Thesis, doi: 10.14264/80d5e00.

[135] Tian, K., Baade, P.D., Aitken, J.F., Narendra, A. and Smithers, B.M., 2021, Procedure-specific outcomes following gastrectomy for cancer compared by hospital volume and service capability, ANZ Journal of Surgery, 91, 2430-2435, doi: 10.1111/ans.17132.

[136] Narendra, A., Baade, P.D., Aitken, J.F., Fawcett, J., Leggett, B., Leggett, C., Tian, K., Sklavos, T., Smithers, B.M., 2021, Hospital characteristics associated with better 'quality of surgery' and survival following oesophagogastric cancer surgery in Queensland: a population-level study, ANZ Journal of Surgery, 91, 323-328, doi: 10.1111/ans.16397.

[137] Ibid.

[138] Smith, R.C., Creighton, N., Lord, R.V., Merrett, N.D., Keogh, G.W., Liauw, W.S., Currow, D.C., 2014, Survival, mortality and morbidity outcomes after oesophagogastric cancer surgery in New South Wales, 2001–2008, Medical Journal of Australia, 200, 408-413, doi: 10.5694/mja13.11182.

[139] Hummel, R., Ha, N.H., Lord, A., Trochsler, M.I., Maddern, G., Kanhere, H., 2017, Centralisation of oesophagectomy in Australia: is only caseload critical? Australian Health Review, 43, 15-20.

[140] High service capability hospitals are those with high level intensive care, interventional radiology, advanced endoscopy and have dedicated units staffed by surgeons with specialized expertise in upper gastrointestinal surgery. Narendra, A., et al, 2020, Hospital characteristics associated with better "quality of surgery" and survival following oesophagogastric cancer surgery in Queensland: a population-level study, ANZ Journal of Surgery, 91(3), 323–328, doi:10.1111/ans.16397.

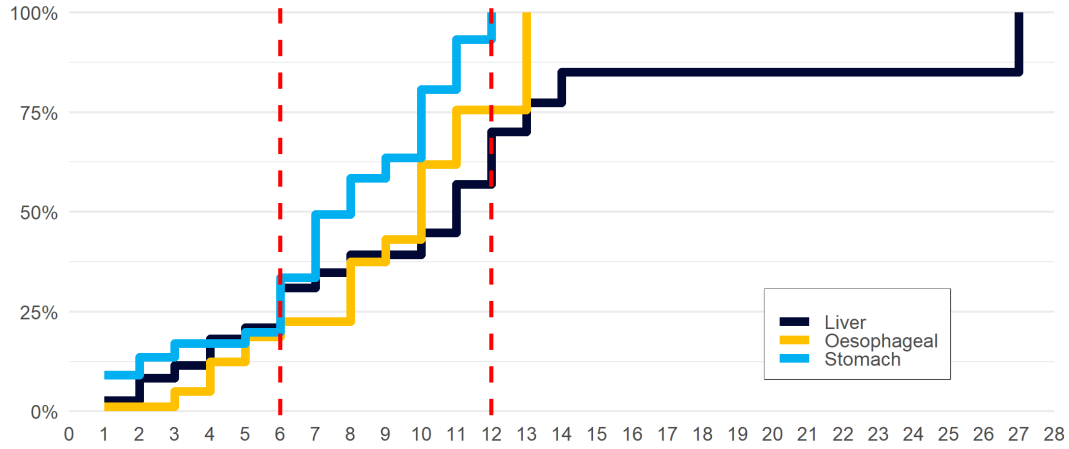
Evidence for consolidation has justified policy change; for example:

- The Cancer Institute of NSW recommends that oesophagus and stomach cancer specialist centres perform at least six oesophagectomies per year, and publishes lists of public and private specialist centres and associated case loads[141]
- Queensland has followed a policy of gradual consolidation
- Darwin ceased oesophagogastric surgery approximately 15 years ago, sending patients to Adelaide for their operation (all other work is done in Darwin).

However, there is inconsistency in the availability of information pertaining to the volume of services offered in Australia; information regarding quality of outcomes is scarce.

In 2019, the proportion of oesophageal cancer resections performed in NSW public and private hospitals above minimum suggested caseload numbers (i.e., six oesophagostomies per year) was 92 per cent. In contrast, in 2018, 86 per cent of resections occurring in public hospitals took place at those which exceeded the threshold, while 71 per cent of resections occurring in private hospitals took place at those which exceeded the threshold.

Figure 4.14: NSW cumulative number of patients served by hospital volume (FY2018)



Note: 19.9 (18.75) [21] per cent of patients undergoing gastrectomy (oesophagectomy) [liver resection] were serviced in hospitals servicing less than six patients per annum. 27 per cent of private hospital patients are serviced in hospitals with patients volumes below six per annum, compared to 17 per cent in public hospitals. Source: Cancer Institute NSW.

Queensland Oesophagogastric Surgery Quality Index data highlight that, over 2012-2016:[142]

- 20 per cent of patients undergoing oesophagectomy were treated in low volume hospitals (less than six surgeries per year)
- 42 per cent of patients undergoing gastrectomy were treated in low volume hospitals (less than six surgeries per year).

The most prominent concern causing resistance that was noted by stakeholders was the prevailing belief that patients prefer to be treated close to where they live. This issue is particularly relevant in Australia, where patients in rural and remote areas may be face worsening access resulting from consolidation. However, whether this belief is accurate is disputed; for example, a discrete choice experiment[143] finds that preferences were

[141] See: CI NSW website, available: https://www.cancer.nsw.gov.au/what-we-do/supporting-cancer-care/specialist-cancer-centres/oesophageal-gastric-stomach-cancer-specialist-cent.
[142] Cancer Alliance Queensland, 2019, Queensland Oesophagogastric Surgery Quality Index: Oesophagogastric cancer care in public and private hospitals 2007-2016.
[143] Vallejo-Torres, et al., 2018, Discrete-choice experiment to analyse preferences for centralizing specialist cancer surgery services, BJS, 105(5), doi: 10.1002/bjs.10761.

particularly influenced by the risk of complications, the risk of death and access to a specialist multidisciplinary care team (MDT). Furthermore, enabled by developing technology, consolidation would be restricted to surgery alone – other activities could be administered locally.

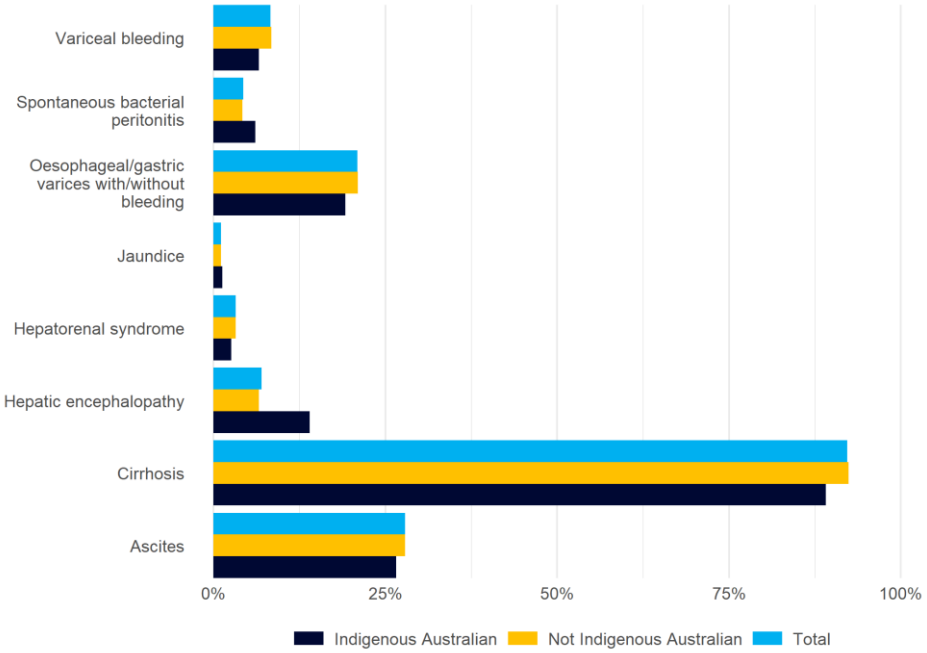
Stakeholders also highlighted that one barrier to achieving consolidation is health department and government policy, which promotes patient treatment at local hospitals rather than the hospital which will provide the best outcome.

Inconsistent use and composition of multi-disciplinary teams (MDTs)

Multi-disciplinary teams (MDTs) are consistently recognised as an important tool for ensuring best outcomes for patients, especially considering the complexity of upper GI cancers and treatments available.[144] For example, for hepatocellular carcinoma:[145]

- Hepatocellular carcinoma frequently arises in the background of cirrhosis and is associated with numerous confounding issues (Figure 4.15); up to 20 per cent of patients have advanced decompensated liver disease and over 40 per cent have significant hepatic decompensation during their illness
- Diagnostic radiologists and pathologists often aid in diagnosis and staging
- Hepatologist, surgeons (hepatology, transplant), radiation oncologists, medical oncologists, interventional radiologists, and palliative care specialist are involved in selecting appropriate treatment modality, with 17 or more treatments available.

Figure 4.15: Complications arising in people with hepatocellular carcinoma

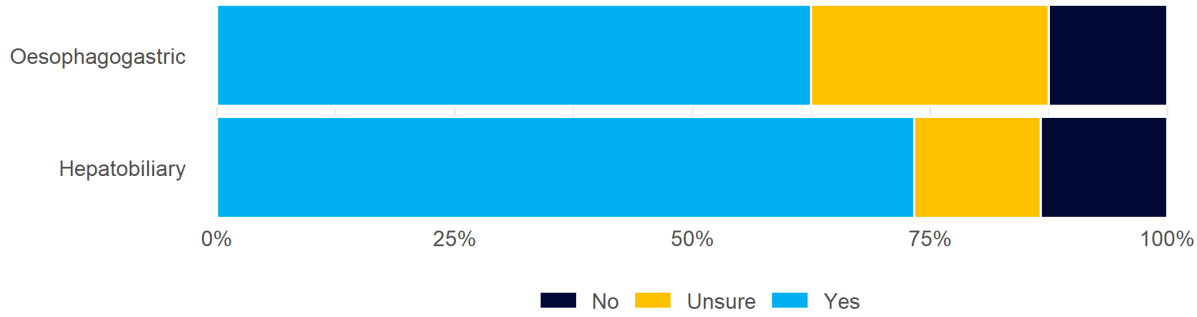


Source: Wigg, A.J., et al., 2021, Hepatocellular carcinoma amongst Aboriginal and Torres Strait Islander peoples of Australia, eClinicalMedicine, 36, doi: 10.1016/j.eclinm.2021.100919.

[144] Luijten, J., et al., 2021, Implementation of a regional video multidisciplinary team meeting is associated with an improved prognosis for patients with oesophageal cancer A mixed methods approach, European Journal of Surgical Oncology, 47(12), doi: 10.1016/j.ejso.2021.04.020.
[145] Lubel, J.S., Roberts, S.K., Howell, J., Ward, J., Shackel, N.A., 2021, Current issues in the prevalence, diagnosis and management of hepatocellular carcinoma in Australia, Intern Med J, 51, 181-188, doi: 10.1111/imj.15184; Salgia, R., Mendiratta, V., 2021, The Multidisciplinary Management of Hepatocellular Carcinoma, Clinical liver disease, 17(6), 405–408, doi: 10.1002/cld.1068.

Although many patients are being managed in MDTs, there is limited evidence as to take up and timely access to MDTs. Responses to the Patient and Carer survey indicated that over 25 (35) per cent of hepatobiliary (oesophagogastric) respondents (patients and carers) were either unsure whether an MDT reviewed their treatment plan or believed that their treatment plan was not reviewed.

Figure 4.16: Frequency of multidisciplinary team review of treatment plan (Patient and Carer Survey)



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Likewise, literature indicates inconsistency in MDT review between and within states:

- In an analysis of regional Victorian health service provision, 78 per cent of oesophagogastric patients were discussed at an MDT[146]
- A single state-wide upper GI cancer video-linked MDT meeting guides management of all newly diagnosed upper GI cancer patients in South Australia.[147]

Stakeholders noted that sometimes MDTs are not carried out. For example, one stakeholder indicated that, although the high volume of available treatments for hepatocellular carcinoma have warranted management through MDTs, approximately 10 per cent of oncologists fail to connect their patients with an MDT.

An additional area of variation is timeliness of patient review at MDT. For example, an analysis of regional Victorian health service provision found that it took on average 31 days between referral and diagnosis (the optimal care pathway for oesophagogastric cancer implies that this should take between two and four weeks), 19 days between diagnosis and MDT (the optimal care pathway for oesophagogastric cancer sets a maximum of two weeks) and 18 days between MDT and first treatment (the optimal care pathway for oesophagogastric cancer sets a maximum of two weeks).[148]

In addition to an MDT occurring in a timely fashion, variation occurs in MDT composition. Under the Cancer Council's optimal care guidelines, there are a variety of possible multidisciplinary team members. A subset of these team members is considered 'core'; that is, they should consistently be engaged within MDTs (Table 4.3).

[146] Kabwe, M., Robinson, A., et al., 2021, Timeliness of cancer care in a regional Victorian health service: A comparison of high-volume (Lung) and low-volume (oesophagogastric) tumour streams, Cancer Reports, doi: 10.1002/cnr2.1301.
[147] Abbas, M.N., Bright, T., Price, T., Karapetis, C., Thompson, S., Connell, C., Watson, D., Barnes, M., Bull, J., Singhal, N., Roy, A., 2021, Patterns of care and outcomes for gastric and gastro-oesophageal junction cancer in an Australian population, ANZ Journal of Surgery, 91, 2675-2682, doi:10.1111/ans.17249.
[148] Kabwe, M., Robinson, A., et al., 2021, Timeliness of cancer care in a regional Victorian health service: A comparison of high-volume (Lung) and low-volume (oesophagogastric) tumour streams, Cancer Reports, doi: 10.1002/cnr2.130; Cancer Council, 2021, Optimal care pathway for people with oesophagogastric cancer.

Table 4.3: Core team members of multidisciplinary team, optimal care pathways

	Oesophagogastic cancer	Hepatocellular carcinoma
Dietitian		
Interventional endoscopist	Refers to gastroenterologist or surgeon	
Medical oncologist		
Nurse and care coordinator	Oesophagogastric cancer nurse care coordinator	• Nurse with appropriate expertise • Care coordinator (determined by MDT)
Specialist surgeon	Oesophagogastric surgeon	Hepato-pancreato-biliary surgeon
Gastroenterologist/hepatologist		
Pathologist		
Radiation oncologist		
Radiologist	Upper GI	Interventional

Note: Dark purple denotes core team members, who are expected to attend most MDMs. Light purple denotes non-core team members. Other possible team members include: Aboriginal health practitioner, Indigenous liaison officer or remote general practitioner, Clinical trials coordinator, Anesthetist, Exercise physiologist, Fertility specialist, General practitioner, Geneticist, Nuclear medicine physician, Physiotherapist, Palliative care, Social worker, Spiritual/pastoral care, Psychiatrist, Psychologist, Occupational therapist, and Pharmacist. Source: Cancer Council, Optimal Care Guidelines, Oesophagogastric Cancer and Hepatocellular Carcinoma.

However, stakeholders highlighted substantial variation in composition of MDT:

- Private hospitals adopt sequential MDTs rather than a formal scheduled MDT with all team members involved; private hospitals lack focus on MDTs, with patients 'owned' by their clinician
- Palliative care is often excluded, reflecting resource limitations and stigma
- Allied health and dieticians are rarely included (despite being a 'core' team member for oesophagogastric cancer), reflecting resource limitations
- Participation sometimes limited to surgeon and oncologist alone
- Inter-state and cancer variations, e.g., South Australia and Northern Territory have a single oesophagogastric MDT meeting, enabled through telehealth.

Uptake of MDTs is restricted by various barriers (perceived and actual), including:[149]

- Absence of palliative care representation (skills)
- The number of MDT meetings (environmental context and resources)
- The cumulative cost of staff time (beliefs about consequences)
- The lack of capacity to discuss all patients within the allotted time (beliefs about capabilities)
- Reduced confidence to participate in discussions (social influences).

[149] Maharaj, A.D., Evans, S.M., Zalcberg, J.R., et al., 2021, Barriers and enablers to the implementation of multidisciplinary team meetings: a qualitative study using the theoretical domains framework, BMJ Quality & Safety, 30, 792-803.

Stakeholders indicated that telehealth and other enablers of MDTs have seen increasing acceptance following the COVID pandemic. However, concern exists regarding accessibility of supporting technologies which should enable data sharing between team members.

Notably, concordance of clinical management with MDT recommendation is not necessarily 100 per cent. For example, a retrospective audit of nine oncology MDTs observed that 13.9 per cent and 6.5 per cent were partially concordant and not concordant, respectively.[150]

Inconsistent use of best practice imaging

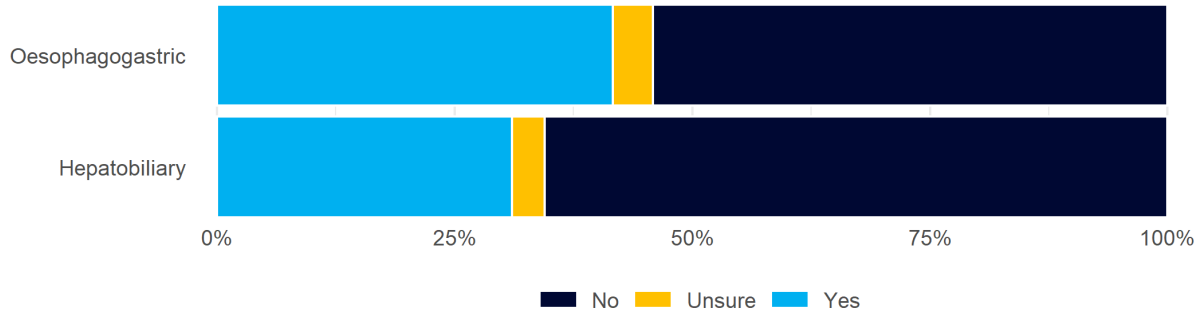
Liver cancer is currently diagnosed, staged and managed based on imaging findings without the need for invasive tumour biopsy. The current gold standard for reporting solitary or multiple liver lesions uses the Liver Imaging Reporting And Data System (LI-RADS) system. LI-RADS standardizes terminology, technique, interpretation, reporting, and data collection of liver imaging in patients at-risk for or with hepatocellular carcinoma and addresses the entire spectrum of lesions and pseudo-lesions.

In Australia, only a minority of radiology reporting of liver lesions uses the LI-RADS system.

Limited and inconsistent access to clinical trials

Clinical trials present an opportunity to access novel treatments in a setting of high quality care. However, respondents to the Patient and Carer Survey highlighted that clinical trials are frequently not discussed (54 per cent and 66 per cent of respondents).

Figure 4.17: Trials often not discussed

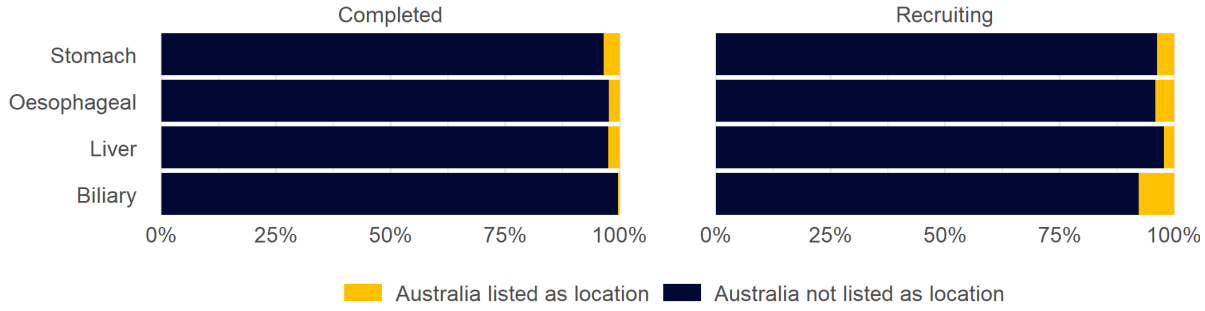


Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Stakeholders indicated that a common frustration for patients (who are supported or empowered to search for trials) is that internationally available trials for upper GI cancers are frequently not available in Australia. No more than four per cent of completed clinical trials in upper GI cancers listed on clinicaltrials.gov from 2010 to present involve Australia. The paucity of clinical trials available in Australia is further illustrated via Cancer Australia's clinical trials website. By way of comparison, there are 17 biliary cancer clinical trials known to be actively recruiting in Australia compared with more than 130 in breast cancer.[151]

[150] Vinod, S.K., Wellege, N.T., Kim, S., et al., 2021, Translation of oncology multidisciplinary team meeting (MDM) recommendations into clinical practice, BMC Health Serv Res, 21, 461, doi: 10.1186/s12913-021-06511-3.
[151] See: Cancer Australia Australian Cancer Trials website, available: https://www.australiancancertrials.gov.au.

Figure 4.18: Australian participation in clinical trials limited (since 2010)



Note: Biliary cancer data obtained from search terms: "cholangiocarcinoma" OR "biliary cancer" OR "bile tract cancer" OR "gallbladder cancer" OR "gall bladder cancer", liver cancer data obtained from search terms: "liver cancer" OR "hepatocellular carcinoma", stomach cancer obtained from search terms:"stomach cancer" OR "gastric cancer", oesophageal cancer obtained from search terms: "oesophageal cancer" OR "esophageal cancer" OR "oesophageal cancer" OR "oesophageal adenocarcinoma" OR "oesophageal squamous cell carcinoma" OR "esophageal squamous cell carcinoma" OR "esophageal adenocarcinoma". Locations identified as including Australia using 'location' variable. Source: Clinical.trials.gov data.

For trials available in Australia, stakeholders highlighted a variety of issues regarding inequality of access to clinical trials in Australia, including:

- Limited patient awareness of available trials and ability to find trials, particularly for those who cannot use clinical trial websites (and reflecting various inclusion and exclusion criteria, particularly for cholangiocarcinoma and relating to poor health status and low platelet counts at time of trial for those with hepatocellular carcinoma)
- Large reliance on health care practitioner awareness of available trials leading to access inequalities, e.g., oncologists in rural and regional areas covering many cancers may not be aware of specific opportunities available
- That culturally and linguistically diverse patients are often excluded due to English requirements, with additional issues relating to stigma (viewed as an experiment, rather than an opportunity to access best available care)
- That elderly Australians may be excluded due to age
- Possible bias against inclusion of rural and regional patients within clinical trials
- Difficulties in rural and regional access, underpinned by the potentially specious assumption that patients are not willing to travel for trials.

These difficulties are well recognised. For example, Brindley et al (2021) highlight that:[152]

> *Access to clinical trials is the primary barrier patients face. Patients most likely will have to travel to be able to participate in a trial and that, in turn, causes other issues, such as financial burden. Patients with a diagnosis as grim as CCA are deterred from clinical trials with a placebo arm unless there is an opportunity for crossover after a reasonable amount of time. There is no time to waste on a placebo.*

Lack of data to support complex referrals

There are numerous quality indicators which may support complex referrals:

- Case volumes metrics

[152] Brindley, P.J., Bachini, M., Ilyas, S.I., et al., 2021, Cholangiocarcinoma, Nat Rev Dis Primers, doi: 10.1038/s41572-021-00300-2.

- Use of MDTs and composition
- Services offered, including allied health and prehabilitation
- Access to clinical trials.

However, referring clinicians and patients often lack data on a range of these indicators, which inhibits their ability to direct patients to high quality services. Stakeholders indicated that this issue is most acute in oesophagogastic cancer, with hepatocellular carcinoma patients reported to more frequently navigate to specialist centres.

Stakeholders noted that the consequence of limited referral support tools is that there is variability in access to high quality services. One stakeholder wrote that:

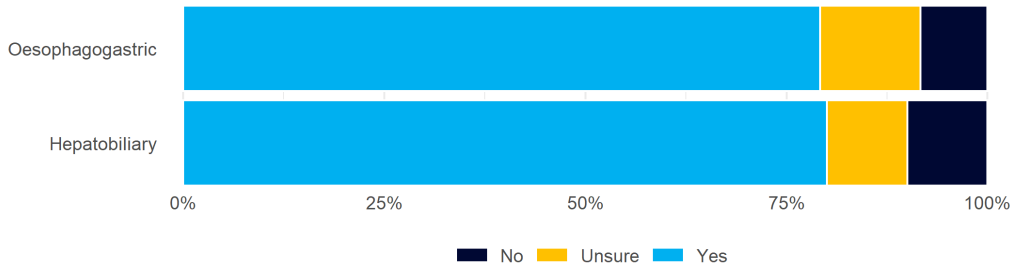
> *Patients really are spinning a roulette wheel in terms of who they see. In larger institutions, at least you will eventually be directed to a specialist. You have some general oncologists who might say they can deal with these cancers, even though they have only seen one over the past 10 years.*

Figure 4.19: Lack of data to support complex referrals – stakeholder perspectives

Variable support for patient engagement and empowerment in treatment decisions

While most patients and carers reported that treatment and referral options were discussed, 8 to 10 per cent reported lack of discussion of treatment and referral options.

Figure 4.20: Clinician discussion of treatment options



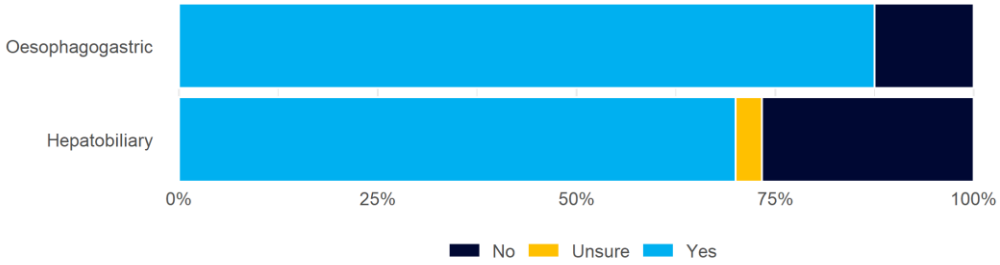
Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Approximately nine in ten respondents to the Patient and Carer Survey reported general understanding of treatment options available. However, respondents indicated that the extent of discussion is limited by few treatments being available (e.g., only chemo) and urgency of surgical action needed. A related challenge highlighted by stakeholders is communication breakdowns between patients and clinicians, with presumption of patients' preferences and failure to discuss the costs and benefits of treatment. For example, one stakeholder noted that:

Outcomes of treatment needs to be better discussed. For example, what is the response rate? Honest communication of the side effects and the benefit of these treatments is needed. This helps patients make informed decisions. I often find myself asking patients to go back to the oncologist and query the effectiveness of therapies – how many more days/months/years will the therapy add?

Moreover, 12 and 27 per cent of oesophagogastric and hepatobiliary patients and carers, respectively, reported that they did not feel empowered to make treatment decisions.

Figure 4.21: Felt empowered to make treatment decisions



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Some stakeholders highlighted difficulty in expressing opinions to health care professionals:

Doctors sometimes weren't happy to hear my opinions, but I had to be able to do it. We thought of ourselves as drivers of the bus.

The issue of limited empowerment was emphasised by stakeholders, who indicated that low empowerment is particularly problematic as patients are often the drivers of quality care:

Diagnosis can be quite devastating. Often patients are not offered options. They're just told, this is what you've got, this is the treatment that you'll be having. Often patients are left to their own to see if there's other treatment options, and if they don't know any better, they'll just do what the first doctor tells them. I think there is a lot that needs to change in understanding diagnosis and treatment options for patients.

Table 4.4: Variation in commentary regarding discussion and understanding of treatment

Issue	Commentary from respondents to Patient and Carer survey
Discussion of treatment	*"There was limited discussion. He was told that, as he had no private health insurance, he would be referred to the nearest metro hospital which was Western Health."* *"We were told we were being offered the 'gold standard' of treatment but the nature of the surgery was not explained. Surgery was never properly explained and so was refused when it became clear how extensive it was. It is too major, too risky, with too long a recovery. There was no guarantee of the outcome."* *"He was initially referred to one well known public hospital and told to put his affairs in order and to stop working. The professor did not want to discuss the possibility of other treatments (such as immunotherapy) nor clinical trials, instead preferring to use chemo (the gold standard) first and other treatments as a last resort. We pursued other avenues and eventually found a clinical trial at another hospital and transferred to that team."* *"At the first institution, he was given all the negative news by a very harried looking resident. The elderly Prof swept in for the last five minutes and suggested that he put his affairs in order, e.g., to get his sperm collected if his wife wants a baby in the future. The Prof then left them shell shocked in the hands of the register to organise forms for more tests and appointments. No wonder we then looked elsewhere for other treatment options."* *"I thought I understood cancer staging but information on upper gastrointestinal cancer was hard to understand."* *"The purpose of treatment was never to try and save his life. It was devastating to realise that the oncologist was never going to try and save his life and was never going to try anything outside the box. Essentially, the message was all we have for you is standard chemotherapy and at some point the cancer will become resistant and you will die."* *"Not once did anyone feel my tummy. I felt like an alien and couldn't even understand where the cancer was or how big it was. No one told us anything. It was so frustrating."* *"I was told I had six months to live without chemo, one year with chemo and that chemo will not shrink the tumor. This was negligent. I transferred elsewhere."*
Treatment intent discussed	*"Only when palliative care specialist became involved was treatment intent discussed."* *"I was only told that chemo would hopefully kill the cancer – no idea how. That was up to the next person to tell me or rather for me to ask questions about next time. Nurses had better communication than the doctors."* *"I was given plenty of information and opportunity to ask questions."*
Understanding off treatment options and empowerment	*"I researched the treatment options and outcomes with help from Pancare and opted out of resection surgery."* *"We only learned that the surgery was to be complete gastrectomy 48 hours before the operation at the pre admission clinic. We refused surgery and sought other options."* *"There were no options discussed, it was just surgery or I would die."* *"I really had no choice as it was too late for any other treatment."* *"Everything happened quickly and there were no options to consider. I went with what was put before me."* *"I had confidence in the surgeon undertaking the operation."* *"I knew I had to do something and put my trust with the surgeon. It happened very quickly once diagnosed."*

Issue	Commentary from respondents to Patient and Carer survey
	"I was so grateful for the medical help I received. I also felt a bit dazed by the speed at which everything happened." *"It was a bit of a shock and we went along with what the medical staff were advising."* *"Listening to the patient/family, here was a young man with so much to live for, a very positive attitude, a very supportive network, keen to try whatever it took to beat this disease. The first prof didn't listen. Thank God the second medical team did. He is now officially disease free coming out of the two year study"* *"We had to do our own research."* *"We needed time to let things sink in, time to consider the information provided, and time to do our own research."*

Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

- Stakeholders highlighted that there is limited clinical and patient facing resources to guide treatment and empower patients. As shown in

Figure 4.22, there is:

- No optimal care pathway (OCP) for biliary cancer
- No clinical guidelines for oesophageal, stomach or biliary cancers
- Limited data to empower patients with respect to quality of care
- No quality framework for these cancers.

Figure 4.22: Limited resources for navigation and referral

Resource	What	Target audience	Oesophageal	Stomach	Biliary	Liver
Cancer Council Guides to best cancer care	Resource to guide patients and carers through cancer experience.	Patients and carers (multiple languages)	✓	✓	x	✓
Optimal care pathway and quick reference guide	Describe a national standard of high-quality cancer care that all Australians should expect.	Health professionals and services (English)	✓	✓	x	✓
Clinical guidelines	Recommendations regarding optimal care informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options.	Clinicians	✓ Barrett's x Oesophageal Cancer	x	x	✓
Clinical care standard	Quality statements that describe the care patients should be offered by health professionals and health services for a specific clinical condition or defined clinical pathway in line with current best evidence	Medical directors	x	x	x	x

Notably, while OCPs exist for numerous cancers, integration is limited. Stakeholders highlighted a variety of issues, including that clinicians and patients are not aware of them, or that they are deprioritised. As one stakeholder put it:

> *Evidence tells us that when clinicians use OCPs, patient outcomes improve. The problem is they aren't taken up to a large extent. I hear many clinicians are aware of them, but never look at them. We can make these, but if people aren't going to use them, they're a waste of resources.*

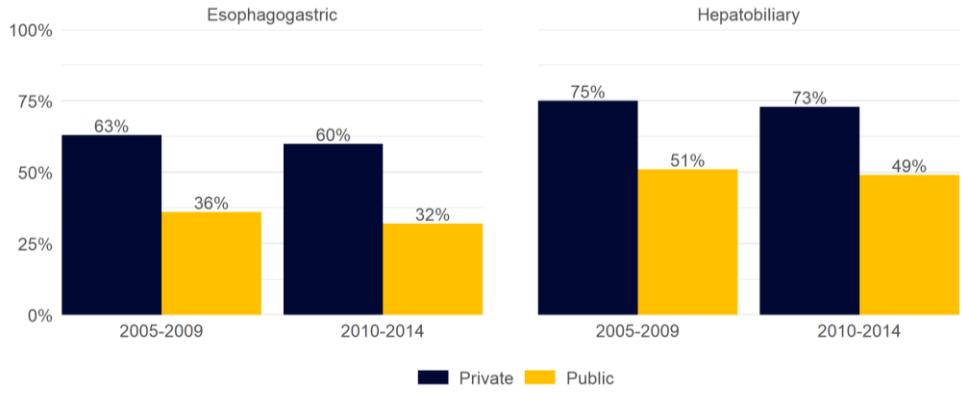
Delays in time spanning diagnosis and treatment

Under the optimal care pathway for oesophagogastric cancer, treatment should begin four weeks following diagnosis. However, the timeline from diagnosis to treatment for oesophagogastric cancer frequently exceeds 30 days; for example:

- An audit of patients diagnosed with oesophageal cancer across Victoria between July and December 2016 reported an average time of 38 days from diagnosis to first treatment, with 40 per cent meeting the optimal care pathway recommendation of 28 days.[153]
- A retrospective cohort study of patients with oesophageal cancer in regional Victoria found that, among the 81 patients with active treatment dates available locally, the median time from diagnosis to first treatment was 35 days, with only 26 patients (32 per cent) commencing treatment within 28 days from diagnosis.[154]

This is similarly illustrated by data from a Queensland-based study, which indicates that treatment in both the private and public system frequently begins later than 30 days after diagnosis. This study also indicates that patients in the private system more frequently receive treatment within 30 days of diagnosis.

Figure 4.23: Proportion of patients receiving first treatment within 30 days of diagnosis



Source: Walpole, E.T., Theile, D.E., et al., 2019, Development and Implementation of a Cancer Quality Index in Queensland, Australia: A Tool for Monitoring Cancer Care, Journal of Oncology Practice, doi: https://doi.org/10.

[153] Victorian Integrated Cancer Services, 2019, Victorian Oesophagogastric Cancer Audit – report 2017.
[154] Conway, P, et al., 2021, Oesophageal cancer treatment patterns, timeliness of care and outcomes in the Loddon Mallee region of Victoria: A retrospective cohort study, J Med Imaging Radiat Oncol, 65(2), 242-250, doi: 10.1111/1754-9485.13167.

Lack of treatment breakthroughs

Treatment of upper GI cancers has not seen significant advancement since the 1970s. Whilst other cancers have seen breakthroughs in the use of targeted therapies and/or immunotherapies, upper GI cancers have seen few novel treatments approved despite a relatively high number of mutational targets compared to other cancers.

An underlying difficulty faced in development of targeted therapy and immunotherapy is that resistance is high; for example, 30-40 per cent of liver cancer patients are resistant to individual immunotherapy options. Stakeholders noted that this relates to the complexity of these cancers, which can have many less potent driving mutations. One stakeholder's analogy provides clarity:

> *If you get a freighter stuck in the Suez Canal, everyone knows! If there is one strong driver, you can address it and have a major impact.*
>
> *Upper GI cancers are more like the mouth of the Mississippi. I can plug up one branch and nobody notices because you can just go around it. The abnormalities within GI cancers are not nearly as dominant.*

Notwithstanding, there have been some breakthroughs in drug therapies since 2007. However, some stakeholders raised concern that these new treatments are either not available in Australia or take long periods of time to receive PBS approval. For example, one respondent to the Patient and Carer survey noted that:

> *There are many targeted therapy drugs for cholangiocarcinoma that are not available in Australia. It is very disheartening as these are available in America and other countries. This needs to change as soon as possible – chemo doesn't cure and gives very bad side effects, while targeted therapy/immunotherapy can prolong survival and possibly cure.*

Year of FDA approval	Oesophageal OEJ	Stomach	Hepatocellular carcinoma	Biliary	Indication	Availability in UK (NICE)	Availability in Australia
2021				Ivosidenib	Adult patients with previously treated, locally advanced or metastatic cholangiocarcinoma with an isocitrate dehydrogenase-1 (IDH1) mutation		
2021				Infigratinib	Adults with previously treated, unresectable locally advanced or metastatic cholangiocarcinoma with a fibroblast growth factor receptor 2 (FGFR2) fusion or other rearrangement		
2021	Nivolumab				Patients with completely resected oesophageal or gastroesophageal junction (GEJ) cancer with residual pathologic disease who have received neoadjuvant chemoradiotherapy	November 2021	While nivolumab is PBS authority for some cancers and is TGA registered for hepatocellular and oesophageal carcinoma, it is not PBS listed.
2021	Pembrolizumab, trastuzumab, fluoropyrimidine- and platinum-containing chemotherapy				First-line treatment of patients with locally advanced unresectable or metastatic HER2 positive gastric or gastroesophageal junction (GEJ) adenocarcinoma		
2021	Nivolumab, fluoropyrimidine- and platinum-containing chemotherapy				Advanced or metastatic gastric cancer, gastroesophageal junction cancer, and oesophageal adenocarcinoma.		
2021	Pembrolizumab, platinum and fluoropyrimidine-based chemotherapy				Patients with metastatic or locally advanced oesophageal or gastroesophageal (GEJ) (tumors with epicenter 1 to 5 centimeters above the gastroesophageal junction) carcinoma who are not candidates for surgical resection or definitive chemoradiation		
2021	Fam-trastuzumab deruxtecan				Adult patients with locally advanced or metastatic HER2-positive gastric or gastroesophageal (GEJ) adenocarcinoma who have received a prior trastuzumab-based regimen		

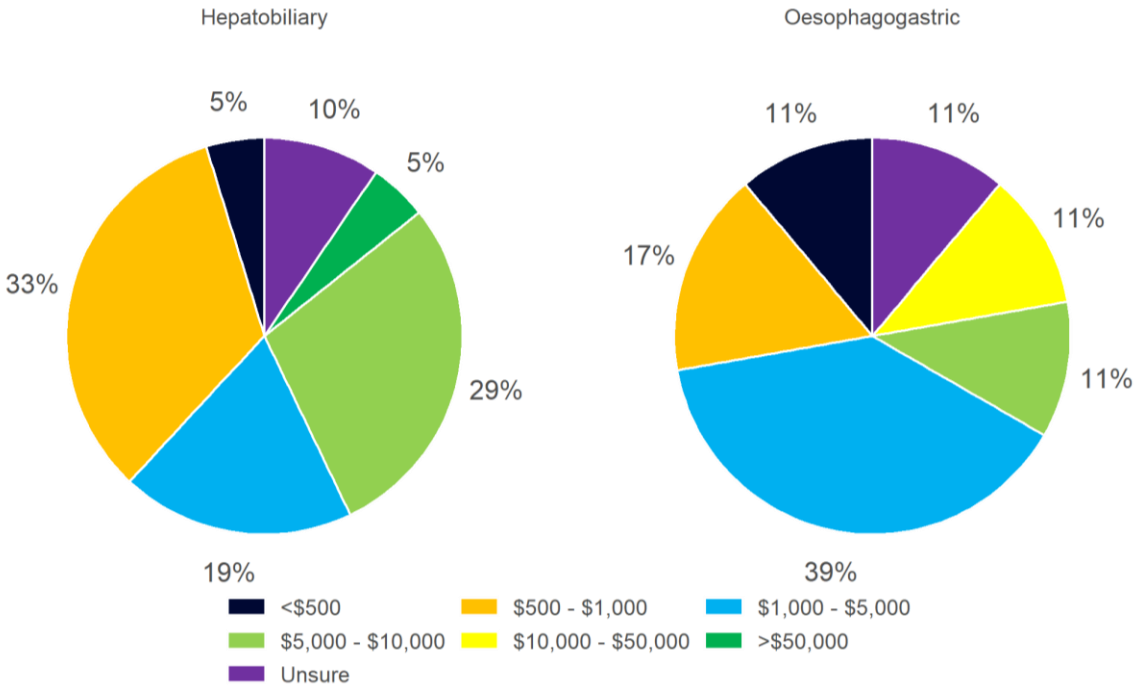
Year of FDA approval	Oesophageal OEJ	Stomach	Hepatocellular carcinoma	Biliary	Indication	Availability in UK (NICE)	Availability in Australia
2020	Nivolumab				Unresectable advanced, recurrent or metastatic oesophageal squamous cell carcinoma (ESCC) after prior fluoropyrimidine- and platinum-based chemotherapy	June 2021	While nivolumab is PBS authority for some cancers and is TGA registered for hepatocellular and oesophageal carcinoma, it is not PBS listed.
2020				Pemigatinib	Adults with previously treated, unresectable locally advanced or metastatic cholangiocarcinoma with a fibroblast growth factor receptor 2 (FGFR2) fusion or other rearrangement	August 2021	
2020			Atezolizumab and bevacizumab		Patients with unresectable or metastatic hepatocellular carcinoma who have not received prior systemic therapy	December 2020	Bevacizumab is on the PBS general schedule; Atezolizumab is PBS authority (November 20120)
2020			Nivolumab and ipilimumab		Patients with hepatocellular carcinoma (HCC) who have been previously treated with sorafenib		While nivolumab is PBS authority for some cancers and is TGA registered for hepatocellular and oesophageal carcinoma, it is not PBS listed.
2019	Pembrolizumab				Advanced oesophageal squamous cell cancer		
2019			Ramucirumab		Patients who have an alpha fetoprotein (AFP) of ≥ 400 ng/mL and have been previously treated with sorafenib	Terminated appraisal.	
2019	Trifluridine/ tipiracil				Adult patients with metastatic gastric or gastroesophageal junction (GEJ) adenocarcinoma previously treated with at least two prior lines of chemotherapy that included a fluoropyrimidine, a platinum, either a taxane or irinotecan, and if appropriate, HER2/neu-targeted therapy	January 2021	PBS authority
2019			Cabozantinib		Patients with hepatocellular carcinoma (HCC) who have been previously treated with sorafenib	Terminated appraisal.	

Year of FDA approval	Oesophageal OEJ	Stomach	Hepatocellular carcinoma	Biliary	Indication	Availability in UK (NICE)	Availability in Australia
2018			Pembrolizumab		Patients with hepatocellular carcinoma (HCC) who have been previously treated with sorafenib		
2018			Lenvatinib		Patients with unresectable hepatocellular carcinoma (HCC)	December 2018	PBS authority (July 2019)
2017	Ogivri				Patients with HER2-overexpressing breast or metastatic stomach cancer (gastric or gastroesophageal junction adenocarcinoma)		
2017			Nivolumab		Patients who have been previously treated with sorafenib		While nivolumab is PBS authority for some cancers and is TGA registered for hepatocellular and oesophageal carcinoma, it is not PBS listed.
2017			Regorafinib		Patients who have been previously treated with sorafenib	January 2019	TGA approved (April 2019)
2017	Pembrolizumab				Patients with recurrent locally advanced or metastatic, gastric or gastroesophageal junction adenocarcinoma whose tumors express PD-L1		
2014	Ramucirumab and paclitaxel				Patients with advanced gastric or gastroesophageal junction (GEJ) adenocarcinoma		Ramucirumab is TGA approved but not PBS reimbursed
2014	Ramucirumab				Patients with advanced or metastatic, gastric or gastroesophageal junction (GEJ) adenocarcinoma with disease progression on or after prior treatment with fluoropyrimidine- or platinum-containing chemotherapy	January 2016	Ramucirumab is TGA approved but not PBS reimbursed
2010	Trastuzumab				Patients with HER2 overexpressing metastatic gastric or gastroesophageal (GE) junction adenocarcinoma, who have not received prior treatment for metastatic disease	November 2010	PBS authority
2007			Sorafenib		Treatment of unresectable hepatocellular carcinoma	September 2017	PBS authority (March 2010) [TGA approved 2007]

Out of pocket costs can be extreme

Where patients experienced out of pocket costs during active treatment, there was large variation. Over 5 per cent experienced out of pocket costs in excess of $10,000. Notably, stakeholder highlighted that immunotherapy that was not publicly subsidized or available on compassionate grounds cost over $100,000 ($11,000 per treatment or roughly $10,000 per three week session).

Figure 4.24: Substantial variation in experienced out of pocket costs



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

These additional costs can put stress on households. In 2017–18, the average equivalised disposable household income was $1,062 per week (which compares to $1,046 per week in 2015–16 and $1,018 per week in 2007–08), which is income available after tax used to pay for housing, food, and other household needs. This drops to $462 per week for low-income households.

At-risk groups less likely to receive best practice treatment

At-risk groups, including low socioeconomic background, culturally and linguistically diverse and Indigenous Australians are less likely to receive treatment and care in line with best practice.

Due to the complexity of curative treatment provided for upper GI cancers, vulnerable patient groups with poorer performance scores, and more comorbidities, are less likely to receive curative treatment. For example:

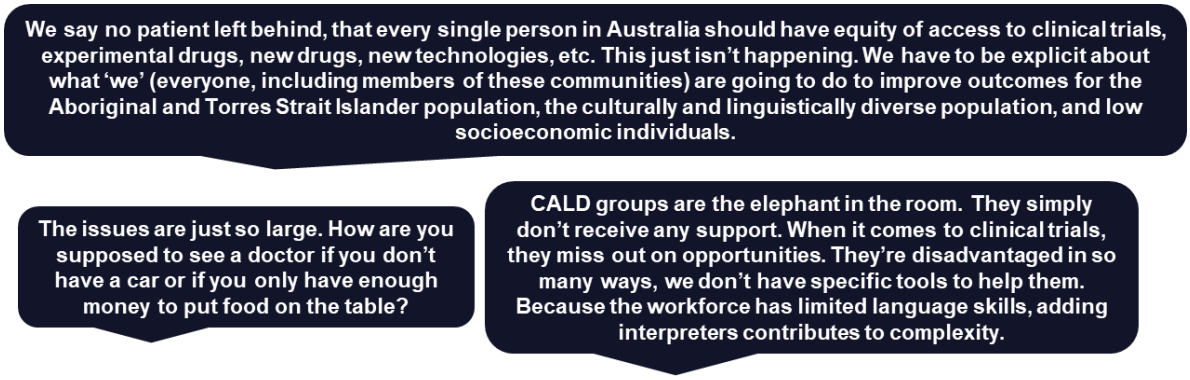
- Patients living in rural and remote areas are significantly less likely to receive surgical resection for the treatment of hepatocellular carcinoma compared with patients living in metropolitan areas (9 vs 13 per cent), and have worse outcomes (33 per cent fewer months of survival)[155]

[155] Taye, B.W., et al., 2021, Remoteness of residence predicts tumor stage, receipt of treatment, and mortality in patients with hepatocellular carcinoma, JGH Open, doi:10.1002/jgh3.12580.

- Indigenous Australians often present late, contributing to markedly lower in Indigenous compared with non-Indigenous Australians (64 v 172 days).[156]
- Stakeholders highlighted that Indigenous Australians, rural patients, culturally and linguistically diverse and those with low health literacy have reduced access to clinical trials and are less empowered to obtain best practice treatment.

Stakeholders noted that often the challenges faced by at-risk groups are systemic.

Figure 4.25: Systemic challenges faced by at-risk groups – stakeholder perspectives



A related issue faced by low socioeconomic status populations, culturally and linguistically diverse and Indigenous Australians is poor health literacy.

Low health literacy is associated with worse health outcomes overall and adverse health behaviours, including low engagement with health services and lower ability to self manage care.[157] In contrast, higher levels of heath literacy are associated with increased involvement in decision making.[158]

Levels of health literacy in Australia are generally low,[159] for example, ABS (2006) data indicates that 59 per cent of Australians living in non-rural settings had low levels of health literacy. Notwithstanding, 2018 data indicated that 'Australians feel positive about their health literacy' (ABS, 2020); for example:

- One-third of Australians (33 per cent) found it always easy to discuss health concerns and actively engage with their healthcare providers
- 56 per cent found this usually easy
- 12 per cent found it difficult.

[156] Parker, C., Tong, S.Y., Dempsey, K., et al., 2014, Hepatocellular carcinoma in Australia's Northern Territory: high incidence and poor outcome, Med J Aust, 201, 470–474, doi: 10.5694/mja13.11117.
[157] Berkman, N.D., Sheridan, S.L., Donahue, K.E., Halpern, D.J., Crotty, K., 2011, Low health literacy and health outcomes: an updated systematic review, Ann Intern Med, 155(2), 97-107, doi: 10.7326/0003-4819-155-2-201107190-00005; Kobayashi, L.C., Wardle, J., von Wagner, C., 2014, Limited health literacy is a barrier to colorectal cancer screening in England: evidence from the English Longitudinal Study of Ageing, Prev Med, 61(100), 100-5, doi: 10.1016/j.ypmed.2013.11.012; AIHW, 2020, Health literacy, available: https://www.aihw.gov.au/reports/aus/234/determinants-of-health/health-literacy.
[158] De Oliveira, G.S., Errea, M., Bialek, J., Kendall, M.C., McCarthy, R.J., 2018, The impact of health literacy on shared decision making before elective surgery: a propensity matched case control analysis, BMC Health Serv Res, 18(1), doi: 10.1186/s12913-018-3755-9; Seo, J., Goodman, M.S., Politi, M., Blanchard, M., Kaphingst, K.A., 2016, Effect of Health Literacy on Decision-Making Preferences among Medically Underserved Patients, Med Decis Making, 36(4), 550-6, doi: 10.1177/0272989X16632197.
[159] Choudhry, F.R., Ming, L.C., Munawar, K., Zaidi, S., Patel, R.P., Khan, T.M., Elmer, S., 2019, Health Literacy Studies Conducted in Australia: A Scoping Review, International journal of environmental research and public health, 16(7), 1112, doi: 10.3390/ijerph16071112.

Social determinants of health are associated with low health literacy, including lower socioeconomic status, diverse cultural background, and lower levels of education.[160] For example, over 70 per cent of the culturally and linguistically diverse population within Australian states have been reported to have low health literacy.[161] The overlap between groups who are at-risk of upper GI cancers and groups with low health literacy implies that efforts to either enhance health literacy within these cohorts or models of care which reduce patients falling through the gaps may be needed.

New technologies can help ameliorate some of these barriers; for example, telehealth can reduce the need to travel for rural or low socioeconomic patients, and in the future, applications may help educate the community. However, stakeholders highlighted that these technologies must be appropriately contextualised; for example, telehealth may not be effective if trust between healthcare practitioner and patient is not adequately developed.

COVID policies adversely impacted care

One of the consequences of covid-19 policies is that some patients have faced delayed treatment. For example:

- Services requiring more intensive perioperative care, including those for oesophageal cancer, were at increased risk of cancellation (COVIDSurg Collaborative, 2021).
- Considerable variation in hepatocellular carcinoma management was observed among countries:[162]
  - Treatment of hepatocellular carcinoma was frequently delayed world wide (66.7 per cent in BCLC 0/A/B and 63.0 per cent in BCLC C)
  - There were changes in treatment modality (33.3 per cent in BCLC 0/A/B and 18.5 per cent in BCLC C)
  - An increase in treatment complications (about 15 per cent across all BCLC stages)
  - No growth in clinical trial enrollments during the pandemic.

4.6 Need to develop a workforce for the future

Upper GI cancers are complex and have extreme physical and emotional impacts, it follows that delivery of best practice care involves a range of medical and allied health care professions. Likewise, the inherent challenges of diagnosing and treating upper GI cancers call for a highly specialised workforce of medical specialists and researchers.

Stakeholders indicated that there are current shortages in skills, including:

- Nursing services
- Palliative care services

[160] Javanparast, S., Naqvi, S.K.A., Mwanri, L., 2020, Health service access and utilisation amongst culturally and linguistically diverse populations in regional South Australia: a qualitative study, Rural Remote Health, 20(4), doi: 10.22605/RRH5694; Heijmans, M., Waverijn, G., Rademakers, J., van der Vaart, R., Rijken, M., 2015, Functional, communicative and critical health literacy of chronic disease patients and their importance for self-management, Patient Educ Couns, 98(1), doi: 10.1016/j.pec.2014.10.006; Rowlands, G., Protheroe, J., Winkley, J., et al., 2015, A mismatch between population health literacy and the complexity of health information: an observational study, Br J Gen Pract, 65(635), doi: 10.3399/bjgp15X685285; Rheault, H., Coyer, F., Jones, L., et al., 2019, Health literacy in Indigenous people with chronic disease living in remote Australia, BMC Health Serv Res, 19, 523, doi: 10.1186/s12913-019-4335-3.

[161] Ethnic communities' council of Victoria, 2012, An investment not an expense: enhancing health literacy in culturally and linguistically diverse communities.

[162] Gandhi, M., Ling, W.H., Chen, C.H., Lee, J.H., Kudo, M., Chanwat, R., Strasser, S.I., Xu, Z., Lai, S.H., Chow, P.K., 2021, Impact of COVID-19 on Hepatocellular Carcinoma Management: A Multicountry and Region Study, Journal of hepatocellular carcinoma, 8, 1159–1167, doi: 10.2147/JHC.S329018.

- Translation and culturally appropriate support services
- Survivorship services
- Specialised cancer nurse and nurse navigator services
- Rural and remote cancer care specialist services
- Cancer researcher and research support
- Specialist cancer health roles including psycho-oncology, exercise physiology and nutritional support.

Skill shortages negatively impact both patients and healthcare professionals, both at present and into the future.

Stakeholder views are validated by available data: Health Workforce Australia modelling, for example, projects a shortfall of total enrolled and registered nurses relative to demand of between 94,000 and 122,000 by 2030.[163]

For patients, shortages create risks to the delivery of best practice treatment and care. For example, as highlighted by one stakeholder in the context of palliative care, shortages mean that patients may experience unnecessary pain or die at hospital instead of at home:

> *There are people in hospital who wouldn't be in hospital if there was adequate ambulatory palliative care support, so they could live at home and die at home instead of in hospital. It's underfunded, under supported and underappreciated.*

Shortages also place additional pressure on the existing workforce, leading to overwork, working out of scope of practice (providing sub optimal value), burnout and possible workforce departure. The extent of shortages has been exacerbated throughout the COVID-19 pandemic. As highlighted in an interview with Professor John Wilson, outgoing president of the Royal Australasian College of Physicians, 'there could soon be a mass exodus of highly skilled, burnt-out doctors and nurses from Victorian hospitals'.[164]

Researcher shortages today, too, limit improvements in outcomes for future patients. Inadequate funding for research, coupled with global competition and alternative occupations and fields of research, can contribute to difficulty in attraction and retention of researchers.

Looking forward, shortages are likely to be exacerbated by growing cancer incidence, an ageing population, continued migration from endemic areas, increasing risk factors such as overweight and obesity, and sedentary behaviour. Furthermore, any improvements in survival will lead to increased requirements for follow-up and survivorship care.

Increasing cancer incidence is also likely to place additional pressure on the primary healthcare workforce. Shortages of general practitioners would foreseeably result in negative outcomes for patients, especially given their critical role in identifying early symptoms and risk profiles, coordinating screening and diagnosis and psychosocial support.

Technological development and progression in best practice care can ease burden on healthcare practitioners through efficiency gains. However, the transition period can place additional change-related burden on practitioners and the system more broadly; for

[163] Health Workforce Australia, 2014, Australia's Future Health Workforce – Nurses Overview Report, accessed at: https://www.health.gov.au/sites/default/files/documents/2021/03/nurses-australia-s-future-health-workforce-reports-overview-report.pdf

[164] Cunningham, M., 2022, 'A dire situation that is unprecedented': Senior Alfred doctor quits, warning of mass burnout, The Age.

example, telehealth, systems for referral, and consumer navigation tools require education on correct use, as well as investment in supporting infrastructure and documentation.

Furthermore, technological development and improvements in practice can result in variations in skill requirements. These changes can lead to stakeholder push back, thereby delaying implementation of policy which may be reduced costs and improved patient outcomes. These changes can also create new roles which need to be appropriately supported; for example, there is evidence that adequately training nurses can conduct endoscopies and ultrasounds (or related procedures), and artificial intelligence can assist with diagnostics imaging and cancer detection.[165] These changes can reduce burden placed upon the healthcare system, but require adequate flexibility.

4.7 Inconsistent supportive care for patients and carers

Supportive care is a term that can mean different things to different people. Clinicians, for example, may sometimes think about supportive care in relatively narrow clinical terms, such as interventions to manage infection or pain, and in some cases may not consider supportive care to be a core component of treatment.

Increasingly, however, supportive care is being defined more broadly and recognised as a core component of cancer treatment and care. For example, the National Cancer Institute defines supportive care to be:[166]

> *Supportive care is care given to improve the quality of life of patients who have a serious or life-threatening disease. The goal of supportive care is to prevent or treat as early as possible the symptoms of a disease, side effects caused by treatment of a disease, and psychological, social, and spiritual problems related to a disease or its treatment. Supportive care is also sometimes called comfort care, palliative care, and symptom management.*

Within Australia, the definition of supportive care is most comprehensively described by the Optimal Care Pathways, which were updated by the Cancer Council Victoria and endorsed by Cancer Australia.[167] The Optimal Care Pathways call for the provision of supportive care screening across physical, psychological, social, information and spiritual domains from diagnosis to ensure appropriate treatment and care planning at all stages of care.

Survivorship care is closely related to supportive care. For example, the NCI defines survivorship to be:[168]

> *Survivorship focuses on the health and well-being of a person with cancer from the time of diagnosis until the end of life. This includes the physical, mental, emotional, social, and financial effects of cancer that begin at diagnosis and continue through treatment and beyond. The survivorship experience also includes issues related to follow-up care (including regular health and wellness checkups), late effects of treatment, cancer recurrence, second cancers, and quality of life. Family members, friends, and caregivers are also considered part of the survivorship experience.*
>
> *A survivorship care plan is a detailed plan given to a patient after treatment ends, that contains a summary of the patient's treatment, along with recommendations for follow-up care. In cancer, the plan is based on the type of*

[165] Queensland Department of Health, 2014, Overview of the planned introduction of nurse endoscopy in Queensland; Luo, H., et al., 2019, Real-time artificial intelligence for detection of upper gastrointestinal cancer by endoscopy: a multicentre, case-control, diagnostic study, The Lancet Oncology, 20(12), 1645-1654, doi: 10.1016/S1470-2045(19)30637-0; Farrington, E. A., Maskell, G., Hussaini, H. S., 2012, Feasibility and experience of nurse-led ultrasound-guided percutaneous liver biopsy. Frontline gastroenterology, 3(3), 187–190, doi: 10.1136/flgastro-2012-100154.
[166] National Cancer Institute, 2020, NCI Dictionary of Cancer Terms, supportive care, available: https://www.cancer.gov/publications/dictionaries/cancer-terms/def/supportive-care.
[167] See: Optimal Care Pathway for Oesophagogastric cancers and hepatocellular carcinoma, 2021, Second Edition.
[168] National Cancer Institute, 2020, NCI Dictionary of Cancer Terms, survivorship care, https://www.cancer.gov/publications/dictionaries/cancer-terms/search?contains=false&q=survivorshipe

cancer and the treatment the patient received. A survivorship care plan may include schedules for physical exams and medical tests to see if the cancer has come back or spread to other parts of the body. Getting follow-up care also helps check for health problems that may occur months or years after treatment ends, including other types of cancer. A survivorship care plan may also include information to help meet the emotional, social, legal, and financial needs of the patient. It may include referrals to specialists and recommendations for a healthy lifestyle, such as changes in diet and exercise and quitting smoking. Also called follow-up care plan.

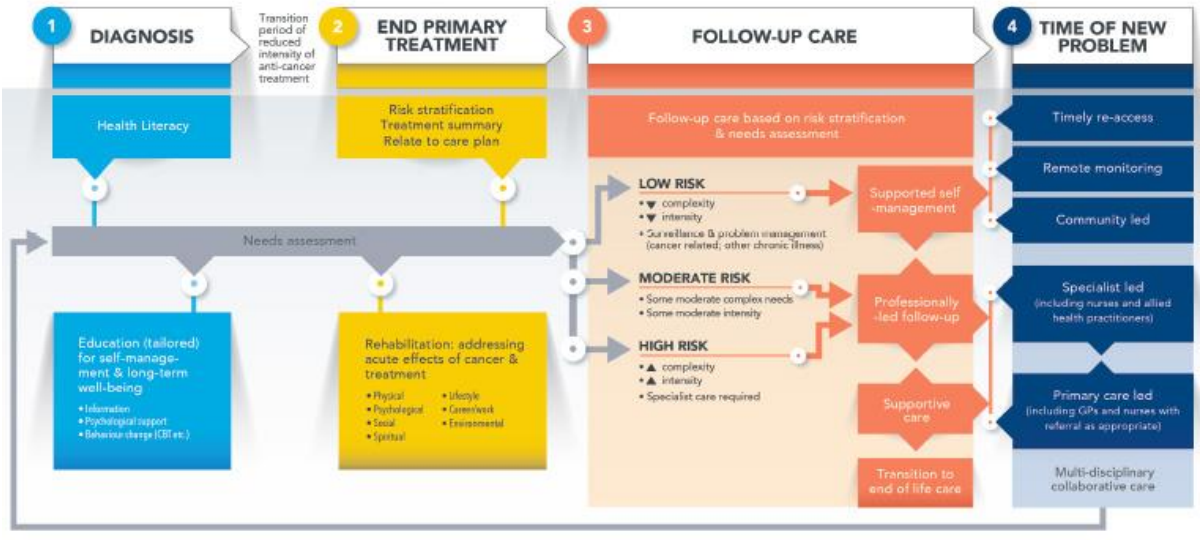
While in its broadest definition a person is a cancer survivor from diagnosis for the remainder of their life,[169] in practice the use of the term 'survivorship' tends to be applied from when a person transitions from active anti-cancer treatment to post-treatment care and disease surveillance. Thus, a survivorship care plan (also called a follow-up care plan or post-treatment care plan) is typically provided at the conclusion of active treatment.

The Clinical Oncology Society of Australia (COSA), like the Optimal Care Pathways, recommends a model for supportive care and survivorship care that begins at diagnosis, through the provision of information for self-management and supportive care for long-term wellbeing (Figure 7.1). The COSA Model underscores that supportive care needs should be identified from diagnosis to ensure the patient and their family are screened for and referred to supportive care from diagnosis through active treatment and as long-term survivors.

An aspect of supportive care which overlaps with treatment is prehabilitation, which refers to programs which attempt to improve health (or mitigate health deterioration) with the objective of enabling the patient to withstand treatment, particularly surgery. Adopting a broad definition, prehabilitation may include:

- Initiatives to improve physical health
- Initiatives to improve nutritional health
- Initiatives to improve mental health
- Related initiatives, including cessation of smoking, reducing alcohol consumption and improving pulmonary function.

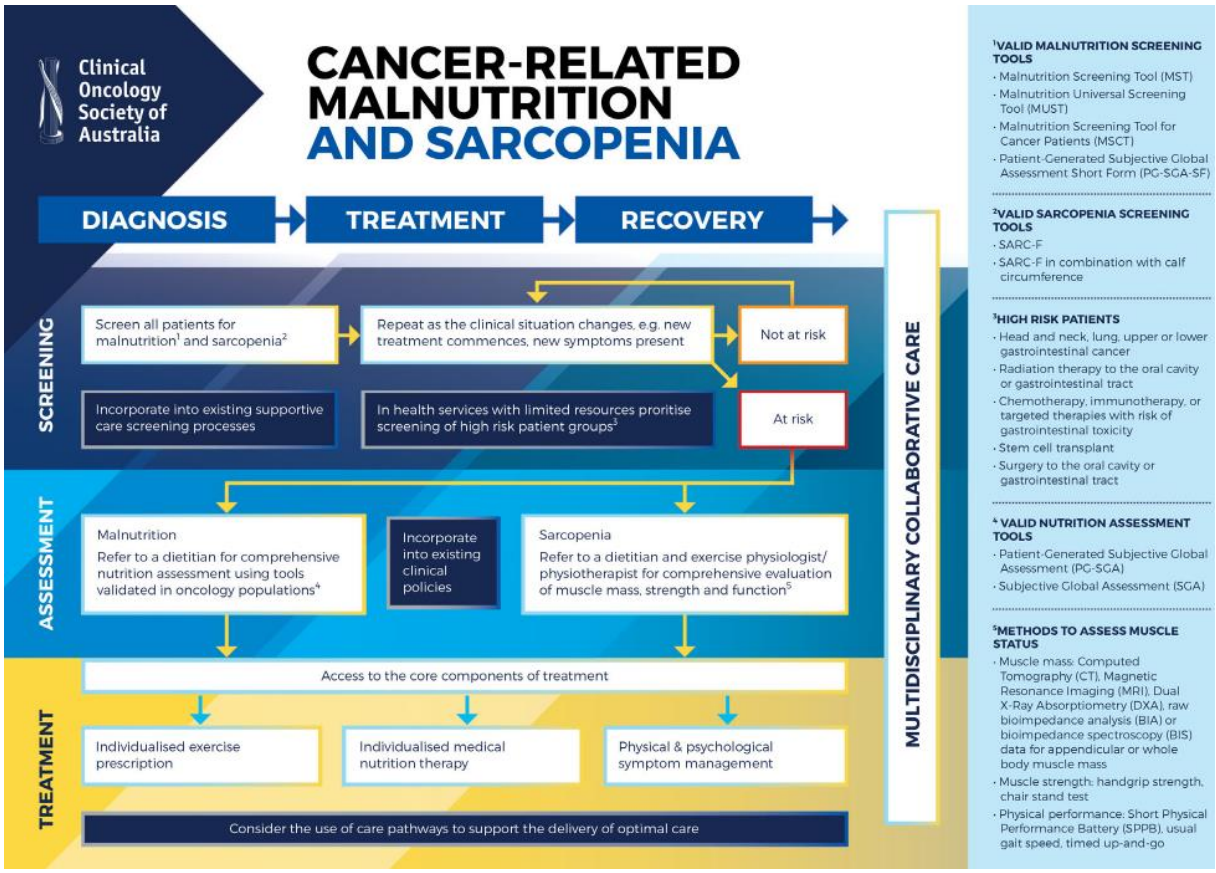
Figure 4.26: Clinical Oncology Society of Australia model of supportive and survivorship care



[169] Hewitt, M.E., Ganz P.A., 2006, From cancer patient to cancer survivor: lost in translation, An American Society of Clinical Oncology and Institute of Medicine Symposium, National Academies Press.

Source: Vardy, J.L., Chan, R.J., Koczwara, B., Lisy, K., et al., 2019, Clinical Oncology Society of Australia position statement on cancer survivorship care, Royal Australian College of General Practitioners, 48(12).

Figure 4.27: Clinical Oncology Society of Australia model of cancer related malnutrition and sarcopenia



Source: Kiss, N., Loeliger, J., Findlay, M., et al., 2020, Clinical Oncology Society of Australia: Position statement on cancer-related malnutrition and sarcopenia, Nutr Diet, 77(4), 416-425, doi: 10.1111/1747-0080.12631.

Patients and carers have high supportive care needs, which are frequently unmet

Access to supportive care services before, during and following active treatment are critical to the long-term wellbeing of upper GI cancer patients and survivors. Both literature and stakeholder consultations indicated that patients with upper GI cancers and their family members have extremely high supportive care needs, particularly given the nature of the treatment, which are not routinely met.

The following sections detail the major physical, emotional and financial impacts of an upper GI cancer, its treatment and the implications for supportive care.

Substantial physical effects throughout patient journey

Patients diagnosed with upper GI cancers face a wide range serious physical side effects arising from the cancer and its treatment.

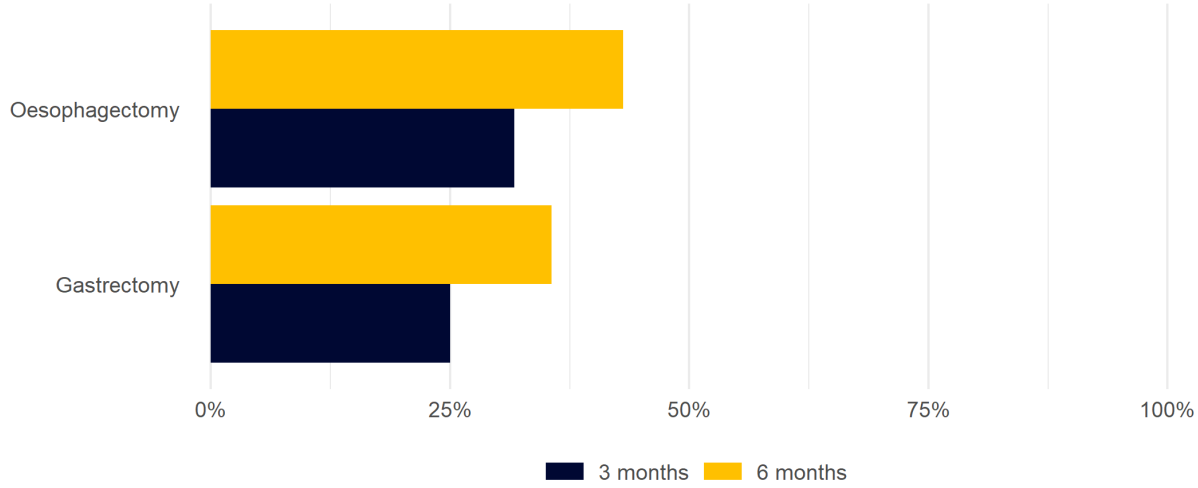
One physical side effect which disproportionately effects upper GI cancer patients before, during and after treatment is unintended weight and muscle loss; for example, over 70 per cent of oesophageal cancer patients experience unintended weight loss and between 26 and 75 per cent of patients experience sarcopenia at diagnosis.[170]

[170] Minnella, E.M., Drummond, K., Carli, F., 2021, The impact of prehabilitation on surgical outcomes, Annals of Esophagus, 4, doi: 10.21037/aoe-2020-15.

Patients with upper GI cancer are one of the highest-risk groups for malnutrition,[171] which can affect up to 80 per cent of upper GI cancer patients. For oesophagectomy and gastrectomy patients, respectively, a recent study observed:[172]

- Malnutrition in 39.4 per cent and 44 per cent of patients
- Unintentional weight loss in 63.6 per cent and 60 per cent of patients
- Low muscle strength in 18.2 per cent and 32 per cent of patients (with 47 per cent and 50 per cent unable to complete muscle strength testing).

Figure 4.28: Prevalence of weight loss of at least 5 per cent in 3 and 6 months prior to surgery



Source: Deftereos, I., Justin, M.C., et al., 2021, Assessment of Nutritional Status and Nutrition Impact Symptoms in Patients Undergoing Resection for Upper Gastrointestinal Cancer: Results from the Multi-Centre NOURISH Point Prevalence Study, Nutrients, 13(10), 3349, doi: 10.3390/nu13103349.

Moreover, as hepatocellular carcinoma often arises in patients with cirrhotic livers, patients may face associated physical symptoms prior to diagnosis with hepatocellular carcinoma, such as ascites (fluid buildup in the abdomen) and gastrointestinal bleeding. One stakeholder noted that:

> *When a patient first presents with liver cancer it is probably also their first presentation with cirrhosis and liver failure. They come in looking absolutely awful, like they are dying. However, in the right setting, it is amazing how they can recover or respond.*

This was echoed by many stakeholders, who noted that a myriad of symptoms and side effects arise at the same time, requiring a multidisciplinary multi-organ team to manage:

> *They're so desperately unwell. Upper GI patients have so many multi system consequences, damage to the gut, etc.*

If patients do not receive adequate supportive care, it can dramatically change their quality of life and have step-change outcomes for their treatment needs:

> *And I find it frustrating just within my role that either people think "Oh, they've got stomach cancer or they've got pancreatic cancer or they've got a liver cancer." And that doesn't sit very well with me. Some people will launch into*

[171] Arends, J., Baracos, V., Bertz, H., et al., 2017, ESPEN expert group recommendations for action against cancer-related malnutrition, Clin Nutr, 36, 1187–1196, doi: 10.1016/j.clnu.2017.06.017.
[172] Deftereos, I., Justin, M.C., et al., 2021, Assessment of Nutritional Status and Nutrition Impact Symptoms in Patients Undergoing Resection for Upper Gastrointestinal Cancer: Results from the Multi-Centre NOURISH Point Prevalence Study, Nutrients, 13(10), 3349, doi: 10.3390/nu13103349.

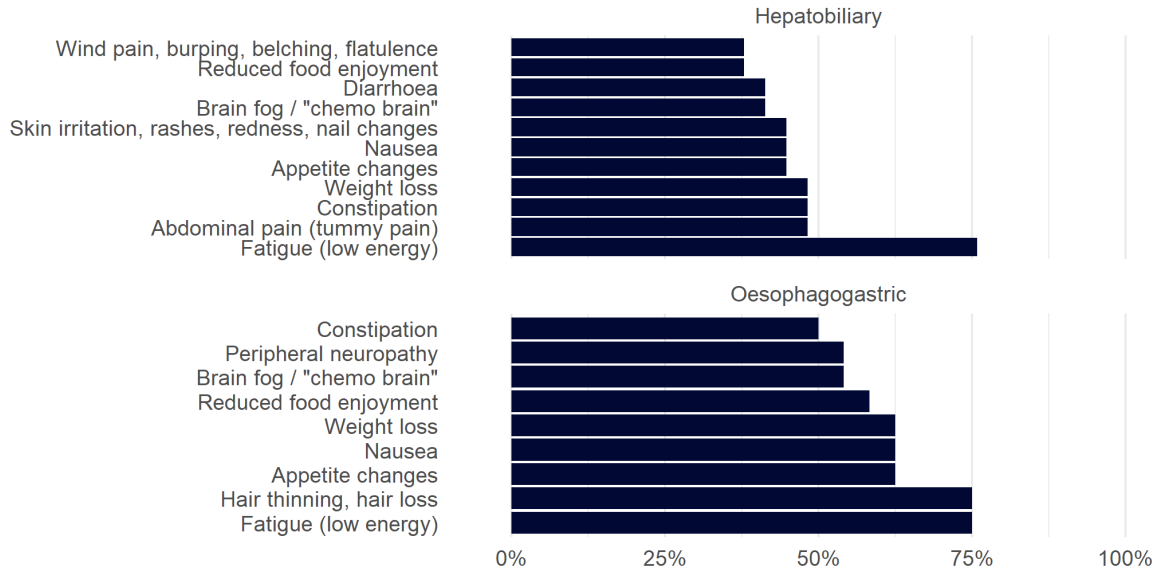
action and get stuff done because they know that, if we diagnose them early enough, we can actually treat them and improve their quality of life.

We do try and meet up with all the patients, we do engage with them very early. For our oesophageal cancer patients, I go and spend an hour with them when they first come, and I assess their swallowing at that appointment. For the last five years, we set up a service so that they see a dietitian the same day. That has meant that, rather than having at least 50 per cent of our patients admitted to hospital within the first two weeks, now we don't have any patients admitted. And we've cut down on our need for feeding tubes, so they can continue to eat and drink normally.

A couple of years ago, 60 to 70 per cent of our patients needed a feeding tube. I do find that the rates of depression, especially with oesophageal cancers, are much higher in anyone who needs a feeding tube. That's an issues in itself.

Results from the Patient and Carer Survey indicated that patients experienced a variety of physical side effects during treatment.

Figure 4.29: Physical side effects experience during treatment (most common)



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Following treatment, physical consequences of treatment persist, including negative impacts on patient (and potentially their family members') eating habits. One stakeholder noted that:

Following surgery, he had to learn to start eating again. It was really tough; he had to get used to the drinks and supplements. It was hard to figure out what foods would be possible to digest. I had to adjust to eat the same as him as well, which was a large adjustment.

The challenges in nutrition and lack of support were identified by multiple stakeholders. One nurse noted that nutritional support, which is not delivered in a nationally consistent way to an agreed standard, is critical to supporting patients:

A lot of them are on soups or you know, they're just very poor understanding of [how to eat] or they might be just surviving on jelly. Some people just think "Oh, well I just need to put everything into a ninja ball and process everything up and I'll still get all my nutrition that way." That doesn't really happen.

Oesophagectomy and gastrectomy have been demonstrated to lead to long-lasting, clinically relevant deterioration in various health related quality of life functioning and symptom scales. For example, the physical and role functioning remained impaired at 12 months following gastrectomy, and many symptom scales showed long-term deterioration, such as

diarrhoea and loss of taste for both gastrectomy and oesophagectomy.[173] Curative treatment may result in a decrease of physical fitness in patients for up to three months postoperatively, with conflicting results at six months.[174] Collectively, these surgeries result in a range of short-long-term nutritional issues.[175]

For patients with unresectable cancer, there are a range of complex physical issues which have radical impacts on patients. For example, up to 43 per cent of patients with unresectable hepatocellular carcinoma die from complications of their cirrhosis rather than the cancer itself.[176]

Despite this, inadequate support for symptoms and other issues across the cancer journey have been recognised.[177]

Large social and emotional effects

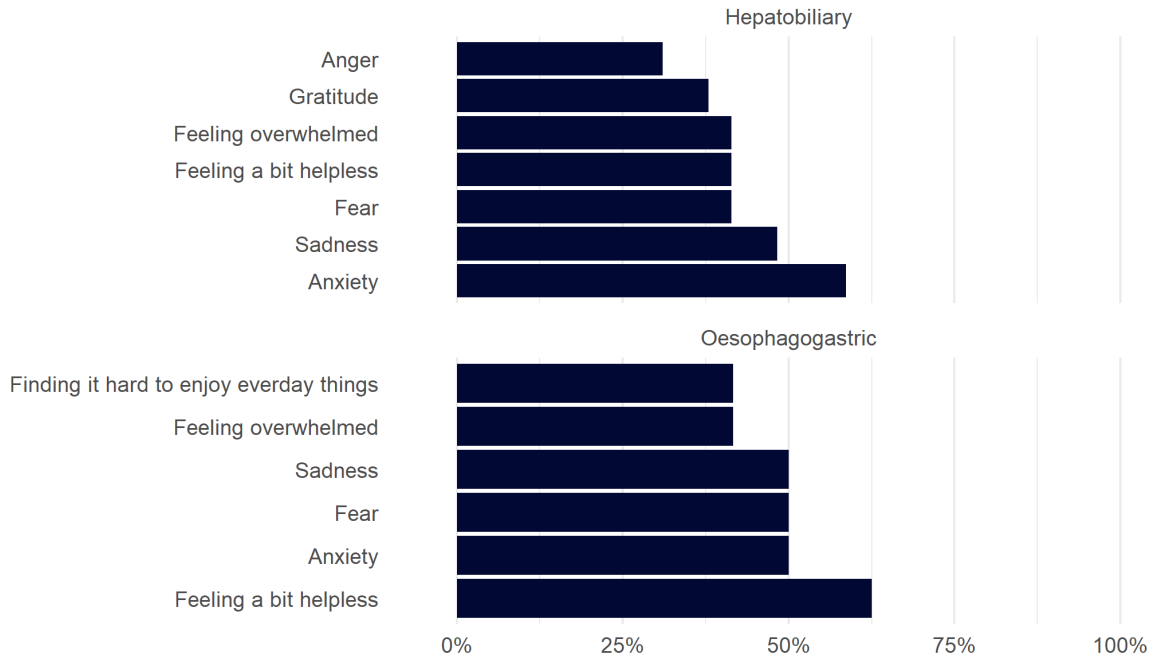
Given the poor prognosis associated with upper GI cancers, a diagnosis of upper GI cancer comes with substantial social and emotional effects – for patients and their carers alike.

Respondents to the Patient and Carer Survey frequently reported that patients often experienced feelings of anxiety, sadness, fear and helplessness.

Furthermore, between 40 and 50 per cent of respondents noted that patients experienced social isolation (with commentary highlighting that this was exacerbated by the COVID pandemic), and close to 50 per cent noted that patients felt too sick to partake in hobbies they previously enjoyed.

[173] Van den Boorn, H.G., Stroes, C., et al., 2020, Health-related quality of life in curatively-treated patients with esophageal or gastric cancer: A systematic review and meta-analysis, Critical Reviews in Oncology/Hematology, 154, doi: 10.1016/j.critrevonc.2020.103069.
[174] Reijneveld, E.A.E., Bor, P., et al., 2022, Impact of curative treatment on the physical fitness of patients with esophageal cancer: A systematic review and meta-analysis, European Journal of Surgical Oncology, 48(2), doi: 10.1016/j.ejso.2021.08.015.
[175] A comprehensive review is available in: Peter MacCallum Cancer Centre, Malnutrition in Victorian Cancer Services (VCS), Phase II, Malnutrition in Cancer eLearning: Literature Review.
[176] Couto, O.F.M., Dvorchik, I., Carr, B.I., 2007, Causes of death in patients with unresectable hepatocellular carcinoma, Dig. Dis. Sci, 52, 3285–9.
[177] Khan, N.N., Maharaj, A., Evans, S. et al., 2022, A qualitative investigation of the supportive care experiences of people living with pancreatic and oesophagogastric cancer, BMC Health Serv Res 22, 213, doi: 10.1186/s12913-022-07625-y.

Figure 4.30: Range of emotional side effects experienced (most common)



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Simultaneously, carer respondents to the Patient and Carer survey reported experiencing a variety of adverse effects. This is especially the case reflecting the poor prognosis that their loved ones are faced with. As one carer put it:

> *Caring for my very sick partner, supporting my distressed children and the knowledge that I was going to lose my partner of 45 years was a sad and stressful time.*

Another carer stakeholders highlighted the difficulties faced:

> *I was his support, I carried it all. Now that he is gone, I don't think my friends understand it. I'm lonely and frightened, I'm everything at the moment. I'm really lacking energy. I found that it has been difficult following losing a spouse. I feel different to my friends, to people around me. People say grief has a timeline, it doesn't. It never ends.*

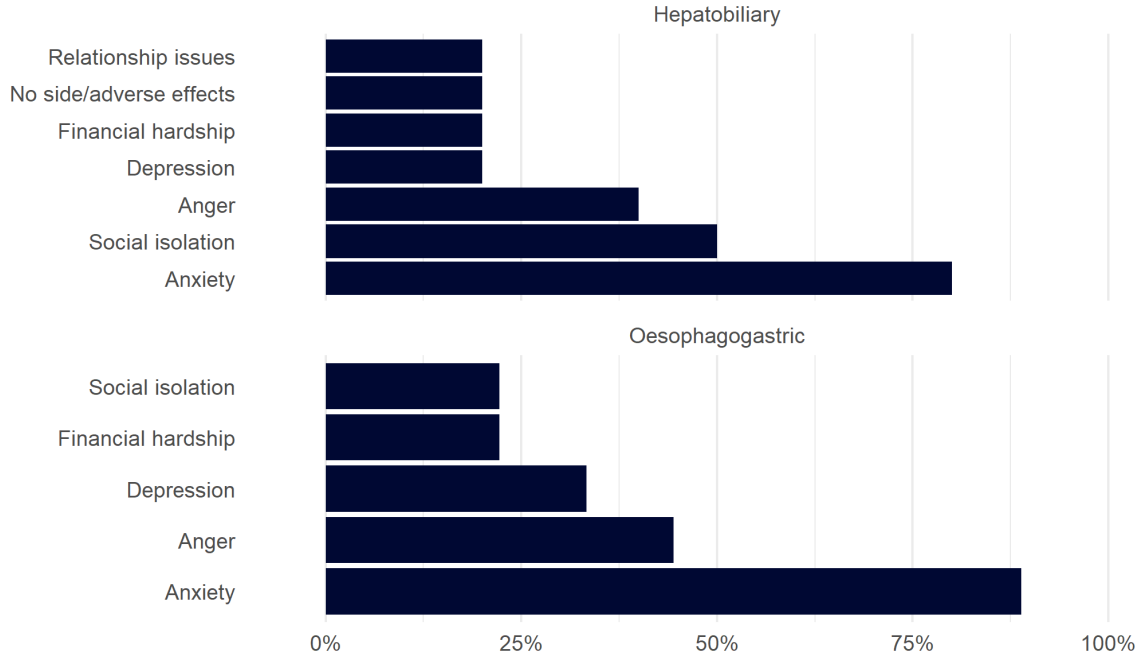
This can contribute to 'carer fatigue', which Pancare Foundation has previously identified as an issue felt and noticed by carers and health care professionals.[178]

The most common adverse effects on carers were:

- Anxiety, which affected more than 75 per cent of carers (89 per cent and 80 per cent, oesophagogastic and hepatobiliary, respectively)
- Social isolation, which affected 50 per cent of hepatobiliary carers
- Anger, which effected 4 in 10 carers (44 per cent and 40 per cent, oesophagogastic and hepatobiliary, respectively).

[178] Pancare Foundation, 2019, No Caregiver Left Behind study.

Figure 4.31: Variation in side effects experience by carers



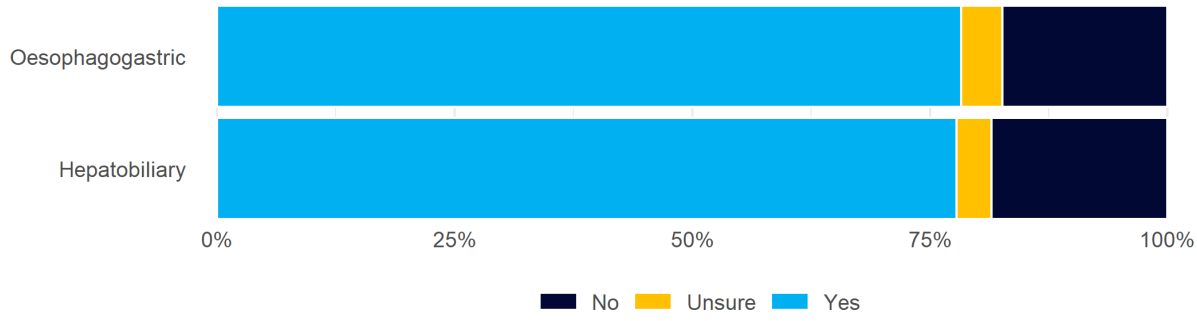
Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Stakeholder consultations highlighted feelings of isolation due to pandemic policy.

Financial side effects

The majority of respondents to the Patient and Carer survey reported that patients experienced out of pocket costs (over 75 per cent).

Figure 4.32: Experience out of pocket costs



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Stakeholder consultation and surveys highlighted a variety of additional out of pocket costs, including:

- Dietitian ($70 to $150 per appointment)
- Physiotherapy services ($90 to $130 per appointment)
- Psychological services
- Dietary supplements ($125 per week)
- Diagnostic testing

- Medication costs
- Bandages
- Parking costs.

.

For example, one respondent to the Patient and Carer survey noted that:

> *It is so hard to find foods to eat. I only had 2 appointments with a dietitian and the protein supplement drinks are about $4 each, they wanted me to take 2 a day and I only take one – it's too much money. I look like a bag of bones but don't know what I should be eating and often I can't eat.*

Evidence from literature, surveys and stakeholder consultations indicates that there are critical issues regarding the provision of support services in Australia:

- Access to supportive care not systematic
- Limited screening for issues and referral to support services
- Variation in provision of allied health services
- Difficulties navigating the healthcare system
- Lack of information about available services
- Limited access to peer support, difficult to find or accessed late, with existing support services facing capacity constraints
- No survivorship support for long-term survivors.

Access to supportive care not systematic

A broader issue arising in patients and carers commentary was that supportive care was not accessed in a systematic way. Patients and carers lamented late access to these services.

This is consistent with findings from other surveys and consultations, where patients and carers noted, for example, that knowledge of community services is often self-sought, and not offered at diagnosis.[179]

Without systematic referral, patient and carer access to supportive care is delayed. Likewise, an opportunity to build credibility of these services among patients and health care practitioners is lost.

[179] Khan, N.N., Maharaj, A., Evans, S., et al., 2022, A qualitative investigation of the supportive care experiences of people living with pancreatic and oesophagogastric cancer, BMC Health Serv Res 22, 213, doi: 10.1186/s12913-022-07625-y.

Table 4.5: Patient and Carer commentary regarding access to supportive care (Consultations, Survey)

Issue	Comments
Access and discussion of psychosocial support	*"Only accessed this support after going through Pancare. The flyers at the hospital were for breast cancer and prostate cancer."* *"I learned about carer support groups much later, e.g., WeKind and CarersCouch. They are helpful. Besides the nurses, I can't say carers feel very supported."*
Access to and discussion of financial support	*"I'm upset that I didn't have financial support earlier."* *"Only had education and support after going to Pancare. Would have been better to have this at the start."* *"I only became aware of the different forms of financial support when my husband spoke to someone from Cancer Council."* *"Only found information regarding care support after education from Pancare."* *"We had to find this out and apply on our own without the medical team pointing us in the right direction."* *"Long term financial assistance was sought after by me. My own research. I sought support from Cancer Council after starting a second lot of treatment and signed up to clinical trials / genomic testing. I wish I had called earlier."* *"We stumbled across carer support when my husband finished work and went to Centrelink – it was Centrelink who advised us about carer support."*
Access to and discussion of physical support	*"A lot of this was discussed only when my partner ended in hospital with severe infection and dehydration following the first round of chemotherapy."* *"I had to constantly ask for help – it was exhausting. A nurse referred me to a dietitian, it wasn't my oncologist or surgeon (they never even asked)! Why don't they have a bloody checklist? Refer to dietitian – tick. Refer to pain doctor – tick. I was lucky if they gave me time to ask questions let alone get referred to more specialised services. I reckon they only do that for their private patients, us public ones feel like cattle getting processed at the bloody abattoir."* *"This type of physical supportive care was only recommended and then accessed once my husband became nutrient deficient due to ascites and was having an ascitic drain inserted. Would have been wonderful if we had been advised that this might happen and given information on how to prevent it rather than dealing with it when it was too late."* *'The dietician was only engaged one week after first treatment (spent nine days in hospital). The first round of chemotherapy made my partner very sick. We had no idea what to expect so it was quite traumatic. He ended up in hospital for two weeks. The third and fourth rounds were much better as the nursing staff (and Pancare) gave us some hints and tips.*
Information support	*"We couldn't find anything until our friend told us to go to Pancare to speak with the nurse. What a godsend."* *"Multilingual support is critical. I have been supporting a fellow patient whose husband speaks English, yet his wife who was diagnosed with biliary cancer cannot. The information provided to him is vastly different to what I receive. He is at a disadvantage. I cannot even imagine how it would be for someone who is frail and disadvantaged."* *"Patients could be much better supported with an integrated and holistic approach to their care and treatment. If oncologists had open minds and worked alongside naturopaths, clinical nutritionists, counsellors etc., and focused on the patient as a whole person not just treating the disease."* *"The only area of improvement is knowing what other therapies are available. This was made evident through self-research and through advice from Pancare. I find their help more trustworthy than googling."*

Limited screening and referral to support services for both patients and carers

Identification of patients and carers with supportive care needs and referral to support is important to ensuring timely access.

However, screening of supportive care and referral is inconsistent. For example, a Victorian review of supportive care screening of cancers indicated that only 62.7 per cent of participants with upper GI cancers had a supportive care screening tool completed.[180]

A salient example, which highlights the difficulty in implementing supportive care screening, is distress screening.

Box 4.1: Distress screening yet to be well taken up

Routine screening for psychological distress, anxiety and depression in a clinical setting is recognised as an important component of best-practice cancer care.[1] The use of routine distress screening by inpatient cancer services can significantly improve their capacity to offer psychosocial care (Lee et al., 2010). However, Fradgley et al (2020) highlight that while there is interest in uptake:[1]

- Approximately 38 per cent of representatives' services never or rarely screen
    - 52 per cent who screen, do so for all patients
    - 55 per cent use clinical interviewing only
    - 34 per cent follow referral protocols.

Drawing upon this example, one stakeholder noted that:

> *Distress screening was introduced as a key component in supportive care 10 or so years ago, it was supposed to be standardized but only around 10 per cent of patients are screened for it. Even that can't be introduced or scaled. Nurses are just too busy, they either don't have time to do the 5-minute distress screening, or if they do it, they don't act upon it or properly store the data. Even when it is being done, it is often done as a one-off. Regarding these issues, you really need to approach people multiple times – their willingness to undertake these activities changes with time. If we can't do that, how are we going to do ANYTHING else?*

Source: Lim, E., Vardy, J.L., Oh, B., Dhillon, H.M., 2017, Integration of complementary and alternative medicine into cancer-specific supportive care programs in Australia: a scoping study, Asia Pac J Clin Oncol, 13(1), 6–12; Lee, S.J., Katona, L.J., et al., 2010, Routine screening for psychological distress on an Australian inpatient haematology and oncology ward: impact on use of psychosocial services, MJA, 193; Fradgley, E.A., Byrnes, E., McCarter, K., Rankin, N., Britton, B., et al., 2020, A cross-sectional audit of current practices and areas for improvement of distress screening and management in Australian cancer services: is there a will and a way to improve? Support Care Cancer, 28(1), 249-259, doi: 10.1007/s00520-019-04801-5.

Once screened, referral pathways are needed to direct patients to supportive care. However, availability of referral pathways varies. For example, a 2015 national survey which mapped supportive cancer care referral pathways and service provision in 124 hospitals with cancer services found that 28 per cent provided either a 'cancer-specific supportive care service' or direct access to these services via an affiliated cancer centre; approximately one in two (53 per cent) had no established referral pathway and one in five (19 per cent) referred cancer survivors to external organisations or allied health practitioners.[181]

Similarly, stakeholders highlighted that, while clinicians may be willing to refer patients to supportive care, limited infrastructure is in place to facilitate referral:

> *The feedback we keep getting from clinicians is that they know there are access programs, but don't know who to contact, where to go. They ring the general helpline numbers, and those people don't always direct them the right way. It takes a lot of time and energy.*

[180] Victorian Government, 2018, Investigating practices relating to supportive care screening in Victorian cancer services.
[181] Lim, E., Vardy, J.L., Oh, B., Dhillon, H.M., 2017, Integration of complementary and alternative medicine into cancer-specific supportive care programs in Australia: a scoping study, Asia Pac J Clin Oncol, 13(1), 6–12.

Inconsistent access to allied health services

A related, common theme highlighted by stakeholders and respondents to the Patient and Carer survey was that there was large variation in access to supportive care based on hospital of treatment. For example, one patient noted that:

> *The first hospital I was at offered no supportive care. Once I transferred, I was referred to a psychologist, dietitian, geneticist and put in touch with a Cancer Care Nurse.*

Evidence indicates inconsistent supply and availability of allied health and supportive care within Australia:

- A 2020 study of nutritional management for patients with oesophageal cancer observed that service gaps remain during pre-operative and post-discharge care, with inconsistent provision of nutritional care across different treatment stages[182]
- A 2022 study found that, although the majority of sites (>92 per cent) reported having dietetics services available in chemotherapy/radiotherapy and 85 per cent of sites reported having some form of outpatient clinic service, a routine service was only available at 26 per cent of sites preoperatively and 37 per cent postoperatively[183]
- A 2022 study found that preoperative services were frequently embedded into surgical/oncology clinics (70 per cent) but only 44 per cent of postoperative clinics; 44 per cent had a nutrition care pathway/protocol in place[184]
- A 2019 national survey of most important care gaps across major cities, regional and remote institutions indicated that 49.6 per cent of institutions considered survivorship/supportive care the more importance cancer service gap[185]
- A 2018 Victorian study of cancer patients found that, of 137 patients with upper GI cancer, only 40 per cent overall and only 37 per cent of malnourished patients were receiving dietetics intervention[186]
- In a national survey of dietitians, surgeons, oncologists and nurses, Deftereos et al (2021) found that although participants indicated that their health service had dietetics support available (98 per cent), only 41 per cent had an outpatient service.[187]

Stakeholder consultation highlighted a variety of issues related to provision of allied health to upper GI cancer patients in Australia.

[182] Findlay, M., Purvis, M., Venman, R., et al., 2020, Nutritional management of patients with oesophageal cancer throughout the treatment trajectory: benchmarking against best practice, Support Care Cancer, 28, 5963–5971, doi: 10.1007/s00520-020-05416-x.
[183] Deftereos, I., Yeung, J.M.C., et al., 2022, Health service nutrition practices and associations with clinical outcomesin patients undergoing resection for upper gastrointestinal cancer: Results from the multi-centre NOURISH point prevalence study, JHND, doi: 10.1111/jhn.13006.
[184] Ibid.
[185] Hunter, J., Smith, C., Delaney, G.P., et al., 2019, Coverage of cancer services in Australia and providers' views on service gaps: findings from a national cross-sectional survey, BMC Cancer, 19, 570, doi: 10.1186/s12885-019-5649-6.
[186] Steer, B., Loeliger, J., 2018, Cancer Malnutrition Point Prevalence Study, available: https://www.petermac.org/sites/default/files/media-uploads/VCMC%202018%20PPS%20Summary%20Report.pdf.
[187] Deftereos, I., Kiss, N., et al., 2021, Awareness and perceptions of nutrition support in upper gastrointestinal cancer surgery: A national survey of multidisciplinary clinicians, Clinical Nutrition ESPEN, 46, doi: 10.1016/j.clnesp.2021.09.734.

Figure 4.33: Challenges in allied health – stakeholder perspectives

Among the consequences of poor nutritional and physical health prior to surgery are heightened adverse effects of surgery (heightened morbidity and mortality, longer length of hospital stay, reduction of treatment efficacy and increased toxicity); malnutrition and excess weight loss are well documented risk factors for negative outcomes for cancer populations.[188] In addition, poor nutrition and physical health can limit treatments available, such as neoadjuvant or adjuvant therapy.[189] For example, it has been estimated that up to 70 per cent of patients undergoing neoadjuvant therapy are unable to complete their prescribed perioperative regimens due to dose-limiting toxicities.[190]

Evidence indicates that prehabiltiation (preparing patient for cancer journey from a physical and emotional point of view) can have positive impacts on patient outcomes, including:

- Reduced hospital length of stay for upper GI cancer patients by 1.78 days[191]
- Improved exercise capacity both before and after surgery.[192]

However, despite its benefits, high quality prehabiltiation is infrequently provided:

- 22.7 per cent and 30 per cent of patients set to undergo oesophagectomy and gastrectomy did not receive a preoperative dietetics intervention
- 31.8 per cent and 48 per cent of patients set to undergo oesophagectomy and gastrectomy did not receive prior nutritional advice from other HCPs
- 40.9 per cent and 40.0 per cent of patients set to undergo oesophagectomy and gastrectomy did not receive nutrition support

[188] Deftereos, I., et al., 2020, A systematic review of the effect of preoperative nutrition support on nutritional status and treatment outcomes in upper gastrointestinal cancer resection, European Journal of Surgical Oncology, 46(8), 1423-1434, doi: 10.1016/j.ejso.2020.04.008.
[189] Minnella, E.M., Awasthi, R., Loiselle, S.E., et al., 2018, Effect of Exercise and Nutrition Prehabilitation on Functional Capacity in Esophagogastric Cancer Surgery: A Randomized Clinical Trial, JAMA Surg, 153(12), 1081-1089, doi: 10.1001/jamasurg.2018.1645.
[190] Ibid.
[191] Lambert, J.E., Hayes, L.D., Keegan, T.J., Subar, D.A., Gaffney, C.J., 2021, The Impact of Prehabilitation on Patient Outcomes in Hepatobiliary, Colorectal, and Upper Gastrointestinal Cancer Surgery: A PRISMA-Accordant Meta-analysis, Ann Surg, 274(1), 70-77, doi: 10.1097/SLA.0000000000004527.
[192] Lau, C.S.M., Chamberlain, R.S., 2020, Prehabilitation Programs Improve Exercise Capacity Before and After Surgery in Gastrointestinal Cancer Surgery Patients: A Meta-Analysis. J Gastrointest Surg, 24(12), doi: 10.1007/s11605-019-04436-1.

- While Enhanced Recovery After Surgery (ERAS) and ESPEN guidelines recommend carbohydrate loading prior to major upper GI surgery, only eight per cent of a cohort of upper GI cancer patients reported receiving carbohydrate drinks prior to surgery.[193]

Simultaneously, over the last 3 decades, exercise has established its role in attenuating and reversing the adverse effects of cancer and its treatments on physical fitness, physical functioning, cancer-related fatigue, and quality of life.[194] Across oncologic care, exercise has been reported to provide important impacts on disease progression, treatment efficacy and safety, and secondary prevention.[195] Exercise also improves perceived physical status, mental health, and overall quality of life.[196]

This has prompted the Clinical Oncology Society of Australia to recommend that exercise should be embedded as part of standard practice in cancer care and to be viewed as an adjunct therapy that helps counteract the adverse effects of cancer and its treatment.[197]

However, access to physical therapy prior to surgery is rarely and/or inconsistently observed in Australia.

Similarly, because the preoperative period of any major elective surgery is known to be associated with a high degree of distress, anxiety and depression, psychological support has been found to benefit patients.[198]

In oesophageal adenocarcinoma, this is commonly compounded by the poor prognosis and devastating physiological manifestations of the disease and contributes to poor treatment compliance and postoperative outcomes.[199] In addition to specifically increasing pain perception, reducing functional capacity and health related quality of life (HRQoL), psychological distress status has also been shown to reduce circulating immunological mediators, alter physiological mechanisms of wound healing, and increase length of stay and, as a result, augment healthcare costs.

With particular emphasis on nutrition and exercise, stakeholders identified various reasons for the lack of implementation of prehabilitation:

- Insufficient resourcing
- Lack of knowledge of appropriate referrals
- Insufficient evidence of optimal prehabilitation services.

With these services defined, stakeholders emphasised that there must be heavy focus on implementation, which has been challenging when implementing other supportive care initiatives. Stakeholders noted that to get this done, there must be a indicators of performance for hospitals: “a standard alone doesn’t cut it”.

Difficulties navigating the healthcare system

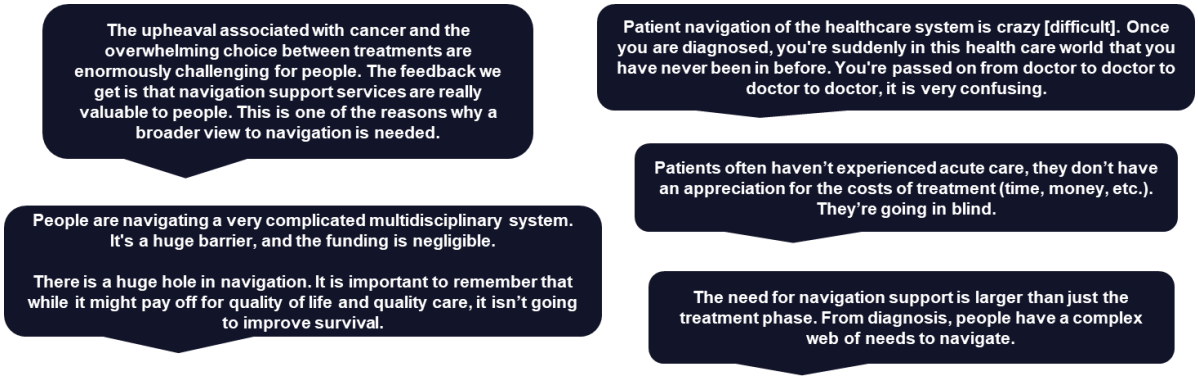
[193] Deftereos, I., et al., 2021, Preoperative Nutrition Intervention in Patients Undergoing Resection for Upper Gastrointestinal Cancer: Results from the Multi-Centre NOURISH Point Prevalence Study, Nutrients, 13(9), doi: 10.3390/nu13093205.
[194] Campbell, K.L., Winters-Stone, K.M., Wiskemann, J., et al., 2019, Exercise Guidelines for Cancer Survivors: Consensus Statement from International Multidisciplinary Roundtable, Med Sci Sports Exerc, 51, 2375-90.
[195] Christensen, J.F., Simonsen, C., Hojman, P., 2018, Exercise Training in Cancer Control and Treatment, Compr Physiol, 9, 165-205.
[196] Fuller, J.T., Hartland, M.C., Maloney, L.T., et al., 2018, Therapeutic effects of aerobic and resistance exercises for cancer survivors: a systematic review of meta-analyses of clinical trials, Br J Sports Med, 52:1311.
[197] Clinical Oncology Society of Australia, 2018, COSA Position Statement on Exercise in Cancer Care.
[198] Pinto, E., Cavallin, F., Scarpa, M., 2019, Psychological support of esophageal cancer patient? J Thorac Dis, 11, S654-62.
[199] Scheede-Bergdahl, C., Minnella, E.M., Carli, F., 2019, Multi-modal prehabilitation: addressing the why, when, what, how, who and where next? Anaesthesia, 74 Suppl 1, 20-6.

Australia's health care system is fragmented, with services provide by state, not-for-profit, private and public providers. By consequence, the Australian health system is a 'less of an Australian healthcare system than a complex set of services'.[200]

Stakeholders reported that patients face difficulties navigating the healthcare system and lack information about available services to help themselves receive supportive care. These issues are exacerbated when a patient does not prefer to speak English, has low health literacy, or requires culturally sensitive care.

Stakeholders highlighted that it is crucial to recognise that patients often have not dealt with the healthcare system before, and that it is overwhelming and complex (Figure 4.33).

Figure 4.34: Challenges in navigation – stakeholder perspectives



Lack of access to information about services

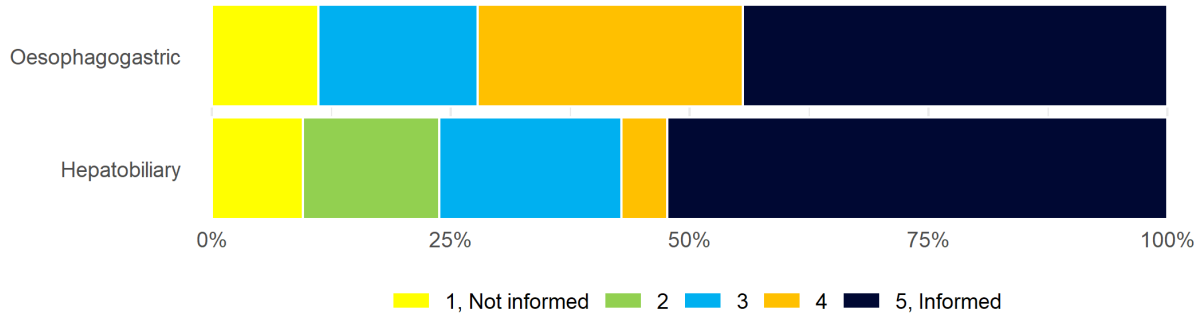
Upper GI cancer patients and carers are recgonised as having unmet information needs including feeling insufficiently prepared for side effect management after discharge, and experiencing worry and confusion associated with not having access to adequate information.[201] Stakeholders highlighted that patients and carers face difficulties with obtaining information in a timely manner.

Figure 4.35: Challenges in information access – stakeholder perspectives

[200] Calder, R., Dunkin, R., Rochford, C.; et al., 2019, Australian health services: too complex to Navigate, A review of the national reviews of Australia's health service arrangements, Australian Health Policy Collaboration, Policy Issues Paper No. 1, AHPC.
[201] Public Health Association, 2019, Abstract book, available: https://www.phaa.net.au/documents/item/4066.

Relatedly, patients often lack information regarding out-of-pocket costs. Over 50 per cent of respondents to the Patient and Carer survey reported that they did not feel fully informed about these out-of-pocket costs (Figure 4.36).

Figure 4.36: Informed about costs prior to expenditure



Source: Patient and Carer Survey, State of the Nation in Upper GI Cancers. See Appendix C.

Limited access to peer support and bereavement support, for patients and carers

Although peer support services exist (PanSupport), both patient and carers consulted indicated that access to peer support was later in their journey than preferrable, and unsystematically obtained. Consultations indicate that unlike other cancers, for patients and carers coping with an upper GI cancer diagnosis it is extremely hard to find an appropriate peer support group, for example:

- Younger people are often grouped with people from older demographics
- Patients have limited access to tumour specific groups
- Patients and carers may be grouped.

Furthermore, with five-year survival rates less than 35 per cent, the sad reality is that 65 per cent of patients will be lost within five years of diagnosis (absent developments in treatment). It follows that many carers and family members will deal with the loss of their loved ones, and therefore, bereavement and available social support are critical for carers.

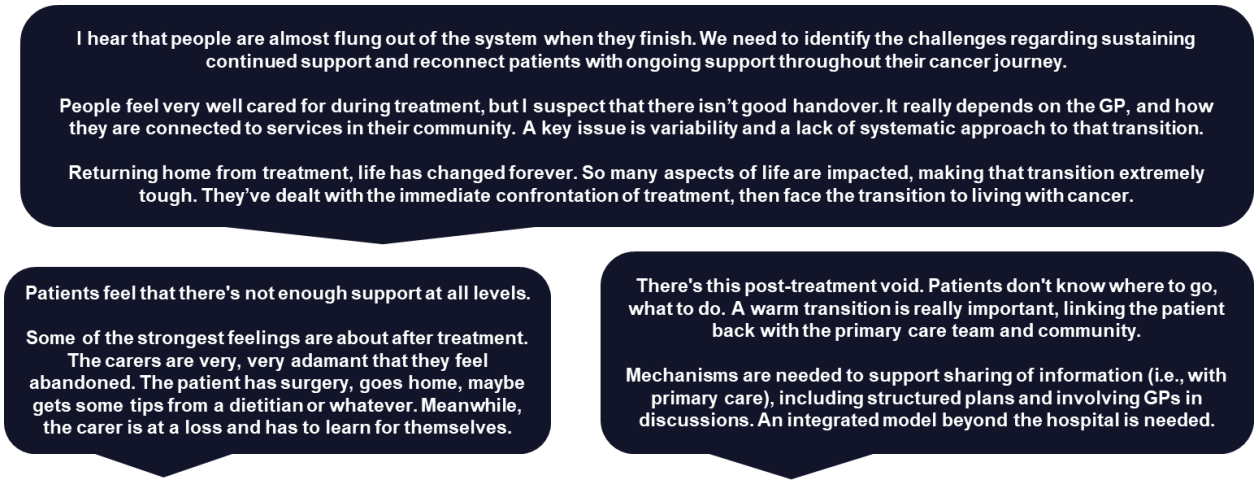
Stakeholders indicated that peer support services are insufficiently resourced to provide the staff required to manage the variety of different peer support requests that are being made.

Figure 4.37: Gaps in peer support for both patients and carers – stakeholder perspectives

No survivorship support for long-term survivors, life after treatment

Stakeholders identified a perceived 'post treatment void' whereby patients and carers feel like they have been abandoned following the completion of active treatment.

Figure 4.38: Lacking model of care for long-term survivors – stakeholder perspectives



4.8 Significant variation and barriers to palliative and end of life care

The World Health Organisation defines palliative care as:[202]

> *An approach that improves the quality of life of patients and their families who are facing problems associated with life-threatening illness. It prevents and relieves suffering through the early identification, correct assessment and treatment of pain and other problems, whether physical, psychosocial or spiritual.*

Palliative care involves a team-based approach to support patients and their caregivers, including addressing practical needs and providing bereavement counselling. Importantly, palliative care is explicitly recognised under the human right to health and should be provided through tailored and integrated health services.[203]

Despite this, stakeholder consultation highlighted issues regarding the quality of palliative care services provided to upper GI cancer patients in Australia, with challenges that limit provision of sufficient care.

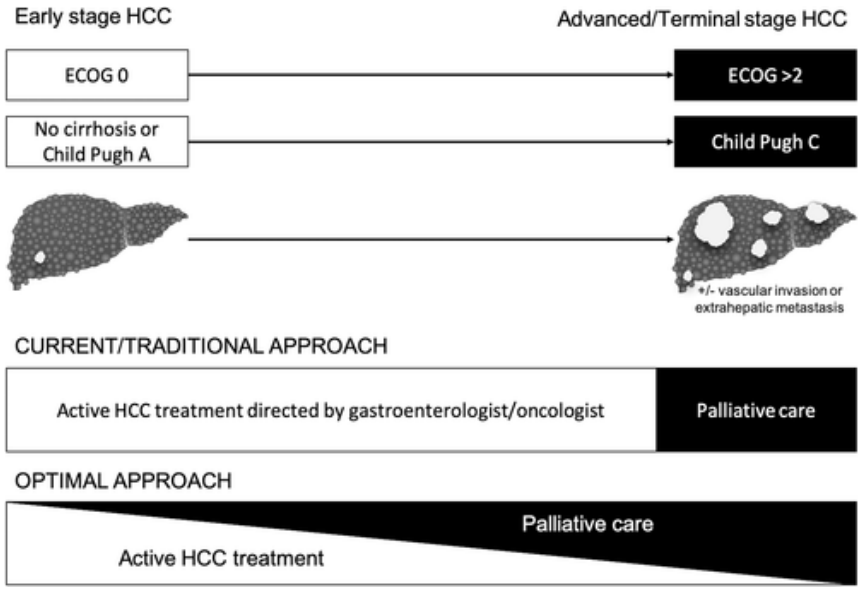
Limited integration of early palliative care, inclusion in MDTs

The World Health Organisation recommends providing palliative care as early as possible in the course of the disease to increase quality of life.[204] Early palliative care involves combining palliative support with standard cancer care after a patient is diagnosed with advanced or incurable cancer. Early palliative care can help people consider their treatment options, prospects and goals, which may also include choosing to decline treatment or care.

Stakeholders and literature indicate a variety of benefits of early palliative care, including in managing pain levels, relieving symptoms, improving patient comfort, and providing psychosocial and spiritual support, assisting with setting care goals and bereavement, reducing healthcare costs and reducing the need for hospital admission in final days of life.[205] An example model which includes early palliative care is illustrated below.

[202] WHO website, available: https://www.who.int/news-room/fact-sheets/detail/palliative-care.
[203] Ibid.
[204] WHO website, available: http://www.who.int/cancer/palliative/fr.
[205] Pereira, J., Chasen, M.R., 2016, Early palliative care: taking ownership and creating the conditions, Curr Oncol, 367–370.

Figure 4.39: Improved approach to palliative care for hepatocellular carcinoma



Source: Laube, R., Sabih, A.H., Strasser, S.I., Lim, L., Cigolini, M., Liu, K., 2021, Palliative care in hepatocellular carcinoma. Journal of Gastroenterology and Hepatology, 36, 618– 628, doi: 10.1111/jgh.15169.

However, patients are often referred only when they are already deteriorating: the median time before death at which a patient accesses palliative care is about 20 days. In this sense, palliative care services are underutilised in Australia.[206] This extends to related diseases; for example, despite benefits from timely referral, a Queensland based study of referral to palliative care in end-stage liver disease patients observed that *less than one in four palliative care eligible patients were referred*, with referral reserved for those facing imminent death.[207]

Stakeholders highlighted that the most common barrier to early palliative care was that palliative care experts are under-resourced with no targeted funding for early palliative care, which limits their ability to attend MDTs, and results in prioritisation of end-of-life patients. Often, barriers to referral are not related to quality of services but to clinician-perceived reactions to or lack of acceptance of palliative care.[208] Additional issues include lack of education and stigma.[209]

Stakeholders noted that there is some confusion regarding the role of early palliative care, which also involves preparing the patient for receipt of palliative care:

> *The point of early palliative care seems to be around relationship building, talking about information and what's available and thinking through goals for a life well lived and then making sure that your medical care matches those goals. It's around communication and building rapport.*

> *It seems like you need a bit more time to be able to make preferences match (than currently allowed via late involvement). The notion is that they've had some of those conversations and they know what we do, and we've broken down the barriers around palliative care so that it can be accessed when truly needed.*

[206] PalliativeCare Australia, 2017, The Economic Value of Palliative Care and End-of-Life Care.
[207] Chen, H., Johnston, A., Palmer, A., et al., 2021, Too little, too late: Palliation and end-stage liver disease, J Gastroenterol Hepatol, 36(8), doi: 10.1111/jgh.15499.
[208] Sabih, A.H., Laube, R., Strasser, S.I., et al., 2021, Palliative medicine referrals for hepatocellular carcinoma: a national survey of gastroenterologists, BMJ Supportive & Palliative Care, doi: 10.1136/bmjspcare-2020-002807.
[209] Laube, R., Sabih, A.H., Strasser, S.I., Lim, L., Cigolini, M., and Liu, K., 2021, Palliative care in hepatocellular carcinoma, Journal of Gastroenterology and Hepatology, 36, 618– 628, doi: 10.1111/jgh.15169.

Skills shortage

Australia is due to face increasing demand-side pressure for palliative care services, reflecting rising demand for services due to an ageing population and growing prevalence of chronic diseases.[210]

In light of this increase, and historically limited funding, Australia has a shortage of palliative care services. In 2017, it was reported that Australia had: [211]

- Only 0.9 full time equivalent (FTE) specialist palliative medicine physicians per 100,000 population, relative to industry benchmarks of 2.0 FTE per 100,000 population, representing a 'severe' shortage of palliative care doctors – more than 50 per cent specialists available than the target rate
- 12.0 FTE palliative care nurses per 100,000 population, which is equivalent to the number of palliative care nurses in 2013, with 53 per cent working in hospitals, 24 per cent working in community health services, and only 0.09 per cent working in Aboriginal health service settings.

Palliative care stigmatised, limited understanding of purpose

Although palliative care is not just for people nearing the end of their lives, and can benefit patients and the broader healthcare system, lack of awareness and stigma limit its use.

Hudson et al (2021) highlighted that palliative care is 'too often considered, in the minds of both health care providers and the public, as exclusively about death and dying, and associated with a loss of control or abandoning of hope'.[212] Indicative of a lack of awareness of the role of palliative care, in a survey of GP understanding of palliative care, close to 8 in 10 (78 per cent) of GPs perceived palliative care and end of life care to be equivalent.

Stigma may be even more profound for patients who are already dealing with feelings of guilt and shame regarding their diagnosis, particularly for patients with hepatocellular carcinoma and cirrhosis. This can prohibit patients from accessing needed palliative care.[213] Simultaneously, a recent survey (2022) reported that patients can misunderstand that value of palliative care services, resulting in apprehension to utilise these services.

Difficulties relating to advanced care planning

According to Advanced Care Planning Australia, up to 50 and 90 per cent of patients with advanced cancer will experience delirium when admitted to hospital, and in the days before death, respectively.[214]

Advanced care planning is suggested to provide a variety of benefits:[215]

- Helps to ensure patients receive the care they actually want

[210] AIHW, 2022, Palliative care services in Australia, available: https://www.aihw.gov.au/reports/palliative-care-services/palliative-care-services-in-australia/contents/palliative-care-workforce.
[211] ACU, 2020, A snapshot of palliative care services in Australia.
[212] Hudson, P., Collins, A., Boughey, M. and Philip, J., 2021, Reframing palliative care to improve the quality of life of people diagnosed with a serious illness, Med J Aust, 215, 443-446, doi: 10.5694/mja2.51307; Shen, M.J., Wellman, J.D., 2019, Evidence of palliative care stigma: The role of negative stereotypes in preventing willingness to use palliative care, Palliative & supportive care, 17(4), 374–380, doi: 10.1017/S1478951518000834; Miller, E.M., Porter, J.E., 2021, Understanding the Needs of Australian Carers of Adults Receiving Palliative Care in the Home: A Systematic Review of the Literature, SAGE Open Nursing, doi: 10.1177/2377960820985682; Zou, W.Y., El-Serag, H.B., Sada, Y.H., et al., 2018, Determinants and outcomes of hospice utilization among patients with advance-staged hepatocellular carcinoma in a veteran affairs population. Dig. Dis. Sci, 63, 1173–81; Fricker, Z.P., Serper, M., 2019, Current knowledge, barriers to implementation, and future directions in palliative care for end-stage liver disease, Liver Transpl, 25, 787–96.
[213] Zou, W.Y., El-Serag, H.B., Sada, Y.H., et al., 2018, Determinants and outcomes of hospice utilization among patients with advance-staged hepatocellular carcinoma in a veteran affairs population, Dig. Dis. Sci, 63, 1173–81.
[214] Harris, D., 2007, Delirium in advanced disease, Postgraduate medical journal, 83(982), 525-8, doi: 10.1136/pgmj.2006.052431.
[215] Advanced Care Planning Australia website, available: https://www.advancecareplanning.org.au/.

- Improves ongoing and end-of-life care, along with personal and family satisfaction
- Families of people who have undertaken advance care planning have less anxiety, depression, stress and are more satisfied with care[216]
- For healthcare professionals and organisations, it reduces unnecessary transfers to acute care and unwanted treatment.

However, there is mixed evidence regarding the extent to which a formal Advanced Care Plan is beneficial. For example, Johnson et al (2018) found that a formal Advanced Care Plan intervention did not increase the likelihood that end of life care was consistent with patients' preferences. A further complication of advanced care planning was identified by a patient stakeholder, who stated that they chose not to undertake an Advanced Care Plan as it was overwhelming and intimidating.

Nevertheless, some stakeholders raised concerns about low uptake and use of advanced care plans, especially around some population subgroups. For example, in Australia only 3.5 per cent of advance directives were completed by those born overseas.[217]

Inconsistent quality of palliative care (including throughout the COVID pandemic)

The quality of palliative care services in Australia are variable, with particularly poor performance due to the COVID pandemic. This was highlighted frequently by patients and carers in stakeholder consultations.

Figure 4.40: Consultation highlighted poor palliative care practices – stakeholder perspectives

Variable service quality may relate to limited resource availability. For example, a reliance on generalists to provide palliative care is recognised, particularly in rural and remote regions; these clinicians are expected to have appropriate skills but often report that they feel ill-equipped to provide palliative care to their patients.[218]

Consultation indicated a range of reasons for variation, including:

- Issues around credentialling of the workforce

[216] Detering, K.M., Hancock, A.D., Reade, M.C., Silvester, W., 2010, The impact of advance care planning on end of life care in elderly patients: randomised controlled trial, BMJ, 340, doi: 10.1136/bmj.c1345.
[217] Wong, A.K.Y., Collins, A., Ng, A., Buizen, L., Philip, J., Le, B., 2022, Evaluation of a Large Scale Advance Care Planning Co-Design Education Program for Chinese-Speaking People in Australia, Am J Hosp Palliat Care, 39(2), 178-183, doi: 10.1177/10499091211014833.
[218] Wenham, S., Cumming, M., Saurman, E., 2020, Improving palliative and end-of-life care for rural and remote Australians, Public Health Res Pract, 30(1), https://doi.org/10.17061/phrp3012001.

- Insufficient screening of needs due to resource limitations
- De-prioritisation of palliative care in the private sector
- Limited referral pathways and institutional awareness of palliative care physician colleagues.

4.9 Limited funding for research, enabling infrastructure

A variety of barriers to research have been identified:

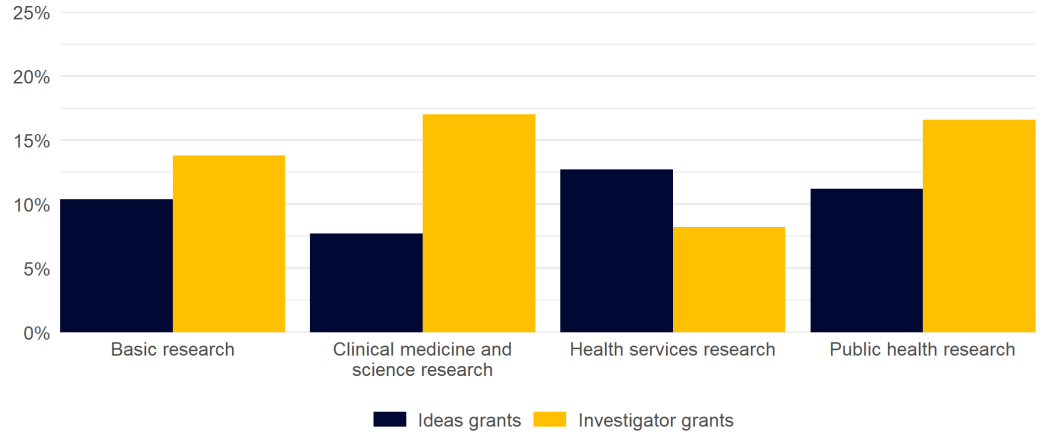
- Historical underfunding of research
- Small sample size
- High cost barriers to research
- Limited clinical and population datasets.

Underfunding of research is a major barrier

Historically, upper GI cancers have received limited funding for research. Stakeholders highlighted that funding is a key barrier to research, both due to inability to undertake specific research projects, and due to wider infrastructure issues, which result from low funding.

Regarding difficulty to secure funding for research, stakeholders highlighted that low funding is a major problem that is limited Australian success. For example, while grey literature has estimated that for every $1 invested into National Health and Medical Research Council (NHMRC) grant schemes there is an average return of $3.20 in health and economic benefit, the quantum of NHMRC funded research remains low.[219] To illustrate, in 2021, 14.8 per cent of investigator grant applications were funded (this being the NHMRC's largest funding scheme).[220]

Figure 4.41: Proportion of applications funded by NHMRC



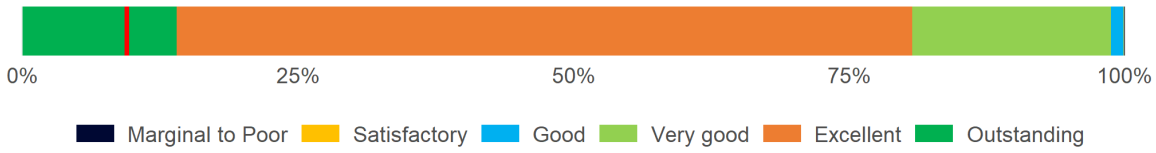
Source: NHMRC, Investigator Grants 2021 Outcomes Factsheet; NHMRC, Ideas Grants Outcomes 2021: Factsheet.

Indicative of low funding is low success rates of high quality proposals; although 14 per cent of ideas grants were deemed outstanding, only 9.5 per cent of ideas grants were funded. The Australian Society for Medical Research suggests that no other international grant scheme in

[219] Deloitte Access Economics, Australia's health and medical research workforce: expert people providing exceptional returns. 2016: www.asmr.org.au/Publications.html.
[220] NHMRC, Investigator Grants 2021 Outcomes Factsheet; NHMRC, Ideas Grants Outcomes 2021: Factsheet.

the Organisation for Economic Co-operation and Development (OECD) is unable to support all of their 'Outstanding' quality research proposals due to insufficient funding.[221]

Figure 4.42: 9.5 per cent of ideas grants funded, less than 14 per cent termed "outstanding" quality



Source: NHMRC, Investigator Grants 2021 Outcomes.

A common consequence of low research funding identified by stakeholders, particularly relevant to basic science, is difficulty maintaining the expert workforce. Stakeholders indicated that people get sick of failing to receive funding and move into other fields or leave research completely.

In addition, stakeholders raised concerns that limited funding for basic research will result in limited progress:

> *Unfortunately, there is a bit of an obsession around commercialisation. Basic research is really the engine room that powers everything else in the research spectrum.*

Stakeholders raised a range of concerns relating to funding for infrastructure, including:

- Insufficient funding for clinical trials personnel (e.g., research nurses, data managers)
- Insufficient funding to build strong research groups which reach critical mass and can further attract funding
- Limited funding to support domestic and international collaboration
- Limited funding for research infrastructure, including mouse/animal models.

Small populations major problem due to squandered solutions

Despite relatively low incidence of upper GI cancers in Australia, stakeholders highlighted that this need not limit Australia's ability to undertake and participate in research. For example, basic research and early stage trials are possible with relatively small sample sizes. Indeed, one international stakeholder suggested that:

> *Australia has the right population size [to undertake and contribute to international research].*

However, further consultation indicated that Australia's ability to undertake high quality research is highly limited by fragmentation.

Stakeholders highlighted that, although fragmentation may not necessarily limit the capacity to undertake research in high incidence cancers, in upper GI cancers this is a critical issue. The consequences of low volumes include:

- Too small samples to reach adequate statistical power
- Inability to cover costs of undertaking research due to low scale

[221] Australian Society for Medical Research, 2022, Pre-Budget Submission for the 2022/2023 Australian Federal Budget.

- Limited sample size to contribute to international trials.

Stakeholders indicated that fragmentation can be overcome by domestic collaboration, which can act to resolve these issues:

- Increase sample size to promote statistical power
- Reduce duplication and repetition of tasks leading to lower costs (e.g., genomics, statistical and data analysis)
- Increase sample size to contribute to international trials.

.

However, stakeholders highlighted that domestic collaboration is inconsistent in Australia. For example:

- The Liver Cancer Collaborative brings together clinicians, researchers, and data experts in Perth
- The Progression of Barrett's Esophagus to Cancer Network (PROBENET) previously brought together researchers, but was discontinued due to failure to receive funding
- Stakeholders noted the presence of little silos across the country, where research happens in isolation
- Some researchers indicated that they had domestic networks but lacked the resources to collaborate
- Other researchers indicated limited awareness of domestic researchers.

Notwithstanding, one stakeholder noted that domestic collaboration between institutions is potentially superficial, with collaboration breaking down when funding is at stake:

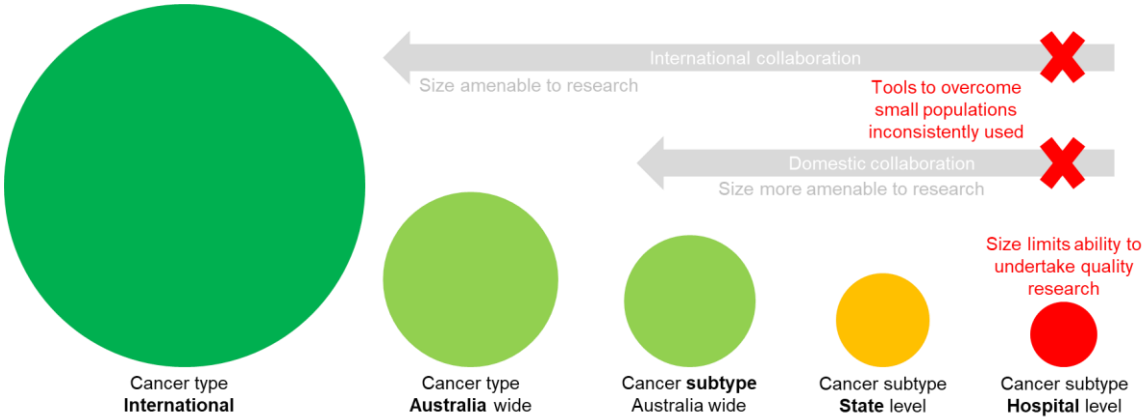
> *I don't think we have appropriate integration and collaboration within Australia, let alone internationally. In a funding round, consortium type approaches were requested. We did not get them. Instead, we got many separate applications. There is an assumption that if the best science will happen through collaboration, then collaborative applications will be put forward but that is not how it happens in practice. When funding was on the line, researchers went back to an individual approach.*

Likewise, international collaboration presents a possible means to overcome small volumes. Stakeholders highlighted that many Australian researchers are 'well plugged in' internationally and are capable of bringing international collaborative efforts if resourced correctly and viewed as representing a collective effort. However, the current fragmented approach provides little funding for fostering international relationships and collaboration. To illustrate, one international stakeholder reported inviting Australian researchers to participate in a strategic research collaboration, but found it difficult to identify who to reach out to and reported limited responsiveness from those that were reached out to.

Stakeholders also highlighted that small incidence need not limit Australia's ability to contribute to international clinical trials, especially considering Australia's reputation for high quality research output.[222] However, frequent commentary indicated that fragmentation and high costs of research in Australia due to governance and ethics reduces incentive to involve Australia in international research.

[222] Standing Committee on Health Aged Care and Sport, 2021, Inquiry into approval processes for new drugs and novel medical technologies in Australia (Zimmerman Report), Chapter 9: Clinical trials.

Figure 4.43: Capability to undertake high quality research limited due to small sample



Added to this is the challenge of fragmented service delivery, particularly for oesophagogastric cancers, where patients continue to be referred to centres with small case volumes. These patients not only have a higher likelihood of poor outcomes due to low case volumes, but it frustrates research agendas by adding barriers to patient identification and recruitment.

High governance and ethics burden creating barriers to research

Although Australian research is respected and of high quality, regulation, ethics and governance present challenges to clinical trials and research investment. Stakeholders noted various concerns with governance and ethics as barriers to research, for example:

> *Some have said the regulatory problem has been solved and we don't have it anymore. Nonsense. It has just been shifted from ethics to governance. It's still the same problem or even worse.*

These issues are well recognised and were highlighted within the Zimmerman report. Notwithstanding, the relatively small incidence of upper GI cancers in Australia implies that these issues are increasingly prominent.

Likewise, high burden of governance and ethics place restrictions on efficiency of Australian research. One stakeholder noted that it took one year to organise their (unfunded) trial.

Figure 4.44: Various issues associated with governance and ethics burden – stakeholder perspectives

The Upper Gastrointestinal Cancer Registry (UGICR) has similarly faced challenges in its establishment and implementation. While the introduction of the National Mutual

Acceptance (NMA) scheme has significantly streamlined the ethics process for all public hospitals in Australia, except in the Northern Territory, obtaining governance approval at each site continues to be both labour intensive and time consuming. Separate Human Research Ethics Committee approval is frequently required to access data from private hospitals and clinics.

Limited clinical and population datasets impede research

Stakeholders highlighted that data is inconsistently collected across Australia, which limits the ability to implement best practice and allow for subsequent improvements.

Figure 4.45: Stakeholders identified various issues pertaining to data – stakeholder perspectives

Stakeholders raised concern that data pertaining to quality of care is not consistently measured and available within Australia. By consequence, it is difficult to measure variation in service and low quality care. This reduces data available for implementation research.

A distinct issue pertains to availability of data for research and care. Stakeholders highlighted that there is a potentially erroneous assumption prevalent within policy that patients are averse to sharing medical data for research purposes. Stakeholders indicated that patients are often surprised by barriers to data sharing under the auspices of privacy.

Another issue pertaining to quality of data available is that there is limited high quality data relating to patients from culturally and linguistically diverse backgrounds.

4.10 Conclusions

There are a number of existing and emerging challenges to the prevention, detection, diagnosis, treatment and care of people living with upper GI cancers and hurdles to realising a cure across all types.

Major issues include mixed success in prevention (poor success in obesity in particular), lack of consistent approaches to secondary prevention and surveillance of at-risk groups, and paucity of effective treatment modalities for patients. Ensuring consistent access to treatment and care has the potential to deliver substantial improvements in survival outcomes and quality of life today. Empowering all patients with the tools to engage with the wider healthcare system are foundational steps towards improving the lives of people living with upper GI cancer.

The full realisation of improved outcomes for upper GI cancer patients and their families, however, will require new discovery and to that end, Australians living with upper GI cancers must participate in international research by cancer sub-types.

The next chapter considers the opportunities to address barriers in detail.

Chapter 5

Opportunities to improve outcomes for people living with upper GI cancers and their families

There are compelling reasons to be optimistic about the future for people living with upper GI cancers, including recent breakthroughs in treatment and the potential to improve secondary prevention of risk factors. While major gaps and inconsistencies in supportive and palliative care exist today, these can be addressed to substantially improve quality of life for patients and their families.

This chapter identifies the opportunities to improve outcomes for patients and their families, as well as the wider health system and community, through more effective prevention, detection, diagnosis and referral, treatment and delivery of supportive and palliative care for upper GI cancers. The ideas explored in this chapter are synthesised into a plan for action in the following chapter.

Key findings:

Opportunities to improve outcomes in upper GI cancers include improved prevention and early detection, presentation, initial investigations and referral, treatment and supportive care, and end of life care These opportunities have the potential to:

- **Substantially reduce the incidence of upper GI cancers, through improved primary prevention**
- **Improve survival in the short run, through earlier detection and improved adherence to clinical best practice today**
- **Improved quality of life and health services utilisation through the empowerment and support of patients and their families to navigate to the right support when they need it**
- **Significant breakthroughs in treatment, through a nationally coordinated approach to research**
- **Lead to economic benefits and savings.**

5.1 Overview of Opportunities

Through focused and strategic collaboration around a common goal, mortality from upper GI cancers can be reduced and quality of life substantially improved.

Organised by Optimal Care Pathway (OCP) domain, in similar fashion to the National Pancreatic Cancer Roadmap, opportunities to improve outcomes for patients, their families and the wider health system include (Figure 5.1):

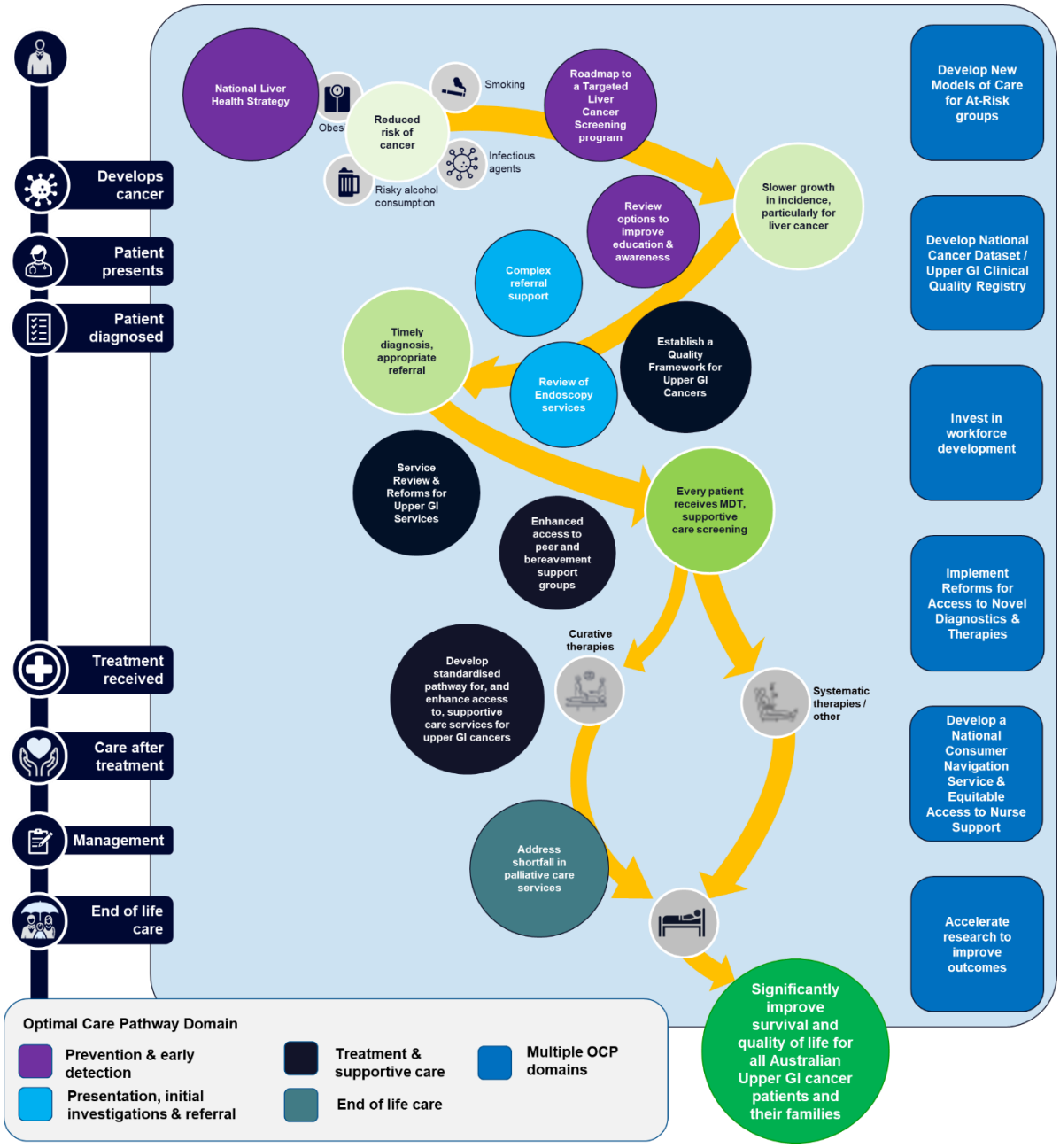
Prevention and early detection

- Improve primary prevention, especially of obesity and alcohol use in the general population and through new models of care for at-risk populations
- Develop a National Liver Health Strategy
- Develop a Roadmap to a Targeted Liver Cancer Screening Program
- Review options to improve education and awareness

Presentation, initial investigations and referral

- Establish systems for rapid and informed specialist referral
- Conduct a review of endoscopy services in each state and territory to improve timeliness and quality of care

Figure 5.1: Opportunities to improve outcomes by optimal care pathway (OCP) domain



Treatment and supportive care

- Establish a quality framework for upper GI cancers, enabled by a National Cancer Dataset and Upper GI Cancers Registry
- Conduct a review of service delivery in Upper GI Cancers to strengthen best-practice treatment
- Enhance access to support groups for patients and carers
- Develop a standardised pathway for supportive and palliative care in upper GI cancers

End of life care

- Address shortfall in palliative care services

Opportunities which span multiple optimal care pathway (OCP) domains

- Develop new models of care for at-risk cohorts
- Develop a National Cancer Dataset and expand the Upper GI Cancers Registry
- Invest in workforce development
- Implement reforms for access to novel therapies and diagnostics
- Develop a National Consumer Navigation Service and ensure equitable access to nurses support for Upper GI Cancers
- Establish a Research Mission for Upper GI cancers.

These opportunities are shown in Figure 5.1 (above) and discussed in turn.

A small number of these opportunities are already being delivered by newly developed strategies, including national public health strategies focused on primary prevention of major risk factors and new models of care for selected at-risk groups, most notably the significant policy work and investment focused on Aboriginal and Torres Strait Islander people. These opportunities are not reinvestigated here given the recency of development of these wider strategies.

Some opportunities are unique to Upper GI Cancers, which will require a specific implementation strategy for investment and reform, while others may be delivered through other existing policy work, such as the Australian Cancer Plan. These implementation considerations are explored further in the next chapter.

5.2 Develop a National Liver Health Strategy

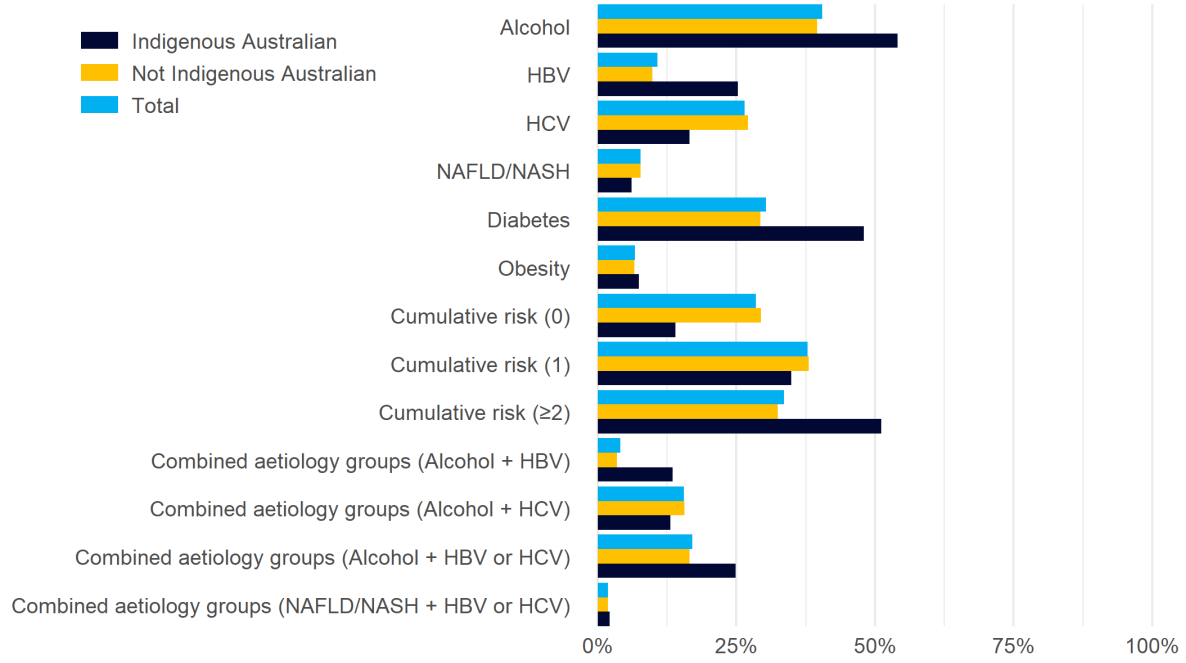
In Australia today, hepatocellular carcinoma has one of the fastest growing incidence rates of all cancers and is the fastest growing cause of cancer deaths;[223] since 1982, the incidence of liver cancer has increased by 394 per cent.[224] This should not be surprising; the increase has been observed by researchers and health care professionals over the past decade.[225]

[223] Deloitte, 2021, The social and economic cost of primary liver cancer in Australia.
[224] Estimated as the percentage change in age standardised rate between 1982 (AIHW actuals) and 2021 (AIHW forecast). Broken down by sex, this equates to a 369 per cent increase for men (from 2.9 to 13.6) and a 422 per cent increase for women (from 0.9 to 4.7). Among the Australian population, the increase in crude incidence rate is 620 per cent (1.5 per cent to 10.8 per cent).
[225] Strasser, S., 2013, Hepatocellular carcinoma: the most rapidly rising cause of cancer death in Australia, Medicine Today, 14(12): 55-57.

As highlighted throughout this State of the Nation in Upper Gastrointestinal Cancers in Australia report (report), hepatocellular carcinoma arises due to various preventable risk factors:[226]

- Obesity, with fatty liver disease estimated to contribute to 14-25 per cent of all hepatocellular carcinoma cases in Australia
- Risky alcohol consumption, with alcoholic liver disease estimated to contribute to 15-39 per cent of all hepatocellular carcinoma cases in Australia
- Tobacco consumption, which has previously been reported to cause 21 per cent of all liver cancers, with current smokers having 1.55-fold higher odds of developing hepatocellular carcinoma
- Infection with hepatitis B and/or C, which is estimated to account for 35-41 per cent of all cases of hepatocellular carcinoma.

Figure 5.2: Distribution of risk factors among people diagnosed with hepatocellular carcinoma



Note: Authors highlighted that there is potential for some measurement error with regards to obesity, reflecting limited historical understanding. Source: Wigg, A.J., et al., 2021, Hepatocellular carcinoma amongst Aboriginal and Torres Strait Islander peoples of Australia, eClinicalMedicine, 36, doi: 10.1016/j.eclinm.2021.100919.

A complexity is that the risk factors for hepatocellular carcinoma interact with and are amplified by one another (as opposed to being additive).[227] To illustrate, although obesity and unhealthy alcohol consumption each separately increase the risk of hepatocellular carcinoma, the combination of these risk factors leads to increased risk; having obesity

[226] Hong, T.P., Gow, P., Fink, M., et al., 2016, Novel population-based study finding higher than reported hepatocellular carcinoma incidence suggests an updated approach is needed, Hepatology, 63, 1205–1212, doi: 10.1002/hep.28267; Abdel-Rahman, O., Helbling, D., Schob, O., et al., 2017, Cigarette smoking as a risk factor for the development of and mortality from hepatocellular carcinoma: An updated systematic review of 81 epidemiological studies, Journal of Evidence-Based Medicine, 10(4), 245-54, doi: 10.1111/jebm.12270; Cancer Council, 2017, Three charts on: cancer rates in Australia, where liver cancer is on the rise while other types fall.

[227] Karlsen, T.H., et al., 2022, The EASL–Lancet Liver Commission: protecting the next generation of Europeans against liver disease complications and premature mortality, The Lancet, 399(10319), 61-116, doi: 10.1016/S0140-6736(21)01701-3.

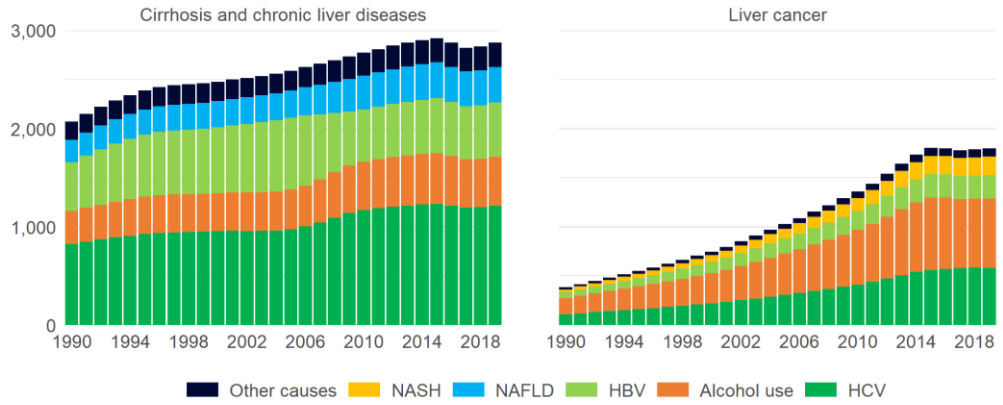
makes alcohol consumption far more dangerous – a body-mass index (BMI) of more than 30 kg/m2 doubling the hepatotoxicity of alcohol.[228]

Consistent with the Figure 5.2 above, hepatocellular carcinoma is the end stage consequence of liver health issues. Liver disease is highly prevalent within the Australia population, impacting 27 per cent of Australians.[229] This may be conservative; a study of Australian adults observed that the most common cause of liver disease in Australia – Metabolic Fatty Liver Disease – was present in 37 per cent of the population.[230] In addition to the 5,560 prevalent cases of liver cancer reported by Cancer Australia in 2016,[231] there were:

- 5,551,000 prevalent cases of non alcohol fatty liver disease in 2019[232]
- 230,154 prevalent cases of chronic hepatitis B in 2019[233]
- 117,810 prevalent cases of chronic hepatitis C in 2020[234]
- 113,237 prevalent cases of haemochromatosis and 6,203 prevalent cases of alcoholic liver disease in 2012.[235]

Incidence estimates presented by the Institute for Health Metrics and Evaluation indicate that incidence of liver disease has increased since 1990.

Figure 5.3: Incidence of chronic liver disease and liver cancer (count by type)



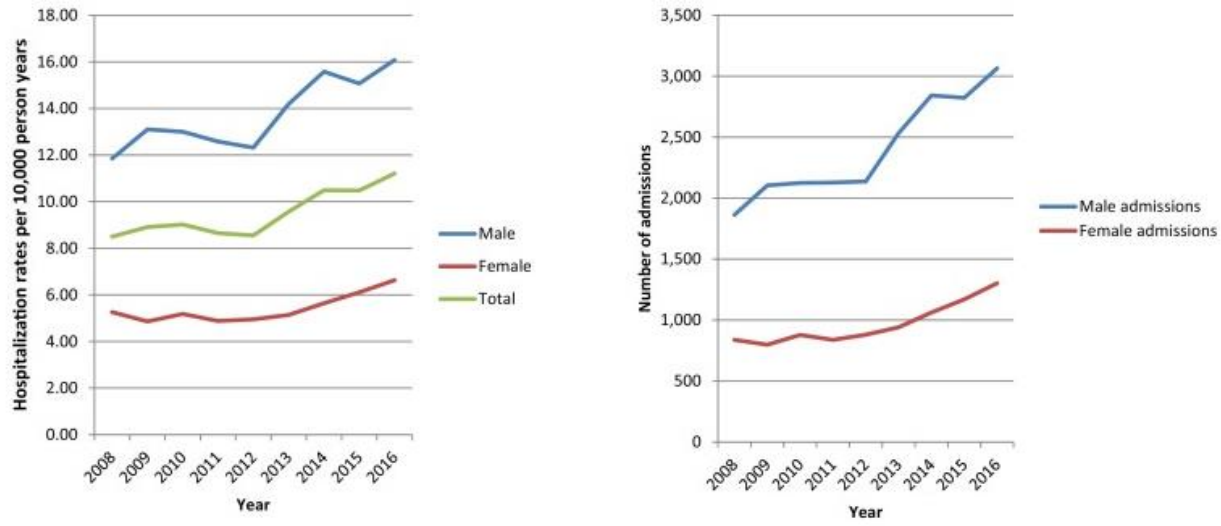
Note: Non-alcoholic steatohepatitis (NASH), non-alcoholic fatty liver disease (NAFLD), hepatitis B (HBV) and hepatitis C (HCV).
Source: Global Burden of Disease Collaborative Network, 2020, Global Burden of Disease Study 2019 (GBD 2019) Results, Institute for Health Metrics and Evaluation (IHME), available from: http://ghdx.healthdata.org/gbd-results-tool.

An analysis of hospitalisation rates for patients with cirrhosis indicates that hospitalisation rates increased from 8.50/10,000 to 11.21/10,000 between 2008 and 2016. Over the same period, the number of admissions increased by 61.7 per cent from 2,701 admissions in 2008

[228] For example, see: Hart, C.L., Morrison, D.S., Batty, G.D., Mitchell, R.J., Davey Smith, G., 2010, Effect of body mass index and alcohol consumption on liver disease: analysis of data from two prospective cohort studies, BMJ, 340c1240.
[229] Calculated as 6,179,285 (Deloitte, 2012) divided by 22,683,600 (ABS). Deloitte, 2013, The economic cost and health burden of liver diseases in Australia; ABS, 2012, Australian Demographic Statistics.
[230] Farrell, A.M., Magliano, D.J., Shaw, J.E., et al., 2022, A problem of proportions: estimates of metabolic associated fatty liver disease and liver fibrosis in Australian adults in the nationwide 2012, AusDiab Study, Sci Rep, 12, 1956 doi: 10.1038/s41598-022-05168-0.
[231] Reflecting those diagnosed within the previous 35 years. Cancer Australia, 2021, Liver cancer in Australia statistics.
[232] A study of NAFLD in regional Victoria found high prevalence of 36 per cent (age, sex standardised). Adams, L.A., Roberts, S.K., Strasser, S.I., et al., 2020, Nonalcoholic fatty liver disease burden: Australia, 2019-2030, J Gastroenterol Hepatol, 35(9), 1628-1635, doi: 10.1111/jgh.15009; Roberts, S.K., Majeed, A., et al., 2021, Prevalence of non-alcoholic fatty liver disease in regional Victoria: a prospective population-based study, Med J Aust, 215, 77-82, doi: 10.5694/mja2.51096.
[233] Romero, N., McCulloch, K., Allard, N., et al., 2020, National Surveillance for Hepatitis B Indicators: Measuring the progress towards the targets of the National Hepatitis B Strategy – Annual Report 2019, Doherty Institute.
[234] Kwon, J.A., Dore, G.J., Hajarizadeh, B., et al., 2021, Australia could miss the WHO hepatitis C virus elimination targets due to declining treatment uptake and ongoing burden of advanced liver disease complications, PLOS ONE, 16(9), doi: 10.1371/journal.pone.0257369.
[235] Deloitte, 2013, The economic cost and health burden of liver diseases in Australia.

to 4,367 admissions in 2016. During this period, the percentage increase varied by socioeconomic disadvantage, with a 3.2 per cent per annum increase in the most affluent compared to a 9.4 per cent per annum increase in the most disadvantaged quintile.[236]

Figure 5.4: Number of hospital admissions and age-adjusted hospitalization rate per 10,000 person years for liver cirrhosis by year and gender in Queensland, Australia during 2008 to 2016



Source: Powell,E.E., et al., 2019, Increasing Hospitalization Rates for Cirrhosis: Overrepresentation of Disadvantaged Australians, eClinicalMedicine, 11, 44-53, doi: 10.1016/j.eclinm.2019.05.007.

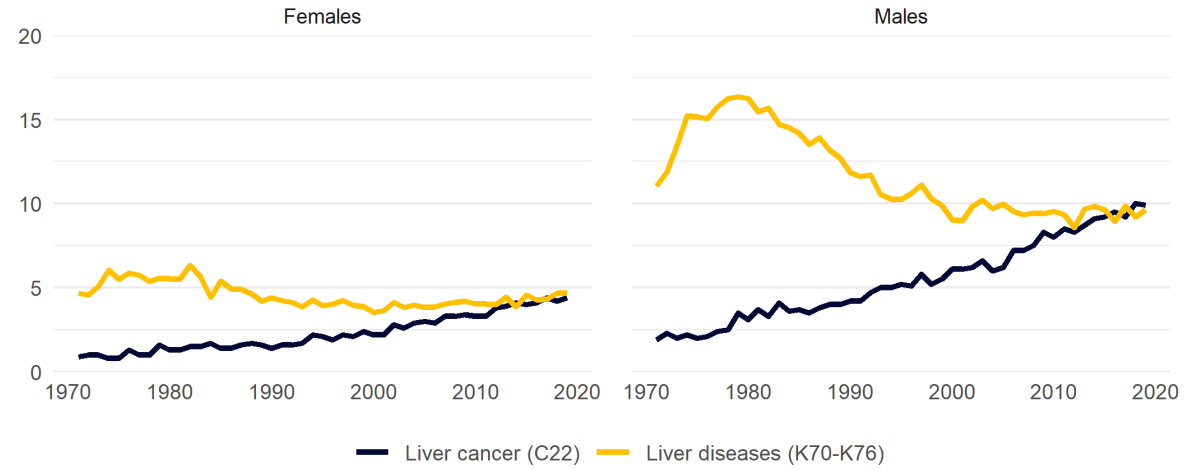
Consistent with trends in hepatocellular carcinoma, alcohol is a common contributor to cirrhosis. A study of hospitalisations for cirrhosis in Australia found that 70 per cent of Indigenous Australian patients had alcohol-related cirrhosis compared to 47 per cent of non-Indigenous patients.[237]

An end result of liver disease and poor liver health is liver failure, which has been observed to increase over recent years. For example, the number of chronic liver failure cases at South Australia's public hospitals increased from 422 cases in 2001 to 1,441 cases in 2015, representing an increase of close to three-fold. The most common sited cause of liver failure is excess alcohol consumption.

In contrast to trends in liver cancer, rates (ASR) of liver disease mortality have decreased over time (Figure 5.5).

[236] Powell,E.E., et al., 2019, Increasing Hospitalization Rates for Cirrhosis: Overrepresentation of Disadvantaged Australians, eClinicalMedicine, 11, 44-53, doi: 10.1016/j.eclinm.2019.05.007.
[237] Valery, P.C., Clark, P.J., Pratt, G., et al., 2020, Hospitalisation for cirrhosis in Australia: disparities in presentation and outcomes for Indigenous Australians, Int J Equity Health, 19(27), doi: 10.1186/s12939-020-1144-6.

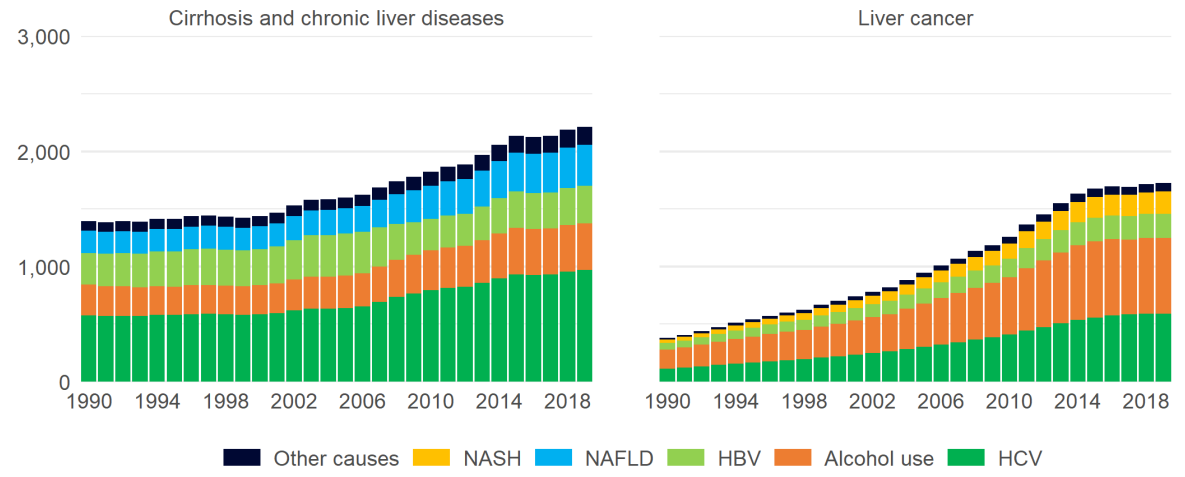
Figure 5.5: Deaths due to liver cancer and liver diseases (age standardised rate)



Note: Liver disease (ICD-10 K70–K76), liver disease (ICD-10 C22) 1968–2019. Source: AIHW GRIM database.

According to AIHW data, in 2019, 2,067 people died of liver disease and 2,187 died from liver cancer.[238] The Institute for Health Metrics and Evaluation provides a breakdown of likely cause of death across time, for both cirrhosis and chronic liver diseases (B.4.1) and liver cancer (B.1.7).

Figure 5.6: Deaths due to liver disease (count by type)



Note: Non-alcoholic steatohepatitis (NASH), non-alcoholic fatty liver disease (NAFLD), hepatitis B (HBV) and hepatitis C (HCV). Source: Global Burden of Disease Collaborative Network, 2020, Global Burden of Disease Study 2019 (GBD 2019) Results, Institute for Health Metrics and Evaluation (IHME), available from: http://ghdx.healthdata.org/gbd-results-tool.

Consistent with patterns in liver cancer, liver diseases are relatively common contributors to mortality of Indigenous Australians. Liver diseases leading to cirrhosis is among the most common contributor to the mortality gap between Indigenous and other Australian adults.[239] According to AIHW disease burden data, in 2018:[240]

[238] Liver disease (ICD-10 K70–K76), liver disease (ICD-10 C22) 1968–2019. Source: AIHW GRIM database.
[239] Valery, P.C., Clark, P.J., Pratt, G., et al., 2020, Hospitalisation for cirrhosis in Australia: disparities in presentation and outcomes for Indigenous Australians., Int J Equity Health 19, 27, doi: 10.1186/s12939-020-1144-6.
[240] Chronic liver disease: 8.1 divided by 2.8. Liver cancer: 3.3 divided by 1.375. Souce: AIHW, 2021, AIHW Analysis of Australian Burden of Disease Study 2018 Database; and AIHW, 2022, Australian Burden of Disease Study: Impact and causes of illness and death in Aboriginal and Torres Strait Islander people.

- The years of life lost to chronic liver disease (ASR) for Indigenous Australians was over 4 times higher than the general population
- The years of life lost to liver cancer (ASR) for Indigenous Australians was 2.4 times higher than the general population.

Looking forward, the burden from liver disease may increase. This is likely to be driven by growth in non alcoholic fatty liver disease, which is expected to become a 'modern epidemic' by 2050, but offset by potential reduction in hepatitis C due to availability of curative treatment.[241] A recent study projects prevalent nonalcoholic fatty liver disease cases to increase by 25 per cent from the current burden (to 7.0 million in 2030), with an associated increase in non-alcoholic steatohepatitis cases of 40 per cent. As consequence, it is projected that incident cases of advanced liver disease will increase 85 per cent by 2030, and incident nonalcoholic fatty liver disease liver deaths will increase 85 per cent to 3,500 deaths in 2030.[242]

Previous studies from the grey literature highlight that the costs associated with hepatocellular carcinoma are only a subset of the broader health and economic costs of liver disease. Cost estimates are substantial:

- In 2013, Deloitte Access Economics estimated that the total financial cost of liver disease was $5.4 billion ($2012) in 2012, and the total cost including burden of disease was $50.7 billion[243]
- In contrast, Deloitte Access Economics estimated that the economic cost of hepatocellular carcinoma was $522 million in 2019-20, and the loss of wellbeing from hepatocellular carcinoma was valued at a further $4.3 billion.[244]

International evidence similarly indicates that patients with chronic liver disease, compared with selected other chronic diseases, have been found to have disproportionately high burden, with increasing rates of hospitalisation, longer hospital stays, more readmissions, and, despite these adverse outcomes, less access to post-acute care.[245] For example, in Australia, the hospital costs associated with treating cirrhosis and alcoholic hepatitis (90 per cent of hepatocellular carcinoma arises in cirrhotic livers) range between:[246]

- $30,687 in major complexity cases
- $11,866 in intermediate complexity cases
- $3,347 in minor complexity cases.

At a higher level, the AIHW estimates that the per person healthcare spend attributable to:[247]

- Hepatitis C (acute) is $1,005,389
- Hepatitis B (acute) is $333,284
- Liver cancer is $26,258
- Chronic Liver Disease is $10,513

[241] Scimex website, available: https://www.scimex.org/newsfeed/alcohol-fuels-surge-in-chronic-liver-disease.
[242] Adams, L.A., Roberts, S.K., Strasser, S.I., et al., 2020, Nonalcoholic fatty liver disease burden: Australia, 2019-2030. J Gastroenterol Hepatol, 35(9), 1628-1635, doi:10.1111/jgh.15009.
[243] Deloitte, 2013, The economic cost and health burden of liver diseases in Australia.
[244] Deloitte, 2021, The social and economic cost of primary liver cancer in Australia.
[245] Asrani, S.K., Kouznetsova, M., Ogola, G., et al., 2018, Increasing Health Care Burden of Chronic Liver Disease Compared With Other Chronic Diseases, 2004-2013, Gastroenterology, 155(3), 719-729, doi: 10.1053/j.gastro.2018.05.032.
[246] IHPA, 2022, National Hospital Cost Data Collection Public Sector, Round 24 (financial year 2019–20)
[247] AIHW, 2022, Health system spending per case of disease and for certain risk factors.

International evidence similarly shows high costs of liver disease globally. For example:

- A US study (2012-2016) estimated national hospitalisation costs of patients with chronic liver disease reached $81.1 billion[248]
- A study of the burden of nonalcoholic steatohepatitis in five European countries in 2018 found that the total economic costs were €8,548 million to €19,546, comprising health system costs of €619 million to €1,292 million; total wellbeing costs were estimated to be between €41,536 million and €90,379 million.[249]
- The average annual health expenditure for liver disease in a sample of European countries is €4·3 billion, and the impact of liver disease on the economy of these countries leads to the loss of the equivalent of 5 million fulltime workers per year.[250]

Despite this high burden, it is well recognised that liver disease and hepatocellular carcinoma (HCC) are preventable:[251]

> *This is particularly troubling since the majority of HCC is potentially preventable if the cause of chronic liver disease is identified and interventions are undertaken (e.g. treatment of viral hepatitis, interventions for alcohol misuse and dependence, and optimization of metabolic risk factors such as obesity and diabetes).*

In accordance with this fact, a 2017 study found that approximately 66.6 per cent of cases of liver cancer are potentially preventable,[252] noting that:

- Only 29 per cent of people diagnosed with hepatocellular carcinoma have no risk factors (alcohol, hepatitis B, hepatitis C, obesity, and diabetes)[253]
- The most common causes of hepatocellular carcinoma are hepatitis C (41 per cent), alcoholic liver disease (39 per cent) and hepatitis B (22 per cent) and fatty liver disease (14 per cent).[254]
- Curing a patient with hepatitis C and cirrhosis reduces cancer risk significantly (adjusted hazard ratio of 0.34, absolute reduction in hepatocellular carcinoma risk from 2.7 to 0.93 per 100 patient-years).[255]
- Curing a patient with hepatitis C and without cirrhosis virtually eliminates hepatocellular carcinoma as most cancers arise in the context of cirrhosis (from 0.73 to 0.18 per 100 patient-years)[256]

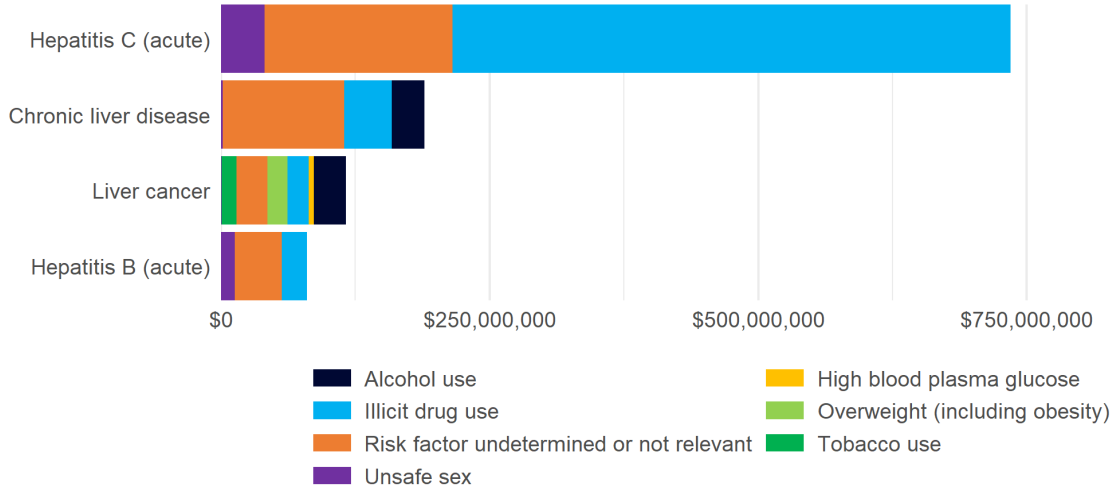
[248] Hirode, G., Saab, S., Wong, R.J., 2020, Trends in the Burden of Chronic Liver Disease Among Hospitalized US Adults, JAMA Netw Open, 3(4), doi: 10.1001/jamanetworkopen.2020.1997.
[249] Schattenberg, J.M., et al., 2021, Disease burden and economic impact of diagnosed non-alcoholic steatohepatitis in five European countries in 2018: A cost-of-illness analysis, Liver international, 41(6), 1227–1242, doi: 10.1111/liv.14825.
[250] Karlsen, T.H., et al., 2022, The EASL–Lancet Liver Commission: protecting the next generation of Europeans against liver disease complications and premature mortality, The Lancet, 399(10319), 61-116, doi: 10.1016/S0140-6736(21)01701-3.
[251] Powell,E.E., et al., 2019, Increasing Hospitalization Rates for Cirrhosis: Overrepresentation of Disadvantaged Australians, eClinicalMedicine, 11, 44-53, doi: 10.1016/j.eclinm.2019.05.007.
[252] Wilson, L.F., et al., 2017, How many cancer cases and deaths are potentially preventable? Estimates for Australia in 2013, Cancer Epidemiology, 142(4), doi: 10.1002/ijc.31088.
[253] Wigg, A.J., et al., 2021, Hepatocellular carcinoma amongst Aboriginal and Torres Strait Islander peoples of Australia, eClinicalMedicine, 36, doi: 10.1016/j.eclinm.2021.100919.
[254] Hong, T.P., Gow, P., et al., 2016, Novel population based study finding higher than reported hepatocellular carcinoma incidence suggests an updated approach is needed, Hepatology, 63(4), 1205-12.
[255] Ioannou, G.N., Green, P.K., Berry, K., 2017, hepatitis C eradication induced by direct-acting antiviral agents reduces the risk of hepatocellular carcinoma. Journal of hepatology, S0168-8278(17)32273-0, doi: 10.1016/j.jhep.2017.08.030.
[256] Ioannou, G.N., Green, P.K., Berry, K., 2017, hepatitis C eradication induced by direct-acting antiviral agents reduces the risk of hepatocellular carcinoma. Journal of hepatology, S0168-8278(17)32273-0, doi: 10.1016/j.jhep.2017.08.030; Alqahtani, S.A., Colombo, M., 2021, Treatment for Viral Hepatitis as Secondary Prevention for Hepatocellular Carcinoma, Cells,10(11), 3091, doi: 10.3390/cells10113091.

- In hepatitis B, treatment of hepatitis B with antivirals based on current guidelines reduces hepatocellular carcinoma risk 70 per cent.[257]

This is corroborated by recent analysis released by the AIHW, which attributes:[258]

- 76.2 per cent of healthcare system spending on chronic hepatitis C to preventable risk factors
- 75 per cent of healthcare system spending on liver cancer to risk factors
- 45.8 per cent of healthcare system spending on chronic hepatitis B to preventable risk factors
- 40.1 per cent of healthcare system spending on chronic liver disease to preventable risk factors.

Figure 5.7: Expenditure attributable to liver conditions, by risk factor

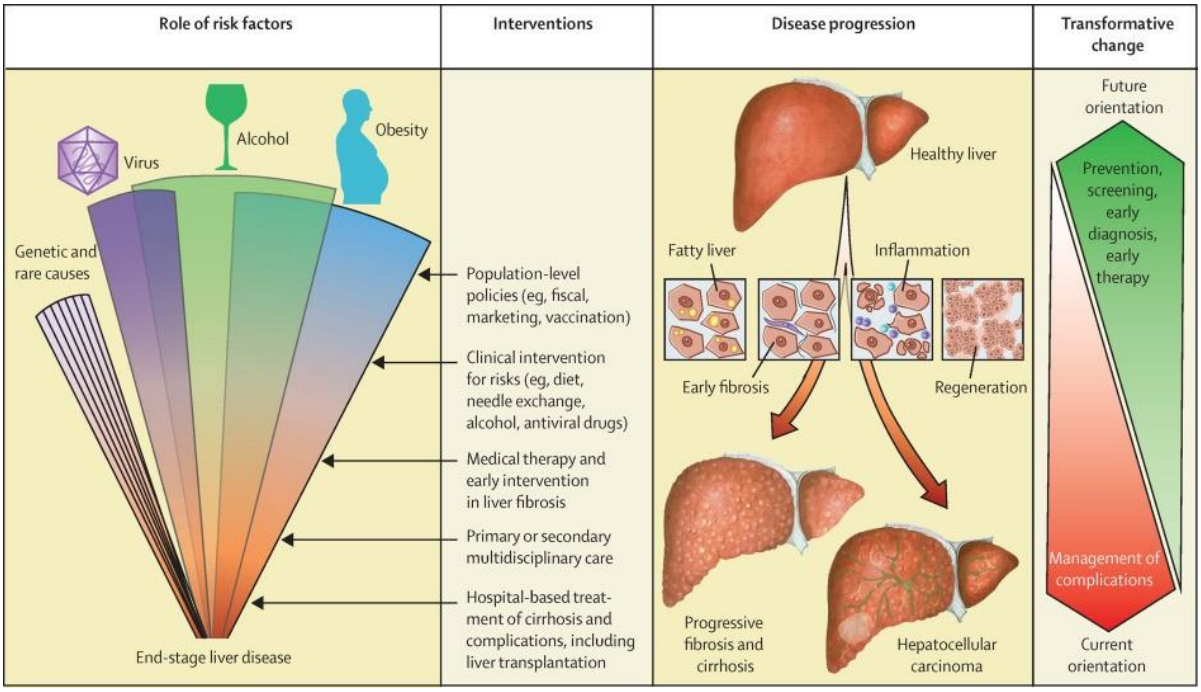


Source: AIHW, 2022, Health system spending per case of disease and for certain risk factors.

Reflecting the possibility of preventing these diseases, efforts that aim to prevent, screen and diagnose liver disease early are increasingly promoted as opposed to responding to complications (including hepatocellular carcinoma) when they emerge. [259] These strategies acknowledge that liver disease is complex and multifaceted, is associated with stigma and disproportionately effect individuals from low socioeconomic backgrounds.

[257] Noting, however, that current guidelines do not recommend treating everyone with HVB as treatment suppresses viremia but is not curative and so treatment is lifelong.
[258] Liver cancer: $87,203,863 of $116,277,967, CHC: $560,193,031 of $735,086,963, CHB: $36,635,810 of $79,924,624 and chronic liver disease: $76,056,681 of $189,481,654.
[259] Williams, R., et al., 2017, Disease burden and costs from excess alcohol consumption, obesity, and viral hepatitis: fourth report of the Lancet Standing Commission on Liver Disease in the UK, Health Policy, 391(10125), doi: 10.1016/S0140-6736(17)32866-0

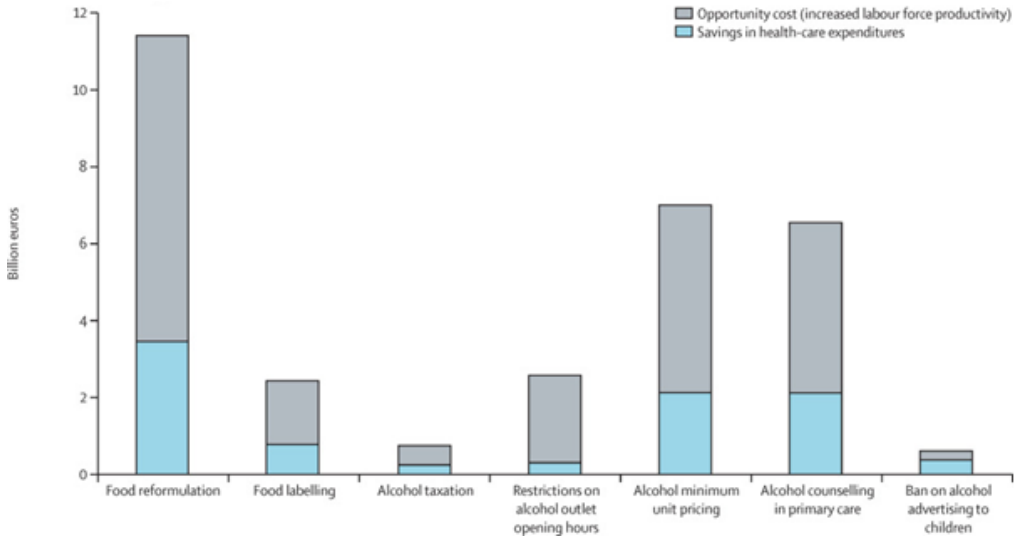
Figure 5.8: Risk factors, interventions, and disease progression for liver disease



Source: Karlsen, T.H., et al., 2021, The EASL–Lancet Liver Commission: protecting the next generation of Europeans against liver disease complications and premature mortality, The Lancet, 399(10319), 61-116, doi: 10.1016/S0140-6736(21)01701-3.

Furthermore, international organisations have identified and analysed a wide range of policies (for example, Figure 5.9) which aim to reduce liver disease.

Figure 5.9: Economic impact of different health policies in EU27+5



Source: Karlsen, T.H., et al., 2021, The EASL–Lancet Liver Commission: protecting the next generation of Europeans against liver disease complications and premature mortality, The Lancet, 399(10319), 61-116, doi: 10.1016/S0140-6736(21)01701-3.

In Australia, several policies have been introduced to address the burden of liver diseases, including a set of national strategies focused on hepatitis as well as several preventative health strategies. For example, Australia was one of the first countries to introduce government-funded unrestricted access to direct-acting antiviral (DAA) therapy and has rolled out national hepatitis B vaccinations for over two decades.

While there has been some success, the current suite of strategies focused on improving liver health have been met with criticism and may be limited in light of the growth in underlying incidence in liver disease. For example:

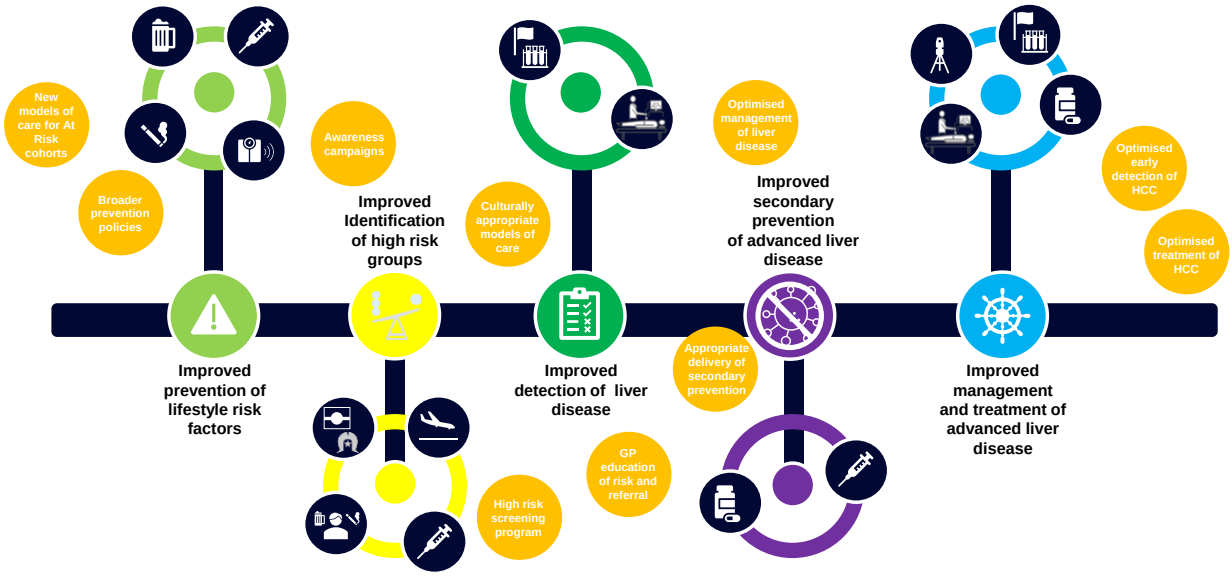
- Obesity is growing and that Australia is amongst the poorest performing developed countries globally (in 2017-19, Australia was ranked fifth among OECD countries)[260]
- There has been a decline in frequency of alcohol consumption at lifetime risky levels, but this has stablised recently[261]
- Australia is falling behind National Strategy targets and WHO targets, for both hepatitis B and hepatitis C[262]
- Inequitable outcomes persist for Indigenous Australians with liver diseases leading to cirrhosis being among the most frequent contributor to the mortality gap between Indigenous and other Australian adults[263]
- Cases of nonalcoholic fatty liver disease are projected to increase 25 per cent by 2030 to 7 million cases in that year, with associated liver death increasing from 1,800 to 3,200.[264]

To address the burden of liver disease within Australia, a National Strategy for Liver Health which systematically identifies and addresses gaps that exist within existing policy arrangements is warranted. This would involve reviewing opportunities to improve risk prevention, identification of high-risk groups, liver disease detection and secondary prevention, and management and treatment of advanced liver disease. Policy may include:

- Raising awareness of importance of liver health through mass media campaigns
- Implementation of an Australian high-risk screening program for liver disease
- GP education of risk factors for liver disease, and appropriate referral
- Development of models which are culturally appropriate and successful meet the needs of high-risk groups
- Development of infrastructure and research to improve efficacy of detection.

[260] Federal Government, 2022, National Obesity Strategy 2022-2032.
[261] AIHW, 2020, National Drug Strategy Household Survey 2019.
[262] Allard, N.L., MacLachlan, J.H., Tran, L., Yussf, N., Cowie, B.C., 2021, Time for universal hepatitis B screening for Australian adults, Med J Aust, 215, doi: 10.5694/mja2.51114.
[263] Valery, P.C., Clark, P.J., Pratt, G., et al., 2020, Hospitalisation for cirrhosis in Australia: disparities in presentation and outcomes for Indigenous Australians, Int J Equity Health, 19, doi: 10.1186/s12939-020-1144-6.
[264] Adams, L.A., Roberts, S.K., Strasser, S.I., Mahady, S.E., Powell, E., Estes, C., Razavi, H., George, J., 2020, Nonalcoholic fatty liver disease burden: Australia, 2019-2030, J Gastroenterol Hepatol, 35(9), 1628-1635, doi: 10.1111/jgh.15009.

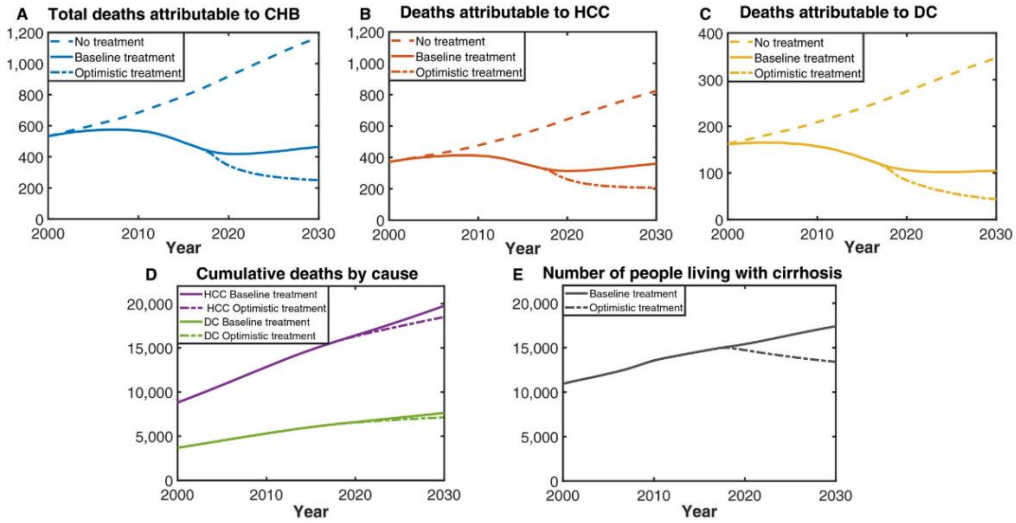
Figure 5.10: National Liver Health Strategy – improving prevention, detection and treatment



The benefits of a National Liver Health Strategy could be enormous, reflecting the large burden associated with liver disease. This strategy would capture the benefits of addressing liver disease before cirrhosis and hepatocellular carcinoma emerge, as well as cost savings through enhanced management of advanced liver disease:

- *Reducing the costs of hepatitis B* — A study of hepatitis B treatment and prevention, estimated that it is cost-effective to spend up to A$328 million or A$538 million per year to reach the National and WHO Strategy targets, respectively.[265]

Figure 5.11: Reduction in consequences of chronic hepatitis B associated with treatment



Note: The baseline treatment scenario assumes that the treatment uptake proportion for those in eligible phases remains constant at the level in 2017, while the intermediate scenario satisfies the WHO 2030 treatment target, and the uptake rate in the optimistic scenario satisfies the National 2022 and WHO 2030 treatment targets. Source: McCulloch, K., Romero, N., MacLachlan, J., et al., 2020, Modeling Progress Toward Elimination of Hepatitis B in Australia. Hepatology, 71, 1170-1181, doi: 10.1002/hep.30899.

[265] Xiao, Y., Howell, J., van Gemert, C., et al., 2020, Enhancing the hepatitis B care cascade in Australia: A cost-effectiveness model, J Viral Hepat, 27, 526– 536, doi: 10.1111/jvh.13252.

Analysis in 2019 indicated that an additional 1,768 deaths would be prevented between 2017 and 2030 if Australia reaches both its 2022 and 2030 targets compared to continuing at the baseline level.[266]

A 2009 study found that hepatocellular carcinoma prevention is relatively attractive when compared to surveillance of patients with hepatitis B, resulting in: [267]

- 0.923 QALYs gained (AU$12,956/QALY gained)
- Reduced cases of cirrhosis (52 per cent)
- Reduced hepatocellular carcinoma diagnoses (47 per cent)
- Reduced chronic hepatitis B-related deaths (56 per cent).

Antiviral treatment of chronic hepatitis B can reduce the risk of liver cancer by 70 per cent. However, two thirds of people requiring antivirals to prevent liver cancer or cirrhosis are not receiving them.[268] Backwards inducting from 2019 incidence counts presented by the Institute for Health Metrics and Evaluation:

- Of the 556 cirrhosis and other chronic liver disease cases due to hepatitis B, 192 could be avoided[269]
- Of the 238 liver cancer cases due to hepatitis B, 75 could be avoided.[270]

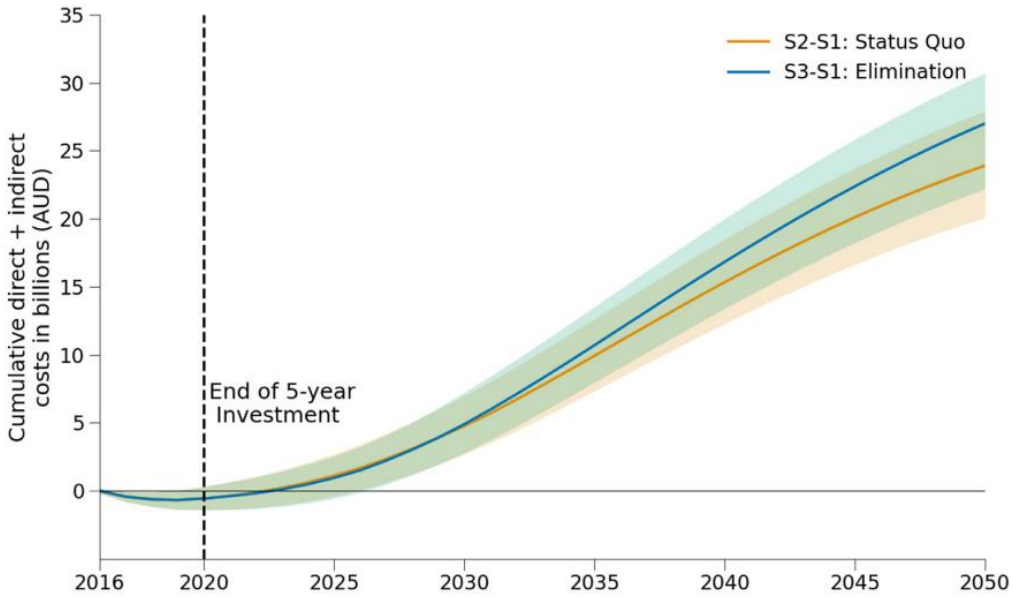
High costs of treatment promote the search for a cure. Compared with current long-term antiviral therapy, a 30 per cent effective functional cure would yield 20.42 and 20.62 QALYs per patient with and without cirrhosis, respectively.[271]

Primary prevention offers further benefits, preventing rather than treating hepatitis B infection. AIHW data indicate that $36,635,810 of total health system spending on chronic hepatitis B in 2018-19 is attributable to illicit drug use and unsafe sex, providing rationale for continued efforts to promote safe drug use.[272]

- *Reducing costs of hepatitis C* — A study of Australian efforts to treat hepatitis C found that, if Australia to achieve WHO hepatitis C targets, an additional 10,000 infections and 930 hepatitis C-related deaths could be averted, which would see an increase in net economic benefit at 2030 by $272 million (relative to status quo) (Figure 5.12).[273]

[266] McCulloch, K., Romero, N., MacLachlan, J., et al., 2020, Modeling Progress Toward Elimination of Hepatitis B in Australia. Hepatology, 71, 1170-1181, doi: 10.1002/hep.30899.
[267] Robotin, M.C., et al., 2009, Antiviral therapy for hepatitis B-related liver cancer prevention is more cost-effective than cancer screening, J Hepatol, 50(5), doi: 10.1016/j.jhep.2008.12.022.
[268] Allard, N.L., et al., 2021, Time for universal hepatitis B screening for Australian adults, Med J Aust, 215(3), 103-105, doi: 10.5694/mja2.51114.
[269] 556 x 2/3 x 0.52 = 192.
[270] 238 x 2/3 x 0.47 = 74.6.
[271] Toy, M., Hutton, D., McCulloch, K., et al., 2022, The price tag of a potential cure for chronic hepatitis B infection: A cost threshold analysis for USA, China and Australia, Liver Int, 42, 16-25, doi: 10.1111/liv.15027.
[272] Liver cancer: $87,203,863 of $116,277,967, CHC: $560,193,031 of $735,086,963, CHB: $36,635,810 of $79,924,624 and chronic liver disease: $76,056,681 of $189,481,654.
[273] Scott, N., et al., 2022, Assessment of the cost-effectiveness of Australia's risksharing agreement for direct-acting antiviral treatments for hepatitis C: a modelling study, The Lancet Regional Health - Western Pacific, 18, 100316, doi: 10.1016/j.lanwpc.2021.100316.

Figure 5.12: Net economic benefits of scale up in hepatitis C treatment scale up



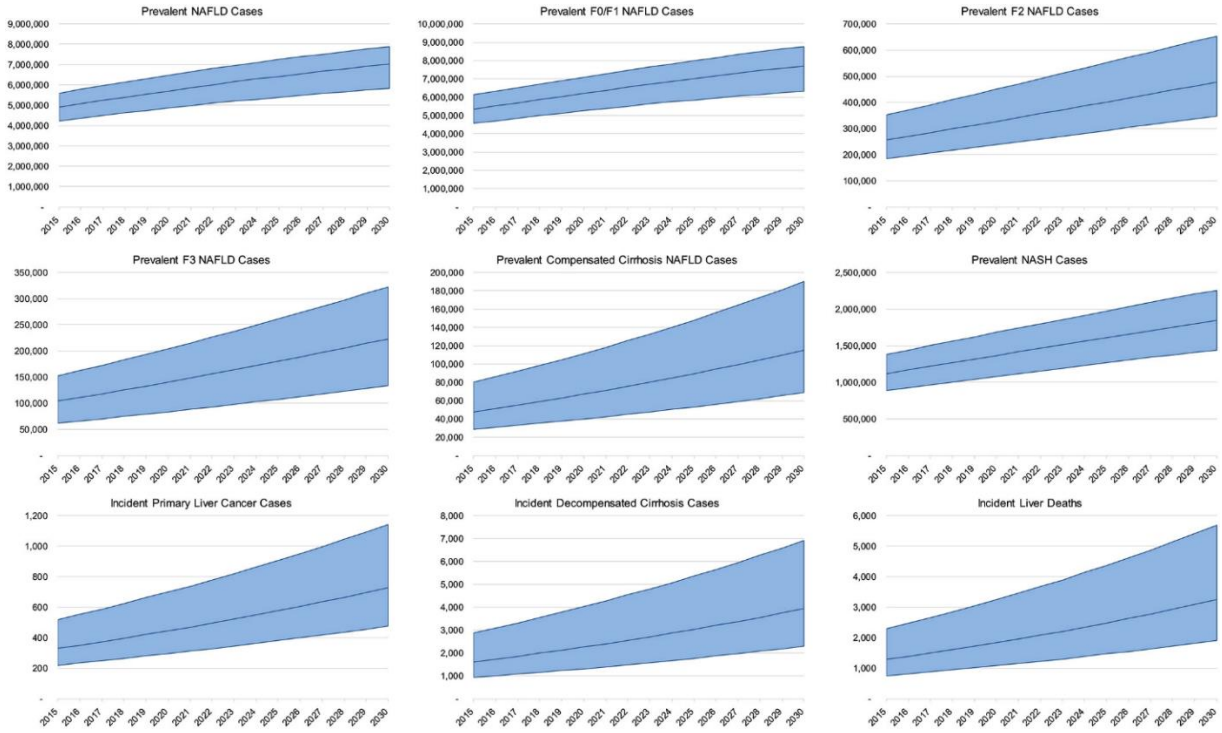
Source: Scott, N., et al., 2022, Assessment of the cost-effectiveness of Australia's risksharing agreement for direct-acting antiviral treatments for hepatitis C: a modelling study, The Lancet Regional Health - Western Pacific, 18, 100316, doi: 10.1016/j.lanwpc.2021.100316.

AIHW data indicate that $560,193,031 of total health system spending on hepatitis C in 2018-19 is attributable to illicit drug use (vast majority) and unsafe sex, providing rationale for continued efforts to promote safe drug use.[274]

- *Reducing costs of nonalcoholic fatty liver disease / nonalcoholic steatohepatitis* — Projections indicate that the impact of nonalcoholic fatty liver disease will increase (Figure 5.13).

[274] Liver cancer: $87,203,863 of $116,277,967, CHC: $560,193,031 of $735,086,963, CHB: $36,635,810 of $79,924,624 and chronic liver disease: $76,056,681 of $189,481,654.

Figure 5.13: Non-alcoholic fatty liver disease (NAFLD) projections



Source: Adams, L.A., Roberts, S.K., Strasser, S.I., et al., 2020, Nonalcoholic fatty liver disease burden: Australia, 2019-2030, Journal of gastroenterology and hepatology, 35(9), 1628–1635, doi: 10.1111/jgh.15009.

If the absolute levels of nonalcoholic fatty liver disease related hepatocellular carcinoma estimated in Adams et al (2020) from 2025 are maintained over the period spanning 2025-2035, approximately 1,200 cases of hepatocellular carcinoma would be prevented and $20 million in $NPV_{5\%}$ terms would be saved from avoided treatment costs alone (based on interpolation of data in Table 5.1).

Table 5.1: Savings from avoided hepatocellular carcinoma treatment alone

	2025	2030	2035
Base projection	580	730	730
Held constant case	580	580	580
Incidence prevented	0	-150	-150
Savings @ average treatment cost of $26,258	**$0**	**$3.9 million**	**$3.9 million**

Source: Insight Economics calculation. Does not account for population change. From 2030 to 2035, values are held constant, difference held constant from 2030 to 2035.

- *Reduction in cirrhosis* — In 2016, there were 4,367 admissions relating to cirrhosis in Queensland alone; at an average cost of hospitalization of $11,583, this implies hospitalisation costs of $50,585,239.[275] Assuming that Queensland's share of domestic cirrhosis aligns with its share of liver disease (19.9 per cent), a domestic equivalent estimate is $254 million per annum.[276]

[275] Powell,E.E., et al., 2019, Increasing Hospitalization Rates for Cirrhosis: Overrepresentation of Disadvantaged Australians, eClinicalMedicine, 11, 44-53, doi: 10.1016/j.eclinm.2019.05.007; separation weighted average cost of treating cirrhosis calculated using National Hospital Cost Data Collection Public Sector, Round 24 (financial year 2019–20).
[276] AIHW, 2021, Australian Cancer Incidence and Mortality (ACIM) Book: Liver cancer.

As discussed above, preventative initiatives could reduce cases of cirrhosis by 52 per cent. It follows that the potential savings from preventing cirrhosis could amount to $132 per annum in hospitalisation costs alone. If this reduction is sustained over the 11 year period spanning 2025-2035, this would amount to $976 million in $NPV_{5\%}$ per cent terms.

- *Reduced incidence of hepatocellular carcinoma* — As discussed above, a reduction of incidence of hepatocellular carcinoma by 47 per cent is possible under a preventative campaign. Assuming that this is reduction is achieved by 2025, between 10,000 and 13,300 cases of liver cancer would be prevented over the 2025-2035 period depending on the rate of hepatocellular carcinoma. It follows that savings in hospitalisation costs associated with the treatment of hepatocellular carcinoma patients would range between $323 million and $427 million in $NPV_{5\%}$ per cent terms over the 2025-2035 horizon (depending on the rate of hepatocellular carcinoma).

It follows that a considerable reduction in the burden of liver cancers and liver disease is possible through a National Liver Health Strategy. Such a comprehensive strategy is needed due to significant challenges arising from stigma, access issues, and the need to create behavioural change, and so will require coordinated research and implementation efforts.

In summation, this strategy could:

- Prevent 10,000 hepatitis infections
- Reduce healthcare costs associated with hepatitis infection by $272 million by 2030
- Reduce cases of cirrhosis by 52 per cent
- Avoid hospitalisation costs associated with the treatment of cirrhosis of $976 million in $NPV_{5\%}$ per cent over the 2025-2035 horizon
- Reduce the incidence of hepatocellular carcinoma by 47 per cent, preventing between 10,000 and 13,300 cases of liver cancer over the 2025-2035 period depending on the rate of hepatocellular carcinoma
- Avoid hospitalisation costs associated with the treatment of hepatocellular carcinoma patients of between $323 million and $427 million in $NPV_{5\%}$ terms over the 2025-2035 horizon (depending on the rate of hepatocellular carcinoma).

Furthermore, if successful, the Liver Health Strategy could set a framework for improving health outcomes, and subsequently be replicated for upper GI cancers more broadly. This would rely on the development of sufficiently actionable and cost effective methods for reducing the burden on these cancers (as would be achieved through a research mission).

5.3 Develop a Roadmap to a Targeted Liver Cancer Screening Program

In conjunction with the development of a National Liver Health Strategy, there is an opportunity to develop a Targeted Liver Cancer Screening Program to improve secondary prevention and early detection of hepatocellular carcinoma. The case for a Targeted Liver Cancer Screening Program is built on the following key data points:

- The incidence of liver disease and hepatocellular carcinoma are increasing rapidly in the community, potentially avoidable healthcare costs, mortality and morbidity

- Less than half of patients diagnosed with hepatocellular carcinoma have been subject to any kind of screening or surveillance for underlying conditions [277]
- Among Indigenous Australians, only 14 per cent of hepatocellular carcinoma is detected through surveillance programs, with the median survival time is markedly lower in Indigenous compared with non-Indigenous Australians (64 v 172 days)[278]
- Participation in hepatocellular carcinoma surveillance was associated with significantly lower mortality:[279]
  - Pooled survival from the Australian studies shows that ultrasound screening improved 2-year survival of hepatocellular carcinoma patients from 40 per cent to 69 per cent
  - Pooled 3-year survival rate was 51 per cent for those who had hepatocellular carcinoma surveillance, compared with 28 per cent for those without prior surveillance ($P < 0.001$)
- Existing and emergent technologies are making monitoring liver health more cost effective.

Screening approaches have also been trialed successfully in other developed nations, such as Japan, which provides insights into the potential for risk stratification of the population to improve the targeting and cost effectiveness of the program (Box 5.1). In Japan, 62 per cent of patients with hepatocellular carcinoma are diagnosed at early stages which has seen 5-year survival rates improve to twice those observed in Australia.

Box 5.1: Hepatocellular carcinoma (HCC) surveillance in Japan

Japan is a global leader in HCC surveillance, with a programme that enables detection of early-stage carcinomas; 62 per cent of HCC patients are diagnosed at stage A and B and consequently 5-year overall survival rates are as high as 44 per cent (5-year overall survival rates in Australia are around 20 per cent).

Japan's healthcare scheme provides financial support for many diagnostic and treatment procedures, including combination therapies and expensive therapies such as direct-acting antivirals. For 'high-risk' patients – including those with chronic hepatitis B, chronic hepatitis C, or cirrhosis – the Japanese Society of Hepatology's Guidelines for Liver Cancer Examination and Treatment recommend ultrasonography every six months and tumour marker evaluation. For 'ultra-high-risk' patients with hepatitis B and hepatitis C cirrhosis, the society recommends more frequent ultrasonography every 3-4 months, tumour marker (AFP, AFP-L3, PIVKA) assays and optional dynamic CT/MRI scans every 6-12 months.

For younger and healthier Japanese cohorts, the country's surveillance system applies a risk stratification strategy with a preceding evaluation by a doctor that is followed by the use of diagnostic tools relevant to a patient's age and prior history of health checks. Young patients may have a viral hepatitis background but are asymptomatic and have not had prior health screening. To ensure that these individuals are not missed, there are efforts to screen them in the workplace and to use more advanced surveillance tools to capture this population completely and quickly.

Japan's surveillance efforts are also supplemented by social and media initiatives, including television programmes or campaigns on viral hepatitis and HCC. For example, at a clinic run by Dr Shun Kaneko (a hepatologist whose clinical research focuses on viral hepatitis, risk analysis for HCC development and liver cancer treatments), patients and the public are educated on asymptomatic disease and fatty liver as a risk of liver cancer, disease monitoring by imaging is offered for advanced fibrosis, workshops are run not only for

[277] Jeffrey, G.P., Gordon, L., Ramm, G., 2020, Hepatocellular carcinoma surveillance in Australia: time to improve the diagnosis of cirrhosis and use liver ultrasound, Med. J. Aust., 212, 297-299.e1, doi:10.5694/mja2.50521; Deloitte, 2021, The social and economic cost of primary liver cancer in Australia; Adams, L.A., Roberts, S.K., Strasser, S.I., Mahady, S.E., Powell, E., Estes, C., Razavi, H., George, J., 2020, Nonalcoholic fatty liver disease burden: Australia, 2019-2030, Journal of gastroenterology and hepatology, 35(9), 1628–1635, doi: 10.1111/jgh.15009.

[278] Parker, C, Tong, S.Y., Dempsey, K., 2014, et al., 2014, Hepatocellular carcinoma in Australia's Northern Territory: high incidence and poor outcome, Med J Aust, 201, 470–474, doi: 10.5694/mja13.11117.

[279] Hong, T.P., et al., 2018, Surveillance improves survival of patients with hepatocellular carcinoma: a prospective population-based study, Med J Aust, 209(8), doi: 10.5694/mja18.00373; Jeffrey, G.P., Gordon, L., Ramm, G., 2020, Hepatocellular carcinoma surveillance in Australia: time to improve the diagnosis of cirrhosis and use liver ultrasound, The Medical Journal of Australia, 212(7), 297-299, doi: 10.5694/mja2.5052.

patients but also general practitioners who need detailed examinations, and research is also conducted on medical health check data.

Despite being a global leader in HCC surveillance, similar issues to those faced in Australia persist, including difficulties in following up. A further complication is that unlike other cancers, in HCC patients it is difficult to know when to cease follow ups following resection.

To achieve further improvements, new technologies are needed, including novel biomarkers and diagnostic tools, because AFP, a mainstay of diagnostic markers for HCC alongside PIVKA and other AFP isoforms, is not always accurate, sensitive, or indicative of disease. Doctors currently rely on established biomarkers in routine clinical practice, patient screening or surveillance, and await genomic biomarkers that can facilitate precision medicine. More generally, markers of and therapies for liver disease are desired.

It is important to contextualise Japanese learnings. Proper screening allows early detection and early treatment and therefore improves prognosis, but costs must also be considered.

Source: Stakeholder submission.

At the same time, although many studies suggest hepatocellular carcinoma screening is cost-effective, substantial limitations of these studies mean the results should be interpreted with caution and further work is needed to fully scope a Targeted Liver Cancer Screening Program, which is why a roadmap model is suggested. Future robust studies need to consider all key parameters, including central adiposity, real-world utilisation rates, and projections of increasing incidence over time.[280] Risk-stratified ultrasound screening for hepatocellular carcinoma, informed by a serum biomarker test, would enable resources to be targeted to patients at the highest risk of developing cancer.

The Roadmap would seek to characterise risk cohorts and identify cost effective and evidence-based testing for these cohorts. The Roadmap could follow a similar approach to the Cancer Council's Roadmap for Breast Cancer Screening and build on the work of the Cancer Council's Optimising Liver Cancer Control in Australia project.

5.4 Develop new models of care for at-risk cohorts: Aboriginal and Torres Strait Islanders, Culturally and Linguistically Diverse, and Low Socioeconomic Background Australians

Upper GI cancers disproportionately impact Australia's most vulnerable and disadvantaged communities. Aboriginal and Torres Strait Islander Australians, new migrants, refugees, prisoners, people from culturally and linguistically diverse backgrounds and Australians from low socioeconomic backgrounds, for example, all face significant cultural and social barriers to healthcare that other Australians are fortunate enough to take for granted. These barriers include challenges related to:

- Poverty
- Racism
- Educational disparities
- Health literacy
- Lack of housing and homelessness
- Cultural barriers including fear, stigma and shame related to cancer diagnoses
- Misinformation and misconceptions
- Language barriers

[280] Nguyen, A.L.T., et al., 2021, A Systematic Review and Narrative Synthesis of Health Economic Evaluations of Hepatocellular Carcinoma Screening Strategies, Value in Health, 24(5), 733-743, doi: 10.1016/j.jval.2020.11.014.

- Lack of social supports and other familial challenges
- Poor access to basic nutrition
- Geographic remoteness and lack of access to transport

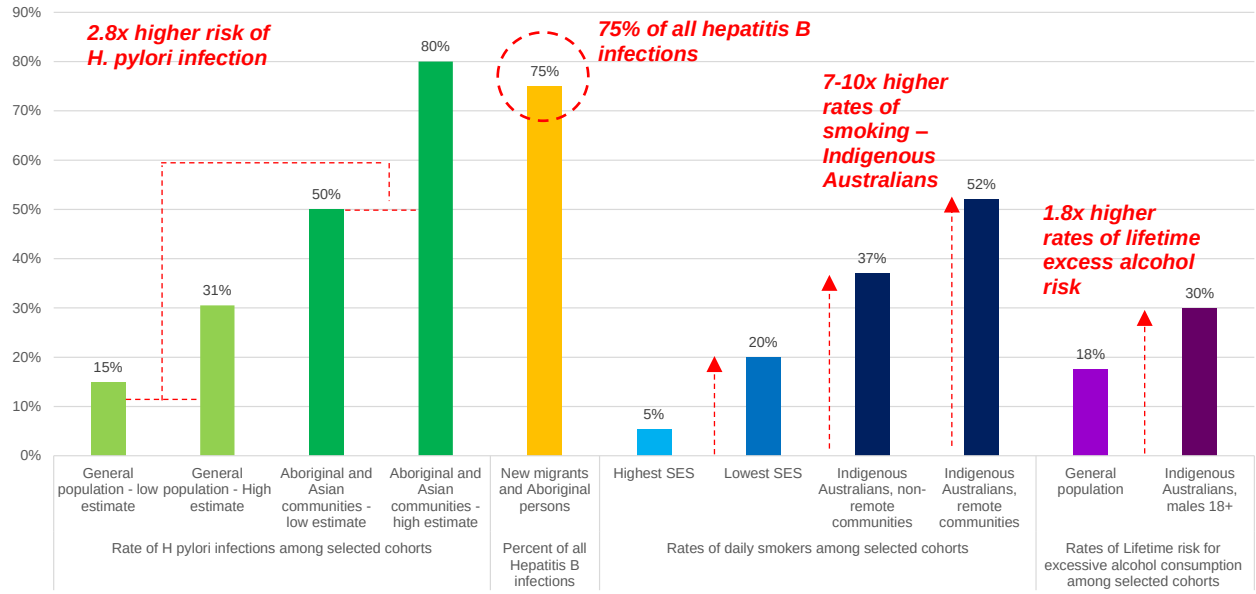
These cultural and social challenges often intersect and result in these communities experiencing higher rates of underlying risk for upper GI cancer. As a result, risks from tobacco use, alcohol consumption, infectious disease and obesity are all an order of magnitude higher for these communities, notwithstanding some improvements that have been realised over the past decade.

Data show that the risks for key at-risk people are disproportionately large (Figure 5.14):

- Aboriginal and Torres Strait Islander and Asian populations are 2.8 times more likely to be infected with Helicobacter pylori (H. pylori)
- New migrants and Aboriginal and Torres Strait Islanders account for 75 per cent of people with hepatitis B
- 8 in 10 new cases of Hepatitis C in Australia result from the unsafe injecting of drugs
- Rates of daily smokers is between 4 and 10 times higher for persons from low socioeconomic backgrounds, diverse cultural backgrounds and in regional areas.
- Lifetime risk from excess alcohol consumption is 70 per cent higher among Aboriginal males than the general population.

Combined with later and poorer engagement with health services, these communities also experience higher rates of cancer incidence and death from upper GI cancers.

Figure 5.14: Need for new models of care for at-risk



Source: Wise, M.J., Lamichhane, B., Webberley, K.M., 2019, A Longitudinal, Population-Level, Big-Data Study of Helicobacter pylori-Related Disease across Western Australia, Journal of clinical medicine, 8(11), 1821, doi: 10.3390/jcm8111821; Tay, A, et al., 2021, Helicobacteriology update, Microbiology Australia, 42, doi: 10.1071/MA21025; AIHW, 2021, Snapshot: Tobacco smoking; Tobacco in Australia, 2021, Prevalence of tobacco use among Aboriginal and Torres Strait Islander people; AIHW, 2022, Alcohol, tobacco and other drug use in Australia; MacLachlan, J.H., Smith, C., Towell, V., et al., 2020, Viral Hepatitis Mapping Project: National Report 2018–19; Healthdirect website, available: https://www.healthdirect.gov.au/hepatitis-c; McCulloch, K., Romero, N., MacLachlan, J., Allard, N., Cowie, B., 2020, Modeling Progress Toward Elimination of Hepatitis B in Australia, Hepatology, 71, 1170-1181, doi: 10.1002/hep.30899.

Stakeholders highlighted that these disparities warrant urgent development of new models of care which, for example, enhance community engagement (Figure 5.15).

It is noted that the scale of these reforms brings in broader considerations of public health and broader health service engagement, and there have recently been a refresh of national strategies focused on improved primary health services delivery and improving Aboriginal Health. In particular new models of care, such as voluntary enrollment models, whereby a patient is enrolled at a GP, contemplated by the Primary Health Care 10-year plan provides an example of a new model of care that may reduce the risk of key populations falling through the cracks.[281]

Furthermore, growing evidence indicates that telehealth and telemedicine is viewed as safe and effective.[282] Stakeholders indicated that telehealth presents an opportunity to reduce the barriers faced by at-risk cohorts. For example, telehealth:

- Provides an opportunity for dietary support of remote patients
- May enhance access to clinical trials via postal delivery of medicines
- Provides an opportunity to reach low socioeconomic patients who may face barriers to reaching appointments
- Could be supplement by in person and/or cultural appropriate nurse support in rural and remote areas or for Indigenous Australians.

In addition to and supporting these national efforts, there is an opportunity for new models of care to be considered as part of a National Hepatitis Strategy refresh, as well as to be developed through the Upper GI Cancer Research Mission. Stakeholders noted that adequate involvement of community groups who can actively engage at-risk groups is crucial in any appropriate review of models of care.

[281] Commonwealth of Australia (Department of Health), 2022, Future focused primary health care: Australia's Primary Health Care 10 Year Plan 2022-2032.
[282] Kaye, R., Rosen-zvi, M. and Ron, R., 2020, Digitally-Enabled Remote Care for Cancer Patients: Here to Stay, Seminars in Oncology Nursing, Vol. 36 No. 6, p. 151091

Figure 5.15: Urgent need for new models of care for at-risk groups – stakeholder perspectives

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You've got the GPs and you got the clinic staff, our GPs are fly in fly out, so they're not they 24/7 They fly in fly out. So they're not there. They might come once a week, once a fortnight or whatever. Okay. So system staff is made up of non Aboriginal nurses.

They've been removed, and then they've been put into an environment which is totally alien to them. And they haven't been talked about how things are, how to use things and how they benefit and also, the precautions. And so you get that sort of thing like overcrowding. [No one told them]: 'This is what happens when it happens when you have too many people.' 'This is what happens.' Nobody's done that. They've just been dumped. All of a sudden, and now they've been in this situation for decades.

And it takes time. Now I know that I can establish a rapport with my patients very quickly. Because I do that by identifying who I am and where my mother is from. And then I'm very informal with my pants. I'm very relaxed. I joke with them. I talk about their lives and try to encourage the traditional lifestyles, you know. They want to know if they can continue traditional treatments for themselves for the cancer and I always say yes but we need to check with the doctors too.

The issues are just so large… how are you supposed to go see a doctor if you don't have a car, or only have enough money to put food on the table?

The education I'm talking about, you know, is for the kids when they're in education, because you've got to start somewhere. But I think you need to start from both sides of the scales. You need to start doing the coding these kids and you need to educate and educate – not re-educate because it's never happened in my view. And adults. Yeah, you know, you need to have two separate things going on [to support better health outcomes]. And then and I kids need to be informed about just basic human anatomy, how things work.

I'm seeing that lots of patients from low socioeconomic groups are not aware of diet… they might say they are able to eat puree but they are only eating broth. Many patients I've worked with really struggled to fill out food diaries…

When you're thinking about Aboriginal Torres Strait Islander populations, there's a whole other layer of explaining information and tools, like, metaphors and analogies, that are needed. It's a different way of presenting information.

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Efforts must be codesigned with the sector… you need appropriate consultation… need to sit with people who are impacted… that's the level of understanding needed… there's a lot of well meaning people who do not consult Indigenous people. It has to be meaningful engagement.
It's important that care is culturally important and sensitive. There's a large opportunity to involve community in the care in whatever way that's delivered. Community members have found have found it incredibly helpful when aspects of care have come from the hospital and met them in the community.
So if there's any way that we can break down that sort of barrier, the reminders of the system that some people don't feel works for them… if we break that down in some way, I think that's a really great way. This can be done through Aboriginal Liaison Officers, who are like gold [valuable]. Early involvement of them in any which way is helpful.
Non English speakers find it extremely difficult to navigate and fill in different forms. Welfare, insurance and broader support are difficult for people who do not speak English.
People already feel quite overwhelmed… aren't used to the culture, the language… if you add in the clinical trial with all its requirements… it becomes overwhelming. So it can be more difficult to recruit these populations especially when they have little background in the areas.
Emotion support faces large stigma… emotions are just not a thing you talk about in this [Chinese] culture… it is extremely difficult to fix if people are not willing to engage. Advanced care planning if also very difficult – its viewed as almost equivalent to cursing them to die – it is quite taboo.
The smart GPs and the smart specialist know that if they have a patient sitting in front of them, who is a recent immigrant to Australia and his wife from one of those hotspots, they do then do a scan for hepatitis, just to see whether that's an issue
CALD groups are the elephant in the room… we've got a lot ahead of us in that regards. They simply don't receive any support… or very limited support… when it comes to clinical trials, they miss out on opportunities… they're disadvantaged in so many ways… we don't have specific tools to help them… even the workforce has limited language skills, then adding interpreters adds complexity (and getting them)…
Research in general sense is seen positively generally. But then when you move to a patient from a Chinese background, they think about research as experimentation because that is the literal translation in Mandarin, it is hard to translate clinical trials and research across… it becomes similar to experimentation.
Often it's a it's a one thing on top of a whole other bunch of other things. In particular, in some of those groups, you're talking about, you know, if you're homeless then that 'is my biggest thing'.
In people coming for their cancer to be treated at the hospital, we tend to isolate them out, we isolate their cancer out and we isolate them out from their whole system of usual stuff. I think that it's a very helpful thing to reposition people back in their system. And to emphasise that system and formally recognise the system when you talk to carers and people with cancer. There needs to be a bit more acknowledgement of the person within their whole community.

5.5 Review options to improve education and awareness

Upper GI cancer patients face barriers to optimal outcomes which stem from patient and healthcare professional education and awareness, including:

- Limited knowledge of risk factors and red flags, by patients and GPs
- Limited knowledge of how the healthcare system works
- Stigma and misunderstanding of the benefits of clinical trials.

A review is warranted to identify how to best:

- Improve primary health professional recognition of signs and symptoms of cancer generally and upper GI cancers specifically
- Improve general practitioner understanding of appropriate initial investigations
- Improve the timeliness of referrals to an appropriate specialist
- Improve healthcare practitioner knowledge of available treatment, support services and build their confidence in exploring these with patients
- Address stigma relating to clinical trials among high-risk groups
- Improve knowledge of healthcare system among high-risk groups.

This review may also consider complementary infrastructure changes which support improved outcomes. Possible options for improved outcomes were identified in literature and by stakeholders and are summarised in the table below.

Table 5.2: Sample of identified options to improve education and awareness

Option	Description
Mass media campaign	Mass media campaign using mixed forms of media. Focus may include risk factors and symptoms. Risk factor awareness may promote reduction in risky behaviours. Symptom awareness may promote increase in referrals for upper GI cancers, which may lead to earlier detection. UK Be Clear on Cancer Campaign saw an 84 per cent increase in urgent referrals for suspected upper GI cancer, however, there were no sustained periods where number of cancers diagnosed exceeded expectations (Lai et al, 2020). Concern may be that a broad campaign regarding symptoms may lead to unwarranted worry within the community (relatively low incidence).
Targeted awareness raising	Provide targeted awareness and education to at-risk cohorts. For example, add labels to reflux medications mentioning risk of oesophageal cancer, and empower pharmacists to inform patients of risks.
GP risk factor education and training	Train GPs to discuss risk factors with patients, especially in contexts of stigma. These options must be developed with consultation from relevant communities.
GP high-risk group education and training	Train GPs to discuss symptoms and risk factors with patients from high-risk groups, which include culturally diverse backgrounds and Indigenous Australians. These options must be developed with consultation from relevant communities.
Primary health professional pathway education	Educate primary health professionals of symptoms, risk factors and referral pathways for upper GI cancers, and screening criteria for liver health. Ensuring GPs understand red flag symptoms and risk factors promotes early detection and secondary prevention, which can lead to benefits (Jeffrey et al., 2020).
Health care professional treatment and care education	National approach to education on available treatments (such as immunotherapies) to ensure provision of best available service, especially given rapid developments.

5.6 Establish systems for rapid and informed specialist referral

Referral patterns vary by practitioner or centre, depending on characteristics such as location and experience. This creates the view that patients are spinning a 'roulette wheel' in terms of the services they receive. Services vary with regards to multiple aspects, including:

- Time to GP referral
- Time to appropriate specialist
- Quality of services provided by specialist.

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The relatively low incidence of upper GI cancers presents a fundamental challenge to general practitioner provision of high quality referrals. While education can promote appropriate referral, a technological solution using systems for rapid and informed specialist referral will provide a more systematic approach to provision of high quality referrals.

The benefits derived from a system for rapid and informed specialist referral relate to reducing the burden placed on general practitioners and improved quality and timeliness of referrals provided by healthcare practitioners. A data-driven system is also compatible with patterns of increasing health care practitioner use of and preference for technological solutions.[283]

5.7 Conduct a review of endoscopy services in each state and territory to improve timeliness and quality of care

A review of endoscopy and gastroscopy services is warranted. Gastroscopy services within the public sector often exceed timelines recommended under the optimal care pathway for oesophagogastric cancers. Simultaneously, stakeholders raised concern regarding availability of endoscopic ultrasounds in Australia, with limited skilled practitioners and infrastructure constraints.

Critical to this review is the availability of high quality data pertaining to wait times of patients for endoscopies. This data should be included within the national quality of care and patient outcomes dataset.

The review would build upon findings from the Australian Commission on Safety and Quality in Healthcare, with focus on:

- Variations in wait times for gastroscopy and diagnostic endoscopy of patients with symptoms of upper GI cancers
- Optimal triage criteria and waiting times given symptoms of upper GI cancers, with consistency across optimal care pathways and health department targets
- Levels of and distribution of demand for endoscopy services
- Levels of and distribution of supply of infrastructure for endoscopy services.

Box 5.2: Recommendations from Australian Commission on Safety and Quality in Health Care

The Commission recommended that:

- State and territory health departments develop and implement evidence-based triage criteria for the prioritisation and allocation of patients to gastroscopy, colonoscopy, and gastroscopy performed with colonoscopy.

[283] Indegene, 2021, The Digitally-Savvy HCP Learnings to Engage HCPs Around the World More Effectively and Efficiently.

- Health service organisations:
  - Audit clinicians performing endoscopy services and provide the results back to clinicians to act upon, in line with Action 1.28 of the National Safety and Quality Health Service (NSQHS) Standards
  - Incorporate individual clinicians' audit data as part of re-credentialing processes
  - Report key performance indicators, trends and adverse events in endoscopy to the governing body, consistent with the NSQHS Standards.
- The Gastroenterological Society of Australia develop a position statement on the appropriate use and timing of gastroscopy, and of gastroscopy performed with colonoscopy, for gastroenterologists and general practitioner.

Source: Australian Commission on Safety and Quality in Health Care, 2021, Fourth Australian Atlas of Healthcare Variation.

It would assess options for addressing issues pertaining to quality of endoscopy in the public sector and analyse the costs and benefits of each. Preliminary options, which are not mutually exclusive, include:

- GP and patient education to promote appropriate levels of demand for gastroscopy through appropriate information about risks
- Improved triage criteria
- Modifications to guidelines for surveillance of Barrett's oesophagus
- Increased supply of trained professionals for services with shortage
- Increased supply of infrastructure for services with shortage
- Investigate possibility of improved technologies for increased accuracy of diagnostics (for example, artificial intelligence).

5.8 Establish a quality framework for upper GI cancers, enabled by a national cancer data ecosystem and the Upper GI Cancer Registry

The consistent implementation of clinical best practice has been shown to improve survival and quality of life for patients. Even still, unwarranted variation in clinical practice persists.

Three actions are available to improve adherence to clinical best practice:

- Close gaps in the availability of data through the development of a national cancer data ecosystem, including an upper GI cancer registry
- Establish a complete definition of best practice through the development of OCPs and minimum standard clinical guidelines for all cancers
- Implementing a performance management framework through the development of a clinical care standard for upper GI cancers.

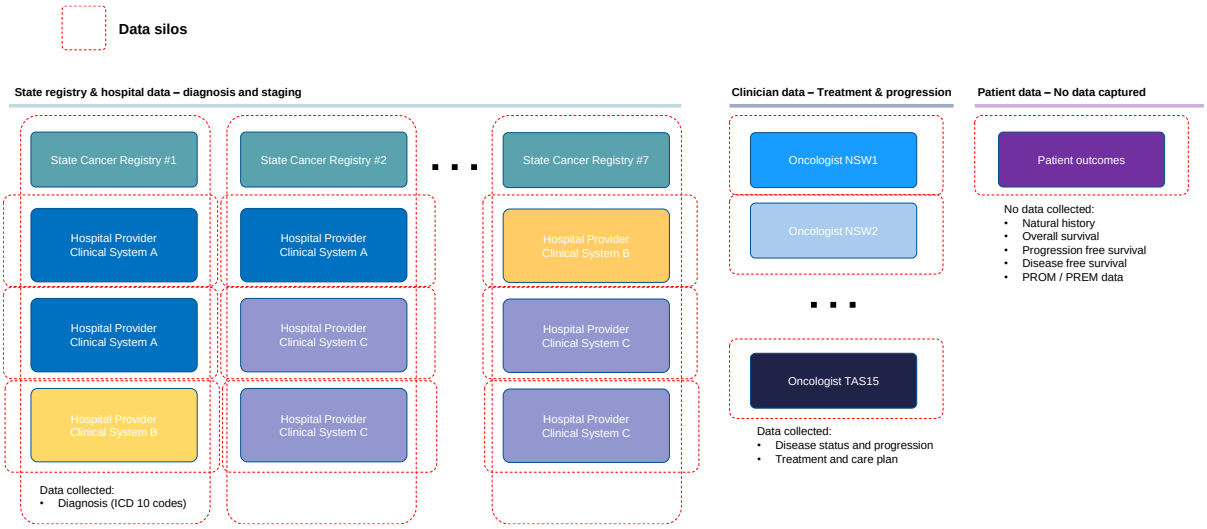
Establish a national cancer data ecosystem and nationwide Upper GI Cancer Registry

'If you can't measure it, you can't manage it', is an old business adage that has been applied to effectively every sector of the economy – but surprisingly, not cancer care. Many Australians would be surprised to know there is no national dataset available to enable continuous improvement in safety and quality in cancer care.

Currently, data are stored in range of clinical system silos, including electronic health records, disease registries, clinical quality registries, pharmacy data, observational data and patient-level surveys of Patient Reported Outcomes. For example:

- Every state has a cancer registry, which are required to collect information according to the national minimum dataset but which are at dramatically varied states of maturity with significant variance in data accuracy
- Every hospital in Australia must report a patient's cancer diagnosis to the relevant state-based registry, including disease stage, but these data are not in practice systematically captured and reported
- Clinicians document a patient's genetic profile and family history, treatment plan, and disease progression, but even within a single state clinical systems are not fully integrated and most are purchased from international vendors which limit systems modification.

Figure 5.16: Data silos in cancer care impede research and adherence to best practice care



This *ad hoc* and duplicative approach to data collection impedes a national research agenda and enables variability in cancer care.

Figure 5.17: Current practice as identified by stakeholders

This gap is being addressed in part through the development of the Upper GI Clinical Quality Registry (UGICR) at Monash University:

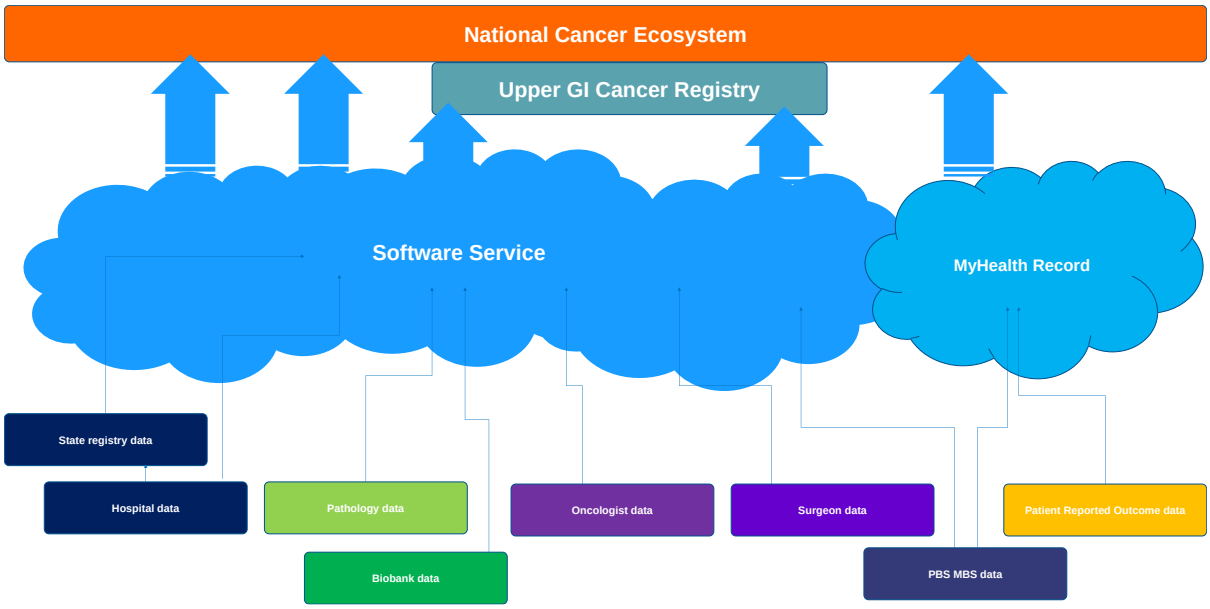
> *The UGICR is designed to describe patterns of care following diagnosis of primary cancers of the pancreas, oesophagus, stomach, liver, and biliary system. The aim of the registry is to identify variation in treatment and outcomes of patients with upper gastrointestinal cancers, with a view to improve patient outcomes and quality of care.*

The Upper GI Cancer Registry (UGICR) represents important national infrastructure aimed at addressing this fundamental barrier to improving treatment and care in upper GI cancers. The UGICR is limited, however, to participating institutions in Victoria and NSW, which leaves out important elements of Australia's health care system.

Investment is urgently needed to develop a complete dataset through the development of a National Cancer Dataset and complete clinical quality dataset through the UGICR.

Historically, this would require significant investment in infrastructure to achieve linkage to all data sets and enable a unified clinical record. Today, however, new software technologies have the potential to virtually connect these systems through software service layers.

Figure 5.18: Establish a national cancer data ecosystem, complete upper gastrointestinal cancer registry to understand patterns of care and improve outcomes for patients



Technologies like clinical and research information exchange platforms can allow clinicians and researchers to share de-identified data to enable clinical and evidence-based research to support better patient care outcomes. Moreover, the MyHealth Record provides the foundational infrastructure to follow the patient from diagnosis through clinical trials, hospitals and specialist care settings.

Developing a National Australian Cancer Dataset would involve:

- The development of a shared cancer record for cancer patients, potentially leveraging the MyHealth Record functionality
- A software service to link source systems and report data into a National Cancer Dataset
- A clinician portal for clinical staff involved in delivery of care to cancer patients
- Tools to enhance the delivery of multi-disciplinary meetings by tumour streams
- A research portal for cancer researchers to access research information and gain access to collaboration tools
- A data governance model and data profile to enable implementation of a cancer research information exchange.

Technically, these solutions are mature and ready to be implemented. Importantly, Australia does not need to develop these technologies, rather, it should work with 'off-the-shelf'

technologies already in use overseas. For example, the National Cancer Institute (NCI) in the US is utilising advanced software services to develop a National Cancer Data Ecosystem (Figure 6.12).

Box 5.3: The National Cancer Institute (NCI) National Cancer Data Ecosystem

NCI is developing a National Cancer Data Ecosystem to enable and encourage all participants across the cancer research and care continuum to share, access, combine, and analyse diverse data, increasing the potential for new discoveries and reducing burden of cancer.

The Cancer Data Ecosystem will be supported by a cloud-based infrastructure and will feature interactive portals that give users access to these data and allow for in-depth data analysis. This infrastructure will enable researchers, patients, and clinicians to incorporate their own data, fostering collaboration and advancing discoveries that improve our understanding of the mechanisms driving cancer – ultimately leading to more informed treatment choices and better patient outcomes.

The National Cancer Data Ecosystem is underpinned by the NCI Cancer Research Data Commons, which is a virtual data science infrastructure that connects cancer research data collections with analytical tools and can be used to store, analyse, share, and visualise cancer research data. The Cancer Research Data Commons includes:

- The NCI Genomic Data Commons, which is a resource for sharing genomic and clinical data to create a more complete understanding of genetic drivers of cancer
- The Proteomic Data Commons, which is a resource for sharing and analysing proteomic data. The PDC is populated with data from the Clinical Proteomic Tumor Analysis Consortium program and will grow to include other data sources over time
- The Imaging Data Commons, which will be a resource for sharing and analysing multi-modal imaging data from clinical and basic cancer research studies. The IDC will build on Google-provided tools such as BigQuery and the Google Healthcare API.

NCI Cloud Resources infrastructure capabilities will allow researchers to access and analyse large-scale genomic, proteomic, and imaging data in the cloud using a variety of analytic tools and pipelines, without the need to download data to their local computer. The Cloud Resources provide researchers with secure workspaces, where they can store the results of their analyses, and optionally share them with other scientists, to foster greater collaboration and new discoveries.

Ultimately, NCI's CRDC infrastructure and related resources will allow researchers, clinicians, and patients to share important data and resources to advance cancer research.

The Enhanced Data Sharing Working Group has recommended the development of this ecosystem within 1-5 years.

Source: Cancer Australia website, available: https://www.cancer.gov/research/key-initiatives/moonshot-cancer-initiative/implementation/data-ecosystem; https://datascience.cancer.gov/data-commons/cloud-resources; and Enhanced Data Sharing Working Group Recommendation: The Cancer Data Ecosystem, pp 6674.

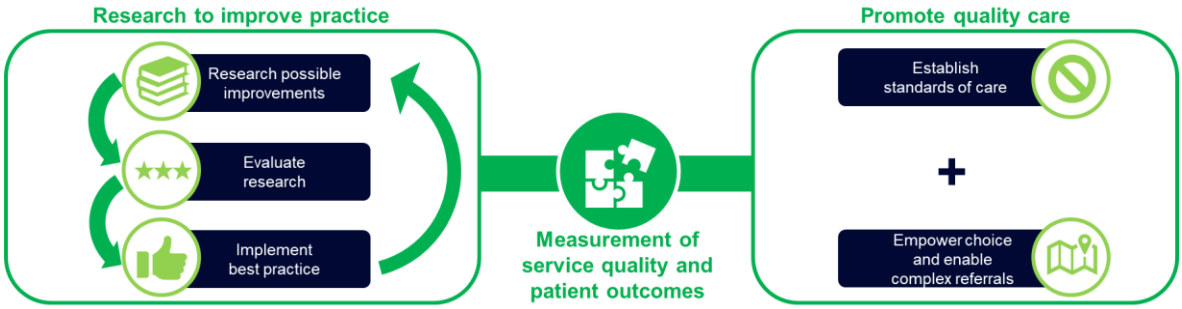
The cost of the technical systems does not represent a significant barrier. Stakeholder consultations indicated the software services could be expected to involve a capital cost in the order of $20 million, and an operating cost substantially less than this. These are high-level estimates, which would require a full feasibility study and business case to properly cost; nevertheless, in the context of total cancer care, which was estimated to cost in the order of $10.1 billion in 2015-16 alone,[284] this represents a tiny fraction of the cost of care.

With data developed, a continuous approach to implementing and improving upon best practice can be implemented:

- Define best practice and reduce barriers to patients seeking best practice care
- Minimum standards to limit patients 'falling through the cracks'
- Improve upon best practice care, and refine minimum standards.

[284] Health system expenditure on cancer and other neoplasms in Australia, 2015–16, Summary - Australian Institute of Health and Welfare (aihw.gov.au)

Figure 5.19: Future practice, powered by data



Depending on the growth rate of cancer care expenditure over the FY2016 and FY2035 period, between $137 billion and $225 billion will be expended on cancer care in total over the 2023-2035 period. If only one per cent of care ($1.3 billion in expenditure over the 2023-2035 period) was inefficient and could be improved through a better understanding of clinical best practice, this would generate a benefit cost ratio (BCR) of 12:1, even allowing for $50 million with $5 million in operating costs growing at five per cent per annum to be spent on the establishment of a National Australian Cancer Dataset. Moreover, this is based on health services utlisation costs alone, and does not consider the very significant improvements in lives saved, which would enable people to potentially return to work or participate in their communities in non-paid roles, or the potential quality of life improvements that would stem from best practice care.

This is consistent with other research that has shown the development of datasets to inform and improve health service delivery can deliver substantial net benefits to the community (Table 5.2).[285]

Table 5.3: Benefits from clinical quality registries

Registry	Net Benefit	Benefit Cost Ratio
Victorian Prostate Cancer Registry (Victorian PCR)	$2.4 million	2:1
Victorian State Trauma Registry (VSTR)	$30 million	6:1
Australia and New Zealand Intensive Care Adult Patient Database (ANZICSAPD)	$26 million	4:1
Australia and New Zealand Dialysis and Transplantation Database (ANZDATA)	$49 million	7:1
Australian Orthopaedic Association National Joint Replacement Registry (AOANJRR)	$53 million	5:1

Source: The Australian Commission on Safety and Quality in Health Care, 2016, Economic evaluation of clinical quality registries: Final report.

The major challenge to implementation would relate to agreeing a model for data governance, which would provide for the ethical use of personal data to support the broader public interest, and covers:

- Raw data collection
- Cleansing and managing the data
- Linkage and aggregation

[285] ACSQHC website, available: https://www.safetyandquality.gov.au/our-work/health-and-human-research/national-arrangements-clinical-quality-registries.

- Access and use of the data.

This is a core, national service that should be delivered as part of the Australian Cancer Plan with an ambitious 5-year target for operations.

Define best practice care through OCPs and clinical guidelines

For best practice care to be promoted, it must be defined. This is the role of optimal care pathways and clinical guidelines, which serve to enable patients and clinicians to have a shared understanding of best practice timelines, treatments and supportive care services. To date there is no optimal care pathway (OCP) for biliary cancer, and no formal guidelines for stomach, oesophageal or biliary cancers.

Box 5.4: Examples of best practice care

Standardised imaging of liver cancer: Liver cancer is currently diagnosed, staged and managed based on imaging findings without the need for invasive tumour biopsy. The current gold standard for reporting solitary or multiple liver lesions uses the Liver Imaging Reporting And Data System (LI-RADS) system. LI-RADS standardises terminology, technique, interpretation, reporting, and data collection of liver imaging in patients at-risk for or with HCC and addresses the entire spectrum of lesions and pseudo-lesions. In Australia, only a minority of radiology reporting of liver lesions uses the LI-RADS system. Universal reporting using LI-RADS for liver lesions at high-risk, or with HCC should be the standard for reporting across all imaging practices in Australia.

Precision medicine: Clinical decisions for best outcomes in cancer rely heavily on precisely assessing patient risk. Rapid advances in genomics medicine (gene expression, copy number, methylation and mutation data, structural variants and Indels), bioinformatics, and quantum decreases in cost of these frontier technologies means that they have the potential to radically impact patient management and improve outcomes, particularly for low survival GI cancers. With this in mind, systems, policies, and procedures to standardise tumour sample collection, preparation, storage and retrieval should be developed to allow patients to benefit from these emerging technologies and to enable the delivery of precision medicine at the clinic level.

There is evidence that clinical guidelines deliver benefits. For example, a review of EU studies suggests that there is moderate certainty that adherence to breast cancer guidelines is associated with an improved survival, prompting the conclusion that guidelines should be rigorously implemented in the clinical setting.[286]

Australia should identify a peak national body to develop, maintain and promote the use of clinical guidelines nationally to reduce unwarranted variation and improve the consistent delivery of quality treatment and care. Guidelines should be 'living' and administered by a party which can ensure that information remains both up to date and accurate.

Define a clinical care standard to ensure adherence to clinical best practice

Clinical care standards go beyond clinical guidelines to promote adherence to best practice care.

Clinical care standards are the mechanism by which quality frameworks for care are established in Australia and play an important role in reducing unwarranted variation in clinical practice. Clinical care standards define the minimum care people should expect to be offered or receive, regardless of where they are treated in Australia.[287] Clinical Care Standards are evidence-based and incorporate performance indicators to drive quality and safety improvements across healthcare settings.

[286] Ricci-Cabello, I., Vásquez-Mejía, A., Canelo-Aybar, C., et al., 2020, Adherence to breast cancer guidelines is associated with better survival outcomes: a systematic review and meta-analysis of observational studies in EU countries, BMC Health Serv Res, 20(920),doi: 10.1186/s12913-020-05753-x.
[287] Australian Commission for Safety and Quality in Health Care, 2021, Clinical Care Standards, available at: https://www.safetyandquality.gov.au/standards/clinical-care-standards.

At present, there are a range of clinical care standards that have been developed in Australia and are in use; these include:

- Acute Coronary Syndromes
- Acute Stroke
- Antimicrobial Stewardship
- Colonoscopy
- Delirium
- Heavy Menstrual Bleeding
- Hip Fracture
- Osteoarthritis of the Knee
- Management of Peripheral Intravenous Catheters Clinical Care Standard
- Third and Fourth Degree Perineal Tears
- Venous Thromboembolism Prevention.

In addition, clinical care standards are in development for acute anaphylaxis, cataracts, low back pain and sepsis.

No clinical care standard has been developed for any cancer to date, despite cancer accounting for the greatest disease burden of all health conditions in Australian communities today based on the Australian Institute of Health and Welfare's most recent Burden of Disease study.[288]

To reduce variation in clinical practice and survival outcomes observed for Australian upper GI cancer patients, it is critical that a clinical care standard is developed for upper GI cancers. This clinical standard could build on the work of Upper GI Cancer Registry (UGICR) and ideally incorporate indicators for quality, including:

- Requirements for multidisciplinary team (MDT) reviews
- Discussion of supportive care as a standard of care
- Discussion of clinical trials as a standard of care
- Minimum standards for palliative care
- Other value-based care metrics (PROMs/PREMs).

5.9 Invest in workforce development

Although an adequately resourced workforce is needed to enable provision of high-quality care and to enable improvements into the future, workforce skill shortages exist. Furthermore, efficiency gains are presently missed due to limited implementation of technologies and failure to support health care practitioners to work towards the full scope of their capability or licence. It follows that workforce development is needed to overcome present shortages and to future proof the healthcare system.

[288] AIHW, 2020, Burden of Disease, Australia's Health 2020, accessed at: https://www.aihw.gov.au/reports/australias-health/burden-of-disease.

A rigorous approach should be undertaken to identify feasible options for workforce development, supported by supply and demand projections and comprehensive consultation to manage concerns regarding risks and benefits of change.

Opportunities identified by stakeholders in the development of this report include:

- Education of primary health care professionals regarding risks and symptoms of upper GI cancers
- Collaboration with primary health and community health professionals to better educate and raise awareness within the community
- Development of accredited training pathways for capability gaps, including in nursing and palliative care
- Continued professional development for emerging capabilities in contemporary cancer care, and enhanced opportunities for career progression especially for nurses
- Support for current cancer care professionals to work to the full scope of their capability or license
- Support for multidisciplinary and interdisciplinary collaboration, through training and infrastructure development, including for enable multidisciplinary care in rural areas and real time consultation between health care practitioners
- Implementation of strategies leveraging technologies to overcome disadvantages faced by rural, Indigenous Australia, culturally and linguistically diverse and low socioeconomic groups, including telehealth (paired with appropriate support)
- Development of a culturally accessible workforce, such as through use of interpreters, cultural education, and partnership with community organisations.

Stakeholders also highlighted an array of opportunities to develop the research workforce. For example, through the provision of programs to attract early researchers (such as Pancare's Early Career Research Mentoring Program) and to retain mid-level researchers (such as through increased available of grants).

Box 5.5: Pancare Foundation's Early Career Research (ECR) Mentoring Program

Why

With an ageing population and workforce, it is imperative that Australia invest in building a sustainable medical workforce capable of meeting the needs of patients with cancers in the future. The inherent challenges of diagnosing and treating complex upper GI cancers call for a highly specialised workforce of medical specialists and researchers. Pancare is committed to supporting early career scientists to ensure upper GI patients and carers have access to world class treatments and therapies. Pancare is determined to reverse the brain drain that sees our science graduates leaving this country to work abroad. To this end Pancare are investing financial and mentoring support to a wide range of early career researchers across rural and regional Australia.

How

Pancare supports early career research scientists to find new ways to diagnose and treat complex upper GI cancers. By seed funding upper GI cancer research Pancare provide opportunities for young scientists to build careers in upper GI research and treatment.

Pancare's Early Career Research mentoring program is also helping scientist around Australia to build professional networks, to attend international conferences, publish peer-review research papers and to learn how to translate complex scientific information into language accessible to patients and carers.

Runs on the board

Dr Samantha Wade, from the University of Wollongong and Illawarra Health and Medical Research Institute (IHMRI) received Pancare sponsorship for her pancreatic cancer research into treatments to reduce tumour volume in pancreatic cancer.

The Early Career Research mentoring program from Pancare came at a critical point in Sam's career, enabling her to undertake preclinical studies of a novel solid tumour chemotherapy delivery system which she had developed within her PhD studies. These preclinical studies have paved the way for the adaptation of new technologies for other cancers and are providing the evidence for future clinical trials. Her pioneering and innovative work has been widely acknowledged. She was named the NSW Young Woman of the Year in 2021 and has gone on to publish her research in the prestigious peer review journal Advanced Healthcare Materials with an Impact Factor of 9.93. Her ground-breaking research is contributing to improving the prognosis for patients diagnosed with pancreatic cancer.

Source: Pancare Foundation

Supporting the development of a health workforce in cancer generally, as well as specialist upper GI service and research skills specifically, is a high priority to facilitate improvements in quality of life in the short run and step change improvements in survival over the longer term.

5.10 Conduct a review of service delivery in Upper GI Cancers to strengthen best-practice treatment

Stakeholders and data analysis highlighted various issues pertaining to service configuration in Australia:

- Low volumes persist despite volume outcome relationship for oesophagogastric cancer surgery
- Inconsistent use of MDTs despite recognised importance, continued low quality care
- Patients have inconsistent access to clinical trials.

Domestically and internationally, evidence of a potential benefits from service configuration have justified varied approaches to consolidation, e.g., regarding definition of 'high volume' and whether figures are legally enforced. For example:

- In the UK centralisation was implemented in 2001 requiring at least 100 procedures annually
- In the Netherlands centralisation was implemented from as early as 2006 (presently 20/year/hospital)
- In the US the Leapfrog Group recommended patients visit centres performing at least 20 oesophagectomies
- CI NSW published the names of hospitals servicing more than six surgeries per year.

Table 5.4: Global centalisation efforts for various cancers

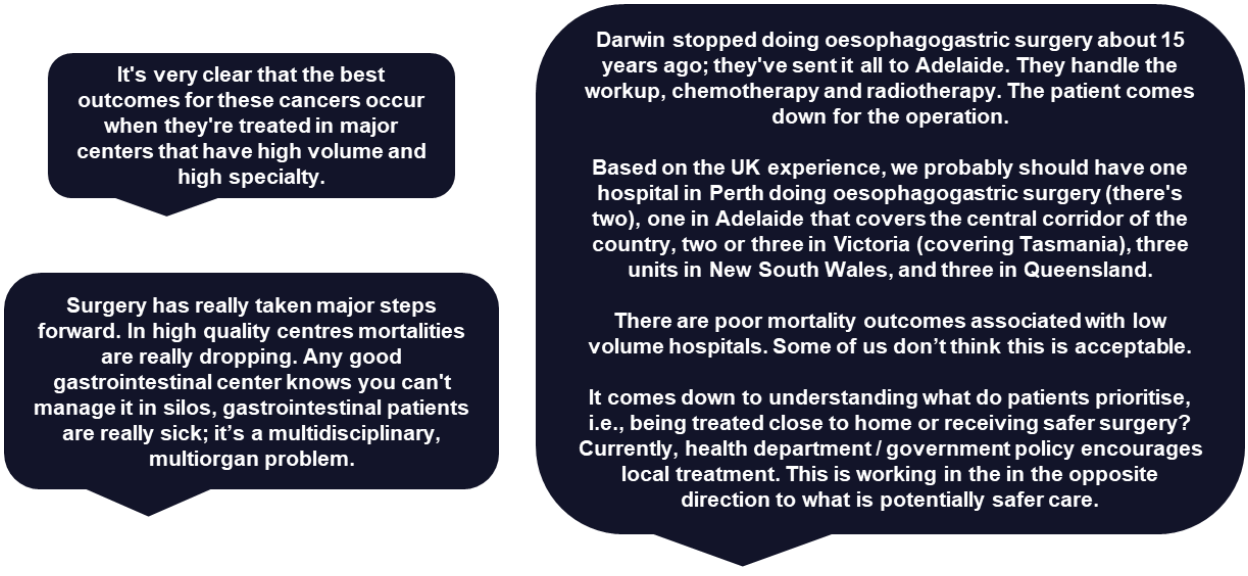
Country	Esophagus	Pancreas	Liver	Rectum	Surgeon Volume	Legally Enforced
Austria	10	10	10 (20 [2018])	10 (15 [2018])	ND	Yes
Belgium	ND	ND	ND	ND	ND	
Czech Republic	ND	ND	ND	ND	ND	
Denmark*	80–100	>100	>200	>120	ND	
England (UK)*	60	80	150	ND	Defined	
Finland	ND	ND	ND	ND	ND	
France†	30	30	30	30	ND	Yes
Germany	10	10	ND	ND	ND	Yes
Greece	15	20	30	ND	ND	
Hungary	10	20	30	20	ND	
Ireland*	ND	ND	ND	ND	ND	
Italy	20	50–100	20	50	ND	
Norway*	10	10	20	20	ND	
Poland	ND	ND	ND	ND	ND	
Portugal	20	20	20	20	ND	
Romania	ND	ND	ND	ND	ND	
Spain	6	11	11	15	ND	Yes
Sweden*	ND	ND	ND	ND	ND	
Switzerland	10	10	10	10	ND	Yes
The Netherlands	20	20	20	20	ND	Yes
Canada	7	20	50	ND	ND	
USA**	20	20	ND	15	Defined	

*Not based on minimal numbers but defined catchment areas/health care regions; Denmark, England, and Norway have additionally secured minimal numbers.
†In France, minimal number of 30 procedures in total for cancer irrespective of the location.
**According to the Leapfrog Group.
ND indicates not defined.

Source: Vonlanthen, R, et al., 2018, Toward a Consensus on Centralization in Surgery, Annals of Surgery, 268(5), 712-724, doi: 10.1097/SLA.0000000000002965.

Numerous stakeholders indicated that the volume outcome relationship observed for oesophagogastric cancer surgery warrants consistent policy change across Australia. Despite Australia's geography, stakeholders suggested an approach which specifically requires surgery to be undertaken in high volume centres would be acceptable.

Figure 5.20: Need for service consolidation – stakeholder perspectives



Stakeholders highlighted that this approach is already implemented in Darwin, whereby patients receive surgery in Adelaide and all other treatments and diagnostics locally. This was implemented 15 years ago, before the recent rise in telehealth as a model of care.

While there is general confidence in the need for consolidation of oesophagogastric surgery, discussion indicated variation in the:

- Optimal extent of consolidation needed; for example, surgery alone, surgery and multidisciplinary team, genomics, and other services

- Minimum number of cases offered by a consolidated service; the current benchmark for surgery is currently six cases per year
- Ideal approach to promoting configuration, including legally enforced via minimum standards, or through clear communication for the purpose of referral.

It follows that there is an opportunity to:

- Develop indicators of service volumes at hospitals performing upper GI cancer
- Undertake a review of options for improving the safety and quality of specialised upper GI cancer services:
  - Review options for promoting access to high quality services, including through accreditation of highly specialised services (hospital, surgeon basis), as well as collaboration with external non-clinical service providers
  - Develop evidence of optimal number of surgeries per hospital, surgeon and year.

5.11 Improve access to novel treatments and diagnostics

While combined upper GI cancers account for a large number of new diagnoses of cancer in Australia each year, individually these cancers are relatively rare, which can limit commercial incentives for the development of novel diagnostics and therapies, as well as incentives for enabling access in Australia through clinical trials and listings on the Medical Benefits Schedule and Pharmaceutical Benefits Scheme. As a relatively small country by population size, Australia must ensure its regulatory frameworks are efficient and incentise listings that improve appropriate access to new technologies.

There are a number of regulatory reviews underway or recently concluded that are focused on improving the competitiveness and attractiveness of Australia to bring new clinical trials and technologies to this market. These include the Zimmerman Review recommendations made in 2021, the Review of Health Technology Assessment which is currently in development, and clinical trials reforms being assessed and implemented by the Australian Commission for Safety and Quality in Health Care:

- *Improving routine access and pathways for novel therapies and diagnostics with the implementation of Zimmerman Review* — In 2020, a House of Representatives Inquiry, known as the Zimmerman Review made a series of recommendations, which looked at the approval processes for new drugs and novel medical technologies in Australia. The Review called for significant reforms to improve the timeliness and access to novel diagnostics and therapies, including recommendations for the establishment of a Centre for Precision Medicine and Rare Diseases, a National Genomics Testing Program, an Office of Clinical Evaluation, a Breakthrough Devices Program, and an annually capped fund with clear and transparent eligibility rules to provide funding for applications by patients, clinicians and non-profits, where there is no realistic prospect of a company serving as a sponsor. The review also called for a range of other reforms aimed at addressing disincentives for listing such as submission fee waivers, funding for submissions without a sponsor, a review repurposing of drugs, molecular indication listings, among other reforms. This suite of reforms would address the long barriers to access experienced by upper GI cancer patients and their families.

  The health technology assessment (HTA) review will build on the recommendations of the Zimmerman review, with a detailed focus on improving timeliness and access to novel diagnostics and therapeutics.

- *Improving access through rapid clinical trials reforms* — The Australian Commission for Safety and Quality in Health Care has been engaged by the

Australian Government Department of Health, in partnership with all jurisdictions via the Clinical Trials Project Reference Group, to conduct consultations to develop the requirements and specifications of the National One Stop Shop for health-related human research approvals and the National Clinical Trials Front Door.

The rapid implementation of these reforms to improve access to novel technologies is particularly important in upper GI cancers where significant innovation is needed to improve outcomes.

5.12 Develop a National Consumer Navigation Service and ensure nationally equitable access to nurse support

Upper GI cancer patients and carers have high supportive care needs. However, patients frequently do not feel empowered in treatment and care, often report poor understanding of the availability of supportive care services and lament late access to support services. As one respondent to the Patient and Carer survey stated:

> *I cannot believe how people with stomach cancer aren't better supported. Chemo nurses are good, but they don't know the ins and outs of my cancer. Doctors didn't know much either, we had to figure a lot out for ourselves.*

The challenges of navigating the health system following a cancer diagnosis are not unique to upper GI cancers; all patients and families face life changing decisions regarding their treatment and care, and having access to the right information in a timely way can significantly improve patients' and carers' experience, quality of life and health services utilization. For example, analysis by HMA on behalf of All.Can Australia found net savings arising from an All.Can cancer care navigator service of $46 million in 2019-20,[289] as access to better information can enable better management of symptoms and side effects, leading to fewer hospitalisations and adverse outcomes for patients. This has been observed in upper GI cancers, too: the introduction of timely referrals to dietitican services on the day of presentation at a Gold Coast hospital saw a 70 per cent reduction in the number of feeding tube insertions. Consumer Navigation services and equitable access to nurses are a mission critical service to ensuring patients and carers do not fall through the cracks and effectively navigate to the right services. This would build on the development of the Optimal Care Plans, which are important patient tools but have been reported to have low take-up by clinicians.

It follows that there is an opportunity to develop a more systematic, National Consumer Navigation Service and equitable access to nurse support as part of the Australian Cancer Plan, which would provide a triage based support service for all cancers, including upper GI cancers. An appropriately defined and nationally consistent approach to consumer navigation and equitable access to nurse support has an array of potential benefits, including:[290]

- Improve the timeliness of diagnostic resolution and care
- Improve healthcare service effectiveness and efficiency, leading to fewer hospitalisations, emergency department visits and intensive care admissions

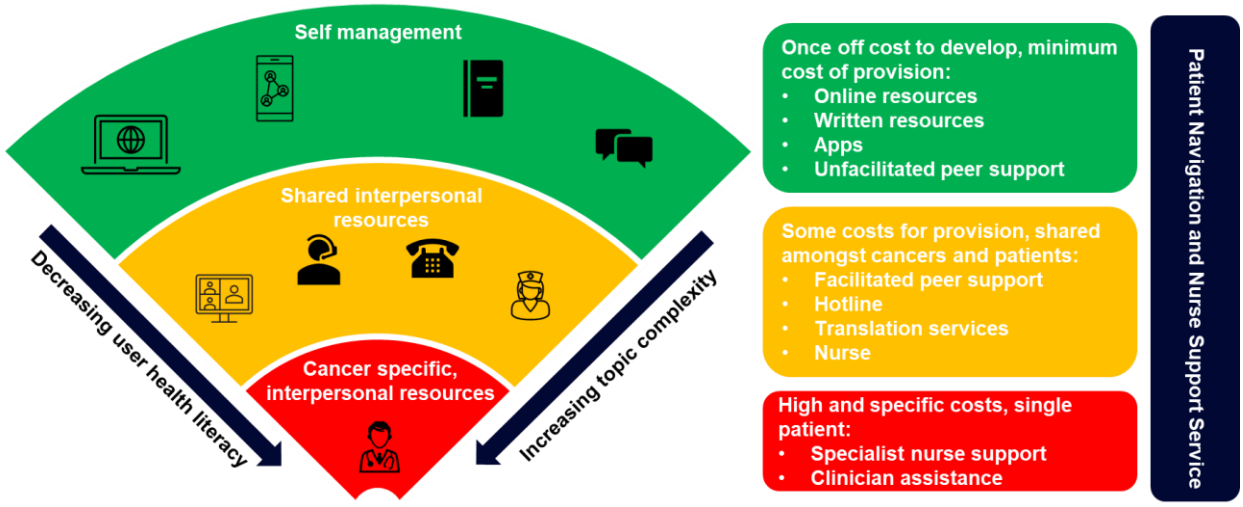
[289] All.Can and HMA, 2021, Cancer Care Navigation Analysis, Final Report.

[290] Wells, K.J., Battaglia, T.A., Dudley, D.J., et al., 2008, Patient navigation: State of the art or is it science? Cancer, 113, 1999-2010, doi:10.1002/cncr.23815; Robinson-White, S., Conroy, B., Slavish, K.H., Rosenzweig, M., 2010, Patient navigation in breast cancer: a systematic review, Cancer Nurs, 33(2), 127-40, doi: 10.1097/NCC.0b013e3181c40401; Rocque, G.B., Pisu, M., Jackson, B.E., et al., 2017, Resource Use and Medicare Costs During Lay Navigation for Geriatric Patients With Cancer, JAMA Oncol, 3(6), 817-825, doi: 10.1001/jamaoncol.2016.6307; Fouad, M.N., Acemgil, A., Bae, S., et al., 2016, Patient Navigation As a Model to Increase Participation of African Americans in Cancer Clinical Trials, Journal of oncology practice, 12(6), 556–563, doi: 10.1200/JOP.2015.008946; Natale-Pereira, A., Enard, K.R., Nevarez, L., Jones, L.A., 2011, The role of patient navigators in eliminating health disparities, Cancer, 117(15), 3543-52, doi: 10.1002/cncr.26264.

- Help those with high unmet needs and low health literacy via increasing access to financial support, improving adherence, and improving involvement in clinical trials.

Critically, however, the Consumer Navigation Service and equitable access to nurse support should be designed to close gaps in patient information and supportive care needs through a mix of printed and online information support services, as well as virtual and in-person support as appropriate. It could be delivered through a mix of general care coordinators, oncology nurses and specialist nurse support, and supported by virtual systems, leveraging existing services where appropriate, particularly as topic complexity and support requirements become increasingly specific to a particular cancer.

Figure 5.21: Visualisation of information needs of patients and resource intensity



To design and implement an appropriate Consumer Navigation Service and nationally equitable approach to nurse support, it is necessarily to understand, for each cancer and consumer group:

- Information and supportive services requirements across the patient journey
- The current landscape for information and supportive care services already available – for both telehealth and in-person services
- Key gaps in the current offerings, including where services are absent or existing support services are not broadly accessible
- Opportunities for service enhancements through different models of consumer navigation and nurse support.

For example, a high level review of presently available resources and support services indicates that consumer navigation and nurse support are currently available (Table 5.5).

Table 5.5: High level review of available resources and support services

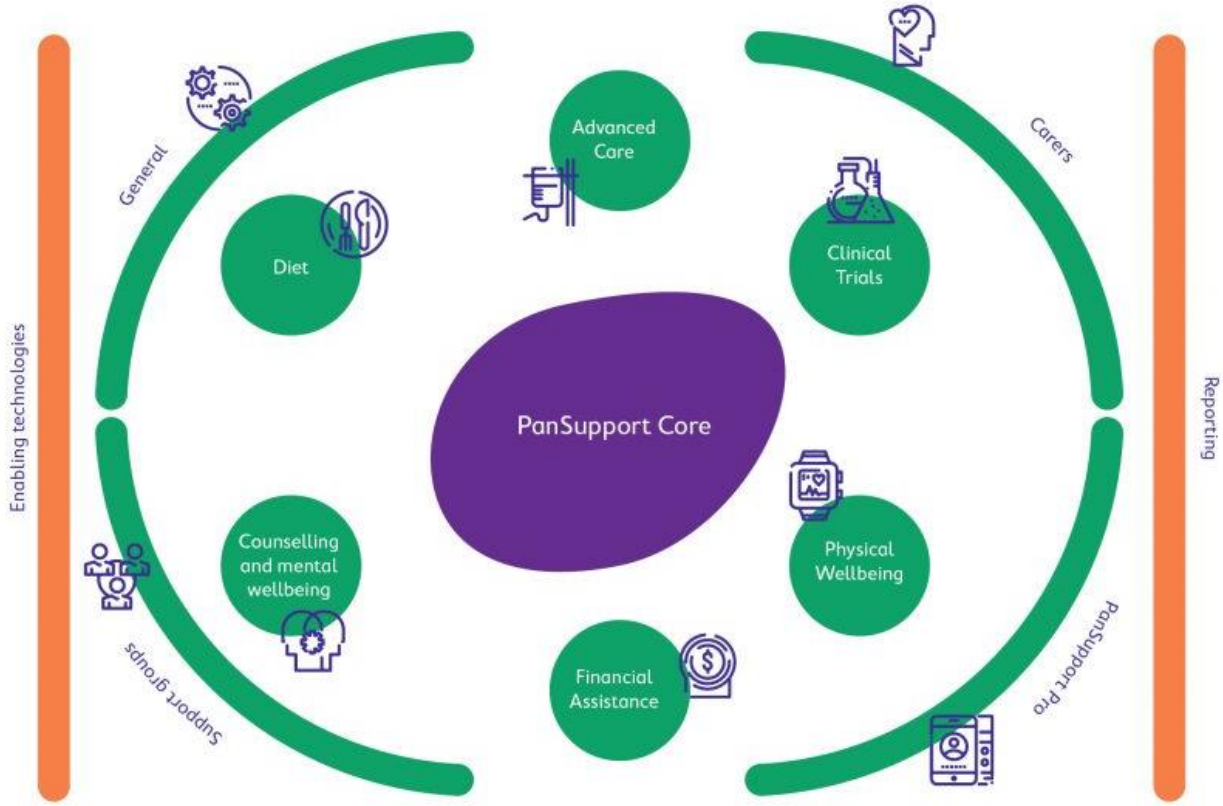
Organisation	Resource	Oesophageal	Stomach	Liver	Biliary	Tumour agnostic	Notes
Cancer Council	Cancer Council Guides to best cancer care	✓	✓	✓		What to expect (for Indigenous Australians)	English, Arabic, Chinese, Filipino, Greek, Hindi, Italian and Vietnamese
Cancer Council	Cancer Council support hotline (13 11 20)					✓	13 14 50 translation service
Cancer Council	Cancer Connect (confidential support from cancer survivor with similar experience)					✓	
Cancer Council	Practical and financial assistance					✓	Fact sheets and links to further information
CanTeen, RedKite	Support for young people affected by cancer					✓ Young people	
Liver Foundation	Wholistic support of liver disease (1300 454 837)			✓*			Wholistic and therefore not completely cancer related
Pancare Foundation	Provides information & resources support, specialist upper GI cancer nurse support	✓	✓	✓	✓		
Pancare Foundation	Peer support groups for patients and carers	✓	✓	✓	✓		Historical strength in pancreatic; capacity in other cancers developing
Pancare Foundation	Emotional and wellbeing support counselling	✓	✓	✓	✓		
Pancare Foundation	Grief and bereavement support	✓	✓	✓	✓		

Organisation	Resource	Oesophageal	Stomach	Liver	Biliary	Tumour agnostic	Notes
Pancare Foundation	Practical and financial assistance	✓	✓	✓	✓		
Pancare Foundation	Care co-ordination and care navigation	✓	✓	✓	✓		
Rare Cancers Australia	Patient and carer support for people with rare cancers, website with navigation					✓Rare cancers	Also has support services knowledgebase
Unicorn Foundation	Support for people affected by NETs, including NET nurse					NETs specifically	
AGITG, GI Cancer Institute	Clinical trials, awareness, informational resources	✓	✓	✓	✓		
GESA	Information for management of risk factors	✓	✓	✓	✓		Includes some translated resources
WeCan	Information support	✓	✓	✓			
Carers Australia	Carer support					✓	
Australian Government	Carer Gateway over the phone support,					✓	
Australian Government	CarerHelp, CareSearch information support					✓	
Palliative Care Australia	Information support regarding palliative care					✓	
Trials sites	Clinicaltrials.gov, Australian Clinical Trials						

As shown in Table 5.5, the Cancer Council performs the function of providing cancer patients with general information, and triages them to specialist non for profits for cancer specific issues, such as the Pancare Foundation for upper GI cancers.

Pancare Foundation's PanSupport, for example, provides comprehensive psychosocial services including upper GI specialist telehealth nurses, counselling and mental wellbeing, diet and physical wellbeing, financial assistance, advanced care planning and clinical trial access (Figure 5.22). Whilst the awareness of these services for pancreatic cancer is relatively high, the awareness in other upper GI cancers is still developing. Survey respondents reported that patients and carers 'stumbled onto' the service, often later than would be ideal. Clinicians, patients and carers alike strongly emphasised a need to increase awareness, referral and access to services like PanSupport.

Figure 5.22: PanSupport specialist upper gastrointestinal consumer navigation support service



Source: Pancare Foundation

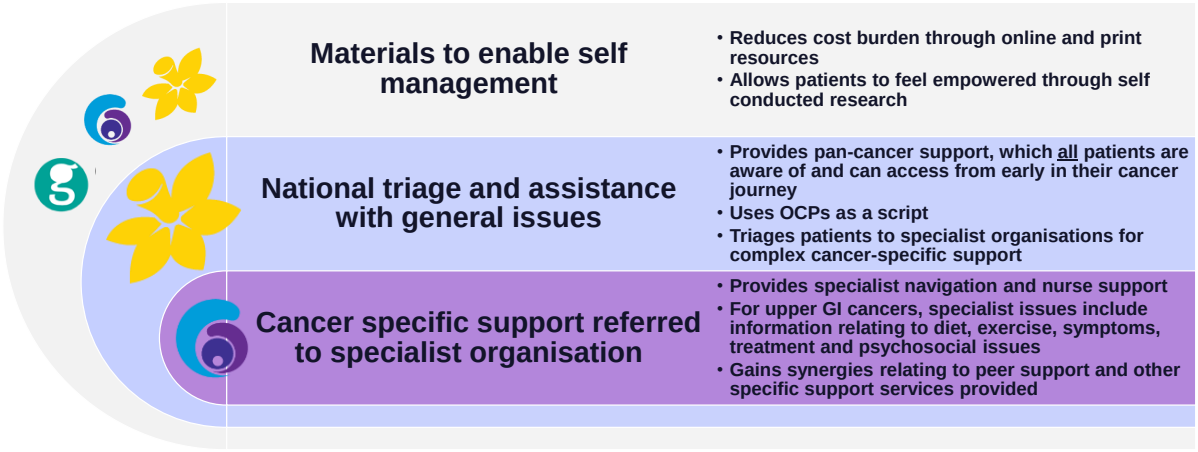
This shared approach to navigation and support reflects three main considerations:

- There are numerous pan-cancer support issues, and savings may be obtained through the provision of support services at scale, for example, financial support
- There are both shared upper GI cancer specific support issues and cancer specific support issues which require specialist input, for example, information support services specific to upper GI cancers
- A collaborative approach between generic and specialist support services provides benefits of scale and ensures patients obtain adequately tailored services.

Patient and carer commentary regarding the need for supporters to know the 'ins and outs' of their cancers indicates that this collaborative approach is appropriate. However, the observation that patients are frequently 'falling through the cracks' and that useful services

are discovered too late indicates that a systematic process for provision is absent. An improved Consumer Navigation Service and nationally equitable approach to nurse support would work to address these issues.

Figure 5.23: Collaborative approach to consumer navigation and nurse support



Importantly, consumer navigation and nurse support services should also consider the availability of in-person nurse support services, which should be integrated into the wider consumer navigation service. While some clinicians reported good availability of specialist upper GI cancer nurses available in some hospitals, but very poor access in other regions. In one state, upper GI cancer nurses reported they only had capacity to support one third of upper GI patients.

The development of a nurse support service should be based on a nationally equitable approach to nurse funding. It is noted, for example, nearly 100 specialist breast cancer nurses have been funded by the Federal Government in addition to state and non government organisation (NGO) funded nursing services, with 30 of these nurses dedicated to supporting patients with metastatic disease; similarly 35 specialist nurses in prostate cancer were also recently funded (Box 5.6). Provision of funding to some cancers and not others creates serious concerns for equity of access to nursing services, which runs counter to the principle of universal access that underpins Australia's health care system.

Box 5.6: Case study of Australian Government funding for breast and prostate cancer nurses

Breast cancer nurses

In 2019, the Australian Government announced the injection of $27 million in funding to increase the number of breast cancer nurses to nearly 100 nurses nationally. This doubling of funding will ensure 98 specialist Breast Care Nurses by 2022-23, building on $20.5 million already invested by the Australian Government in this initiative. As part of the 41 additional nurses, the additional funding supports an increase of more than 30 specialist nurses to be dedicated to supporting metastatic breast cancer patients and their loved ones. The announcement noted that metastatic breast cancer requires complex care, and with this additional funding nurses will now be able to spend more time supporting patients and families with advanced breast cancer.

Prostate cancer nurses

In 2020 the Australian Government announced funding of $23 million over three years for the prostate cancer nursing program through the Prostate Cancer Foundation of Australia. This additional funding has been made in addition to existing prostate cancer nurses, placing funded specialist nurses at more than 29 locations across Australia since 2013.

Source: Prime Minister of Australia, 2019, Vital funding boost to support Australian women with breast cancer; Australian Institute of Health and Welfare, 2021, Cancer Incidence data, accessed at: https://www.aihw.gov.au/reports/cancer/cancer-data-in-australia/contents/cancer-incidence-by-age-visualisation; Australian Institute of Health and Welfare, 2021, Cancer Data in Australia, table S8.1; Cancer Australia, 2020, Breast Cancer, Metastatic breast cancer: What are the symptoms of metastatic breast cancer?, accessed https://www.canceraustralia.gov.au/affected-cancer/cancer-types/breast-cancer/metastatic-breast-cancer; Minister for the Department of Health, 2020, $23 million investment for prostate cancer nurse program; https://www.health.gov.au/ministers/the-hon-greg-hunt-mp/media/23-million-investment-for-prostate-cancer-nurse-program.

A nationally equitable approach to closing gaps in nursing capabilities should be pursued through the Australian Cancer Plan to ensure all cancers have the same access and support. Applying similar nurse-to-incidence ratios applied in breast cancer to liver, biliary, stomach and oesophageal cancers would, for example, would see approximately 45 additional specialist upper GI cancer nurses funded nationally, at a cost of $24 million over four years. This nursing support should be allocated across health services nationally in accordance with need, taking into account the effects of enhanced access to nurse support services through a telehealth consumer navigation model.

The development of specialist nurse support services can not only improve outcomes, it can be cost saving, too. For example, a Chronic Liver Disease Nurse (CLDN) may manage a range of liver conditions and has been shown to be cost saving (Table 5.6).[291] The saving generated by a CLDN more than doubles its cost, returning net savings of close to $200,000 per year per nurse.

Table 5.6: CLDN role savings (excl hepatocellular carcinoma)

KPI	Average number saved per year (A)	Saving allocated (B)	Saving per year by CLDN (A × B)
Saved outpatient appointment	606	$35	$21,210
Saved ED presentation	182	$578	$105,000
Saved admission	115	$1336	$153,640
Supported discharge	58	$1336	$77,488
Total savings			**$357,338**
Salary			$160,000
Net saving			**$197,338**

Source: Wundke, R., McCormick, R, Narayana, S.K. et al., 2020, The Chronic Liver Disease Nurse Role in Australia. Gastroenterology Nursing, 43(1), doi:10.1097/SGA.0000000000000424.

For hepatocellular carcinoma specifically, a study of the savings made through the use of a coordinated care model for patients with hepatocellular carcinoma at Royal Adelaide Hospital found that the activity of the Nurse Coordinator resulted in an equivalent of at least 175 outpatient encounters being spared per year with a minimum annual cost saving of $85,750. This represented a net annual saving of $17,050.[292]

5.13 Enhanced access to peer and bereavement support groups

Upper GI cancer patients and carers have high supportive care needs, with poor prognosis, severe treatment with lasting consequences including dietary issues and fear of recurrence, and difficult to manage symptoms.

Globally, peer support is recognised as a possible solution to issues faced by patients across the cancer journey, including to:

- Promote cessation of risk factors in patients with cancer (e.g., tobacco and alcohol)

[291] Wundke, R., McCormick, R, Narayana, S.K. et al., 2020, The Chronic Liver Disease Nurse Role in Australia. Gastroenterology Nursing, 43(1), doi:10.1097/SGA.0000000000000424.
[292] Ow, T.W., Ralton, L., Tse, E., 2017, Saving costs through a coordinated care model for patients with hepatocellular carcinoma. Intern Med J, 47(9), 1005-1011, doi: 10.1111/imj.13465.

- Promote effective family communication of genetic risk information and family members' ability to cope with genetic risk[293]
- Improve the awareness about and the intention for receiving cancer screening in culturally and linguistically diverse populations[294]
- Provide patients and carers with information support to empower them to make treatment decisions, including regarding transplant and radical surgery[295]
- Help improve quality of life and ensure maximal compliance to treatment[296]
- Help tackle barriers faced by rural patients attempting to access psychosocial support[297]
- Promote male engagement in psychosocial support through male-centred group formats that endorses men's needs[298]
- Support patients during their hospital stay[299]
- Support patients and carers following treatment, during and after palliative care.

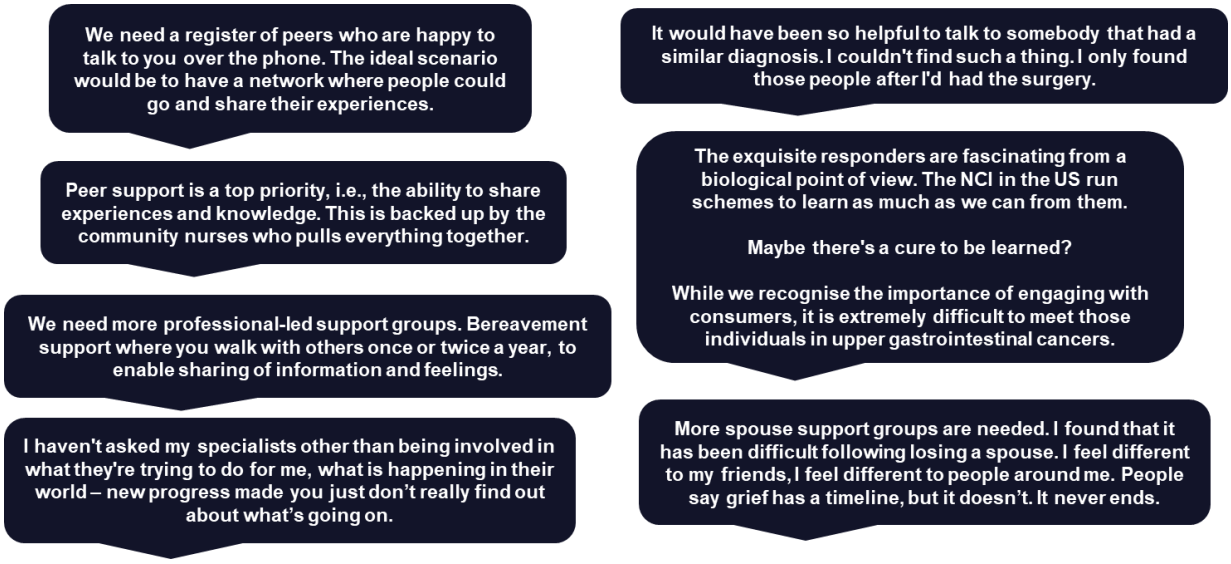
Furthermore, international evidence, and evidence from stakeholder consultations, highlights willingness to participate in peer support.[300]

However, consultations indicated that patients and carers coping with an upper GI cancer diagnosis find it difficult to find appropriate peer support groups (based on age, stage of cancer, similarity of cancer). This reflects limited navigational assistance, but also that there has historically been a paucity of peer support for patients and carers. For example, some patients resort to joining support groups in the United States.

Simultaneously, an implication of low survival rates is that many carers and family members will be bereaved of their loved ones. Despite this, respondents highlighted that bereavement support is presently difficult to access.

[293] O'Neill, S.C., Hamilton, J.G., Conley, C.C., et al., 2021, Improving our model of cascade testing for hereditary cancer risk by leveraging patient peer support: a concept report, Hereditary Cancer in Clinical Practice, 19(1), doi: 10.1186/s13053-021-00198-7.
[294] Hu, J., Wu, Y., Ji, F., et al., 2020, Peer Support as an Ideal Solution for Racial/Ethnic Disparities in Colorectal Cancer Screening: Evidence from a Systematic Review and Meta-analysis, Diseases of the Colon & Rectum, 63(6), p 850-858, doi: 10.1097/DCR.0000000000001611.
[295] A Korean study highlighted that peers support needs in the information domain were significantly higher than other cancers: Park, H.Y., Kim, M.J., Kim, J.Y., et al., 2019, Could Peer Support Programs Be a Good Resource for Managing the Unmet Needs of Cancer Patients? J Canc Educ, 34, doi: 10.1007/s13187-018-1399-4.
[296] Housman, B., Flores, R., Lee, D., 2021, Narrative review of anxiety and depression in patients with esophageal cancer: underappreciated and undertreated, Journal Of Thoracic Disease, 13(5), 3160-3170. doi: 10.21037/jtd-20-3529.
[297] Gunn, K.M., Weeks, M., Spronk, K.J.J., et al., 2022, Caring for someone with cancer in rural Australia, Support Care Cancer, doi: 10.1007/s00520-022-06857-2.
[298] Martopullo, C., Oberoi, D., Levin, G., et al., 2020, In the same boat"—a mixed-methods exploration of reasons why male gastrointestinal cancer patients joined a professionally led men-only cancer support group, J Cancer Surviv, 14, 261–272, 2020, doi: 10.1007/s11764-019-00838-x.
[299] Haldar, S., Mishra, S.R., Yoojun, K, et al., 2020, Use and impact of an online community for hospital patients, Journal of the American Medical Informatics Association, 27(4), 549–557, doi: 10.1093/jamia/ocz212.
[300] Nielsen, S., Ringborg, C.H., Schandl, A., et al., 2021, A qualitative study exploring patient's experiences of oesophageal cancer surgery, through their personal advice to future patients, European Journal of Oncology Nursing, 54(101983), doi: 10.1016/j.ejon.2021.101983.

Figure 5.24: Need for support group services – stakeholder perspectives



Establishing a 'one-stop-shop' or 'portal for peer support' in upper GI cancers would enable improved access to peer support. For enhanced benefit, this would be integrated with the National Consumer Navigation Service. One possible service identified by multiple patients and carers is an 'opt-in directory' which allows patients and carers to contact peers.

The purpose of peer support is not to improve survival outcomes; however, it can offer psychological benefits to patients and carers.[301] Furthermore, it can help empower patients. For example, Ziegler et al (2022) found a weak to moderate, positive association between cancer peer support and the three components of psychological empowerment among cancer patients.[302] A recent review of available resources and support services identified a high benefit from closing gaps in peer support services and access to bereavement support services for carers.[303]

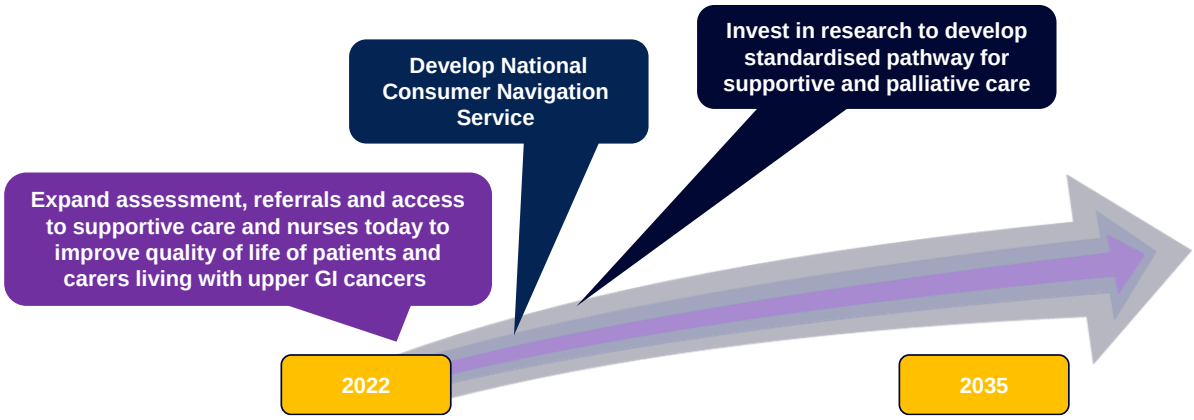
There is scarce literature which estimates the economic benefits of peer support, which reflects limitations in the quality of research and data collection. Weak evidence indicates that peer support may be cost saving via reducing healthcare utilisation.[304] Furthermore, an international study indicates that, among older adults, socially isolated individuals can cost the healthcare system approximately USD$1,608 more annually than those who are socially connected, due to expenditures for inpatient care and skilled nursing facilities.[305]

[301] Goodwin, P.J., 2005, Support groups in advanced breast cancer, Cancer, doi:10.1002/cncr.21245.
[302] Ziegler, E., Hill, J., Lieske, B., et al., 2022, Empowerment in cancer patients: Does peer support make a difference? A systematic review, Psychooncology, 1- 22, doi: 10.1002/pon.5869.
[303] This is consistent with a survey of people impacted by oesophagogastric cancer: Flight, I.H., Chapman, J., Harrison, N.J. et al., 2020, Mapping Information Needs over the Diagnosis, Treatment, and Survivorship Trajectory for Esophago-gastric Cancer Patients and Their Main Supporters: a Retrospective Survey, Journal of Cancer Education, doi:10.1007/s13187-020-01862-7.
[304] Wingate, L., Graffy, J., Holman, D., et al., 2017, Can peer support be cost saving? An economic evaluation of RAPSID: a randomized controlled trial of peer support in diabetes compared to usual care alone in East of England communities, BMJ Open Diabetes Research and Care, doi: 10.1136/bmjdrc-2016-000328.
[305] Flowers, L., Houser, A., Noel-Miller, C., et al., 2017, Medicare Spends More on Socially Isolated Older Adults, AARP Public Policy Institute.

5.14 Develop standardised pathway for, and enhance access to, supportive care services for upper GI cancers

Reflecting recognition that supportive care is a critical element of upper GI cancer care, there is urgent need for consistent provision of and referral to supportive care in the short-term, and for funding to research optimal supportive care in the long-term. This should be complemented by a review of system level barriers to supportive care and opportunities to enhance access. This will ensure that Australians living with upper GI cancers today receive high quality care, and that supportive care is cost effective in the long run.

Figure 5.25: Enhancing supportive care in the short and long-term



This report highlights several barriers which require urgent attention. Specifically, patients and stakeholders reported limited awareness of available services, incomplete referrals, and poor availability of services more generally. In addition, as demand for these services increases, supply must be adequate to meet it.

It follows that there is an immediate opportunity to improve availability of support services through initiatives such as improved access to patient support services, such as Pancare Foundation's PanSupport program (Box 5.7).

Box 5.7: PanSupport: Providing high quality support and care for Australians impact by upper gastrointestinal cancers

Through PanSupport, Pancare Foundation provides dedicated support, resource and information service to all families impacted by pancreatic, liver, stomach, biliary and oesophageal cancers. Pancare Foundation's dedicated specialists in upper gastrointestinal (GI) cancer care and are available to patients and carers in a variety of ways throughout their cancer journey, including through:

- Specialist upper GI cancer nurse telehealth support
- Counselling support
- Cancer information
- Support groups
- Financial assistance

These services aim to both provide and ensure that patients and carers are provided with needed supportive care services. In 2022, Pancare Foundation is projected to support 323 patients and 330 carers.

Pancare Foundation has developed a thorough strategy and roadmap for enhancing and developing its PanSupport service. Following this plan, which draws upon support from funders across Australia, it could provide services to more than 2,650 patients and 3,900 carers in 2027.

In parallel, a review of current provision practices, barriers, and opportunities to address them should be undertaken. Barriers identified within stakeholder consultation and literature review include:[306]

- Limited funding for allied health professionals and supportive care services
- Limited access to supportive care services in regional and remote areas (which can in part be addressed by telehealth, depending on access to technologies and openness)
- Lack of accountability for supportive care services delivery, and trust issues between dieticians and medical professionals
- Potential supply / workforce shortages
- Lack of indicators of safety and quality.

While literature is indicative of supportive care providing benefits to patients in certain contexts, there remains a task of determining an optimal prehabilitation, supportive care and palliative care service for patients with upper GI cancers to ensure that government funding and consumer expenditure is allocated to high value care. In particular, research is needed to define a standardised pathway for supportive care in upper GI cancers, including optimal timing of provision of each intervention, optimal number or duration of interventions needed and optimal combination of allied health interventions. It is expected that a standardised pathway would promote the development of multidisciplinary teams that fit the needs of consumers, so as to maximise benefits while limiting resource requirements.

Reflecting frequency of weight loss and recent progress in Australian research, a starting point of focus may be on optimal provision of nutrition services. Reflecting progress to date, large trials are now needed to investigate optimal standardised methods of nutrition support and nutrition guidelines. This could leverage and build upon work done by the NOURISH Point Prevalence Study Group, which coordinated a study across 27 Australian tertiary centres in Australia.[307]

The potential benefits of evidence-based models of nutrition for patients warrants investment in research into optimisation. For example:

- Findlay et al (2020) found that an evidence based model of nutrition care for patients with head and neck cancer resulted in improved nutrition care and a cost saving of $121,000 per annum, attributed to a reduction of unplanned hospital admissions[308]
- Once accounting for the investment required to resource a senior dietitian to deliver the specified model of care, Findlay et al (2020) estimated a cost reduction of $14.65 per dollar spent on delivering the new model of care
- A Singapore based study of a prehabilitation program for patients undergoing elective liver resection found a reduction in overall morbidity (30 per cent versus 52.9 per cent) and social issues, improved social well-being, and a tendency towards cost savings with a 16.5 per cent cost reduction ($6,892 versus $8,251).[309]

[306] Furness, K., Huggins, C., Croagh, D., Haines, T., 2021, Exploring the Attitudes of Health Professionals Providing Care to Patients Undergoing Treatment for Upper Gastrointestinal Cancers to Different Models of Nutrition Care Delivery: A Qualitative Investigation. Nutrients, 13(3), 1020, doi: 10.3390/nu13031020.
[307] Deftereos, I., Yeung, J.M.C., Arslan, J., Carter, V.M., et al., 2022, Health service nutrition practices and associations with clinical outcomes in patients undergoing resection for upper gastrointestinal cancer: results from the multi-centre NOURISH point prevalence study, J Hum Nutr Diet, 1-11, doi:10.1111/jhn.13006.
[308] Findlay, M., Nicole, M., Rankin, T.S., et al., 2020, Best Evidence to Best Practice: Implementing an Innovative Model of Nutrition Care for Patients with Head and Neck Cancer Improves Outcomes, Nutrients. 12(5), doi: 10.3390/nu12051465.
[309] Wang, B., Shelat, V.G., Chow, J.J.L., Huey, T.C.W., et al., 2020, Prehabilitation Program Improves Outcomes of Patients Undergoing Elective Liver Resection, J Surg Res, 251, 119-125, doi: 10.1016/j.jss.2020.01.009.

- A study of savings in USD through implementation of nutrition support therapy estimated annual savings of $580 million, including $18 million based on an oesophageal cancer intervention[310]
- A UK study found savings of between 119,000 and 432,000 pounds per 100,000 from nutrition interventions[311]
- A US based study found that the use of immunonutrition resulted in cost saving per patient of $6,300 due to reduced length of stay and $4,300 due to lower complication rates[312]
- A European study found gross benefits per euro invested in a dietetic intervention of between 3.08 and 22.57 for gastrointestinal and lung cancers.[313]
- Provision of ≥3 dietetics appointments could reduce the likelihood of complication (odds ratio of 0.3) for patients undergoing gastrectomy[314]
- Provision of High Energy High Protein supplements over two weeks prior to surgery may reduce length of stay for patients undergoing gastrectomy (coefficient of -7.3)[315]
- Prehabiltiation including exercise may reduce length of stay for patients undergoing abdominal surgery by 3.68 days[316]
- Taking a point estimate of reduced length of stay of four days, and an average cost of hospital beds per day of $2,000, a conservative estimate of potential benefits of prehabilitation is $8,000 per patient.

In the context of upper GI cancers, interventions which prevent nutritional deterioration and improve physical fitness may promote:[317]

- Shortened postoperative hospital stay
- Recued surgical complications, infections
- Reduced unplanned admissions
- Increased overall survival, including through enabling improved access to therapies.

[310] Tyler, R, Barrocas, A, Guenter, P, Araujo Torres, K, Bechtold, M.L.; Chan, L, et al., 2020, Value of Nutrition Support Therapy: Impact on Clinical and Economic Outcomes in the United States, Journal of Parenteral and Enteral Nutrition, doi:10.1002/jpen.1768.
[311] NIHR Southampton Biomedical Research Centre, 2015, The cost of malnutrition in England and potential cost savings from nutritional interventions (short version).
[312] Mauskopf, J.A., Candrilli, S.D., Chevrou-Séverac, H., Ochoa, J.B., 2012, Immunonutrition for patients undergoing elective surgery for gastrointestinal cancer: impact on hospital costs, World journal of surgical oncology, 10, 136, doi: 10.1186/1477-7819-10-136.
[313] SEO Economic Research, 2015, The social costs and benefits of dietetics for malnourished patients in hospital.
[314] Deftereos, I, Justin, M.C., et al., 2021, Preoperative Nutrition Intervention in Patients Undergoing Resection for Upper Gastrointestinal Cancer: Results from the Multi-Centre NOURISH Point Prevalence Study, Nutrients, 13(9), doi: 10.3390/nu13093205.
[315] Ibid.
[316] Waterland, J.L., McCourt, O., Edbrooke, L., et al., 2021, Efficacy of Prehabilitation Including Exercise on Postoperative Outcomes Following Abdominal Cancer Surgery: A Systematic Review and Meta-Analysis, doi: 10.3389/fsurg.2021.628848.
[317] Nakajima, H., Yokoyama, Y., Inoue, T., et al., 2019, Clinical Benefit of Preoperative Exercise and Nutritional Therapy for Patients Undergoing Hepato-Pancreato-Biliary Surgeries for Malignancy, Ann Surg Oncol, 26, 264–272, doi: 10.1245/s10434-018-6943-2; Allenson, K., Turner, K., Gonzalez, B.D., et al., 2021, Pilot trial of remote monitoring to prevent malnutrition after hepatopancreatobiliary surgery, BMC Nutr, 7(1), doi: 10.1186/s40795-021-00487-3; Perry, R., Herbert, G., Atkinson, C., et al., 2021, Preadmission interventions (prehabilitation) to improve outcome after major elective surgery: a systematic review and meta-analysis, BMJ Open, doi:10.1136/ bmjopen-2021-050806; Waterland, J.L., McCourt, O., Edbrooke, L., 2021, Efficacy of Prehabilitation Including Exercise on Postoperative Outcomes Following Abdominal Cancer Surgery: A Systematic Review and Meta-Analysis, Front. Surg, doi: 10.3389/fsurg.2021.628848; Dewulf, M., Verrips, M., Coolsen, M.M.E., et al., 2021, The effect of prehabilitation on postoperative complications and postoperative hospital stay in hepatopancreatobiliary surgery a systematic review, HPB, 23(9), 1299-1310, doi: 10.1016/j.hpb.2021.04.021.

5.15 Address shortfall in palliative care services

Palliative care rarely included in MDTs, most often due to reported shortages of palliative care specialists. Patients and carers highlighted concerns regarding the quality of palliative care in some institutions.

There are demonstrated benefits from the provision of early palliative care referral to patients. For example, it can prevent hospital admissions and shift care away from expensive inpatient settings.[318] Further to this: [319]

- A systematic review reported costs savings of $4,251 per patient and simultaneous improvement of quality of care due to early palliative care
- KPMG (2020) analysis estimated a return on investment (ROI) of a $50m investment in 'Increase[d] investment in earlier and more integrated palliative care services in hospitals' to be 168 per cent.

Reflecting the benefits of early palliative care identified within the literature, this should be actioned within the Australian healthcare system. However, there must be adequate resources to address the shortfall in supply of palliative care services.

Shifting patients away from in-hospital settings is also beneficial for the patient's perspective as it provides the opportunity to die at home; a systematic review and meta analysis found that 55 per cent of cancer patients chose home as their preferred place of death.[320]

It follows that a review of the quality and quantity of palliative care provided in Australia should be undertaken, with emphasis on:

- Assessment of quality of palliative care provided, including throughout the covid pandemic and how this should inform future responses to pandemics
- Prioritisation and implementation of evidence based change which addresses the barriers to engagement
- Identifying policies to address supply issues.

5.16 Accelerate research to improve outcomes

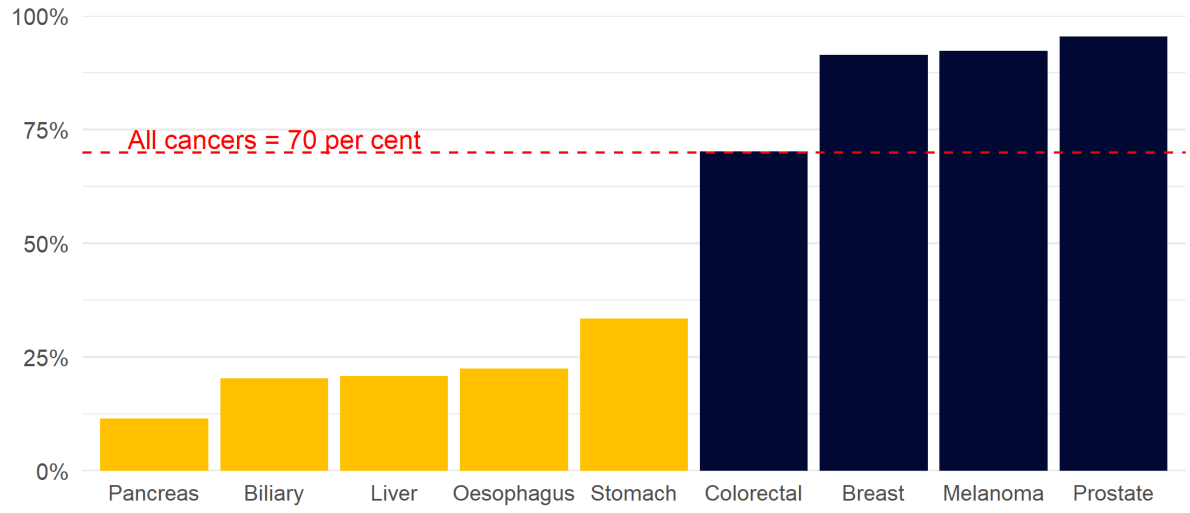
Recognising the continued and significant challenges facing rare, low survival cancers like upper GI cancers, in 2017 Australia's Senate Select Committee called for a comprehensive, Australia-wide strategy to increase survival to above 50 per cent by 2027. However, survival of upper GI cancers remains low.

[318] Laube, R., Sabih, A.H., Strasser, S.I., et al., 2021, Palliative care in hepatocellular carcinoma, Journal of Gastroenterology and Hepatology, 36,618-628, doi:10.1111/jgh.15169; Barnes, A., Woodman, R.J., Kleinig, P., 2019, Early palliative care referral in patients with end stage liver disease is associated with reduced resource utilization, J Gastroenterol Hepatol, doi: 10.1111/jgh.14877.

[319] May, P., Normand, C., Cassel, J. B., et al., 2018, Economics of Palliative Care for Hospitalized Adults With Serious Illness: A Meta-analysis, JAMA internal medicine, 178(6), 820–829, doi: 10.1001/jamainternmed.2018.0750, KPMG, 2020, The Economics of Palliative Care.

[320] Fereidouni, A., et al., 2021, Preferred Place of Death in Adult Cancer Patients: A Systematic Review and Meta-Analysis, Front Psychol, doi: 10.3389/fpsyg.2021.704590.

Figure 5.26: Survival rates for upper gastrointestinal cancers remain low



Note: Data as presented in research summit. Source: AIHW, 2021, Cancer in Australia.

With five years remaining before this deadline is reached, funding remains unsystematic and falls short of the national approach required.

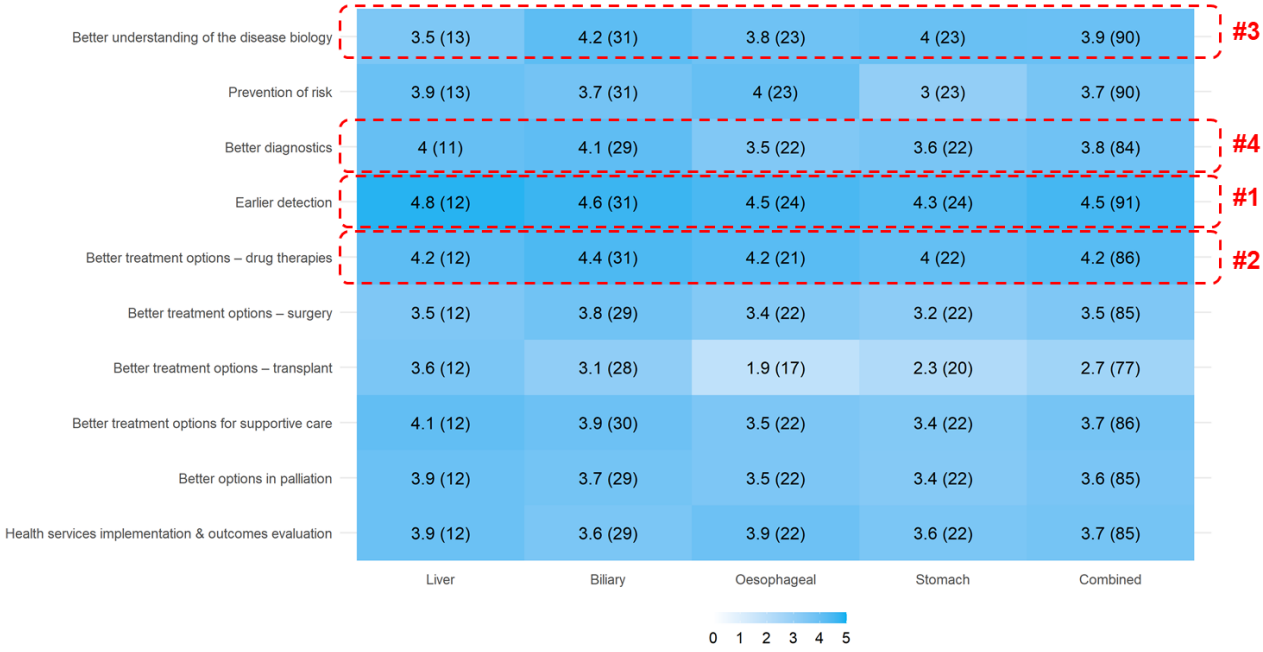
To overcome this disparity and promote improved outcomes, a national approach to improving outcomes for those with upper GI cancers is warranted. This approach would alleviate the barriers faced by Australia's world leading research community, and in so doing allow them to contribute to global efforts in addressing research questions. By investing in Australian research, substantial benefits could be unlocked, extending survival and improving quality of life of people affected by upper GI cancers.

Priority areas for research and Australia's role

Analysis of responses to the Patient and Carer survey and Researcher and Clinician Survey indicated that the highest rated priorities for improving outcomes of Australians impacted by upper GI cancers were:

- Earlier detection
- Better treatment options (drug therapies)
- Better understanding of disease biology
- Better diagnostics.

Figure 5.27: Priorities for improving outcomes



Note: Data presented as average rating (number of responses). Estimates include both consumers and researchers, each individual response was weighted equally. Warning comparing average scores across cancers – composition of consumers and medical professionals varies. Source: Patient and Carer Survey and Researcher and Clinician Survey, State of the Nation in Upper GI Cancers. See Appendix C.

These responses generally corresponded with findings from the literature (Figure 5.28) and commentary from stakeholders (Figure 5.29-Figure 5.32).

In addition, stakeholders indicated that implementation research is important to ensure that research findings translate to practice. Furthermore, stakeholders frequently viewed prevention as a key means of promoting improvements in outcomes in the long-term. Discussion highlighted that successful prevention of these cancers is highly dependent on first understanding the processes by which upper GI cancers develop.

Figure 5.28: Research priorities – perspectives from the literature

	Liver cancer	Biliary cancer	Oesophageal cancer	Stomach cancer	All upper GI cancers
Biology & aetiology	Evolution from/of advanced liver disease	GWAS studies needed, molecular and biological characterisation, tumour microenvironment	Evolution from/of Barrett's		Understanding of aetiology and biology (animal models, molecular/biological characteristics, TME)
Prevention	Primary prevention (NASH, NAFLD) Secondary prevention of liver disease, particular for high risk groups	Primary prevention (NASH, NAFLD, diabetes)	Cost effective secondary prevention of risk factors (e.g., subset of Barrett's)	Cost effective secondary prevention of risk factors (e.g., H. pylori, HDGC gene),	Prevention of broad lifestyle factors
Early detection & diagnosis	Surveillance Detection – e.g., of small HCCs via US in cirrhotic liver <50%		Cost effective surveillance of high risk groups (subset of Barrett's), e.g., through stratification and new tech (must be palatable)	Cost effective surveillance of high risk groups (H. pylori, HDGC gene), e.g., through stratification and new tech	Develop novel and validate biomarkers Novel technologies Identification of high risk groups
Treatment	Optimising treatment, research translation in surgery, use of neoadjuvant therapy, role of immunotherapies, combo	Precision medicine, combination therapies, use of targeted therapies, role of immunotherapies		Biomarker driven treatment (precision medicine), combination therapies	Develop / validate biomarkers Develop new therapies, combinations for Australians Patient selection Tackle resistance + cold tumours
Control, survivorship, outcomes	E.g., 40% patients with cirrhosis not screened; 14% of HCC in Indigenous Australians detected through surveillance		Service configuration, e.g., evaluation of costs (distance) vs benefits (outcomes) in Australia	Service configuration, e.g., evaluation of costs (distance) vs benefits (outcomes) in Australia	Optimise prehabilitation Implementation research Quality research Access for high risk groups (subsets of CALD, Indigenous, etc)
Citation sample	Gastroenterological Society of Australia (2020); Jeffrey et al (2020); Lubel et al (2020); Lubel et al (2021); Nguyen et al (2021); Wigg et al. (2021); Low et al (2021); Laube et al (2020); Lockart & Danta (2019); Sangro et al (2021); Lazarus et al (2022); Banales et al (2020), Ferrao et al (2016); Chandran et al (2022)…		Narendra (2020); Vonlanthen et al (2018); ACSQHC Atlas 2021; Yu et al (2021); Whiteman & Kendall (2016); Vissapragada et al (2021), Lu et al (2020); Tay et al (2021); Rogers et al (2022); Hamade et al (2021); Bornschein et al (2019); Bhandari et al (2021); Ghidini et al (2021); Corso et al (2021);…		Maharaj et al (2019); Calanzani et al (2021); Scanlon et al (2021); DiCE (2021); Underhill et al (2020); Deftereos (2021); Scott (2021); McKenzie et al (2022); Garvey & Cunningham (2019);…

Figure 5.29: Priorities in Early Detection and Diagnosis research – stakeholder perspectives

Figure 5.30: Research into basic biology – the engine room of research – stakeholder perspectives

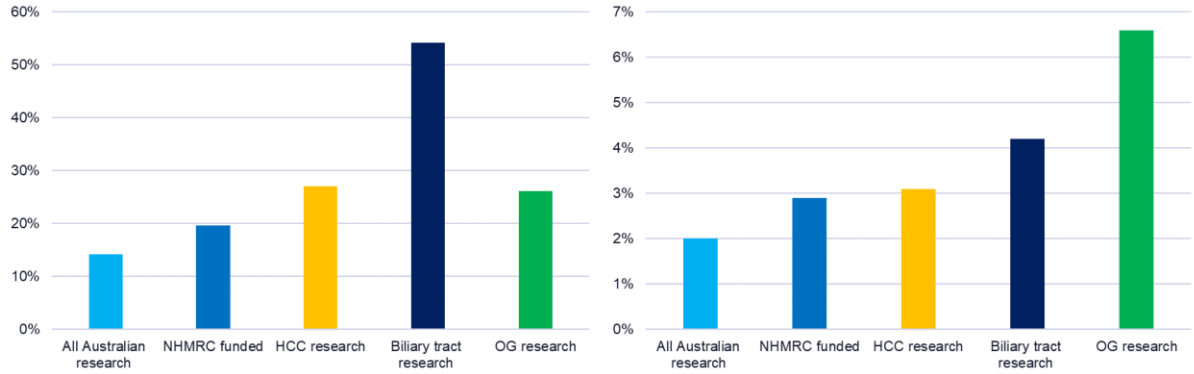
Figure 5.31: Research into precision medicine and drug therapies to improve survival – stakeholder perspectives

Figure 5.32: Research into health services implementation – stakeholder perspectives

Confidence in Australia's ability to undertake high quality research varied by area of research, with small sample size and fragmentation leading to the perception that Australia may be best to play a contributing role in clinical trials, with a more active role in basic

research. Notwithstanding, there was strong confidence in Australian researchers' ability to undertake high quality research and provide valuable contributions to intellectual issues. The high quality of Australian upper GI cancer research is illustrated by citation metrics.

Figure 5.33: Australian research share of publications within top 10 (LHS) and one (RHS) per cent of journals (2016-2020)



Source: NHRMC Measuring up report (2018); hepatocellular carcinoma (HCC), Biliary tract and oesophagogastric (OG) estimates based on Scival field weighted statistics - 2016 to 2020.

Figure 5.34: Perceptions on where Australia can best contribute – stakeholder perspectives

Benefits driven by Australian research

Extensive academic research has shown that medical research generally, and cancer research specifically, delivers significant improvements in both health and economic prosperity. Investment in cancer research directly produces:

- Health gains, in the form of improved survival and improvements in quality of life

- Investment effects, in the form of leveraging investment and activity into an economy that would not have otherwise occurred
- Jobs creation, including in particular highly skilled jobs
- Productivity spillovers, arising from the spillover of knowledge from disease area into the treatment of other cancers and chronic health conditions through open, networked research communities.

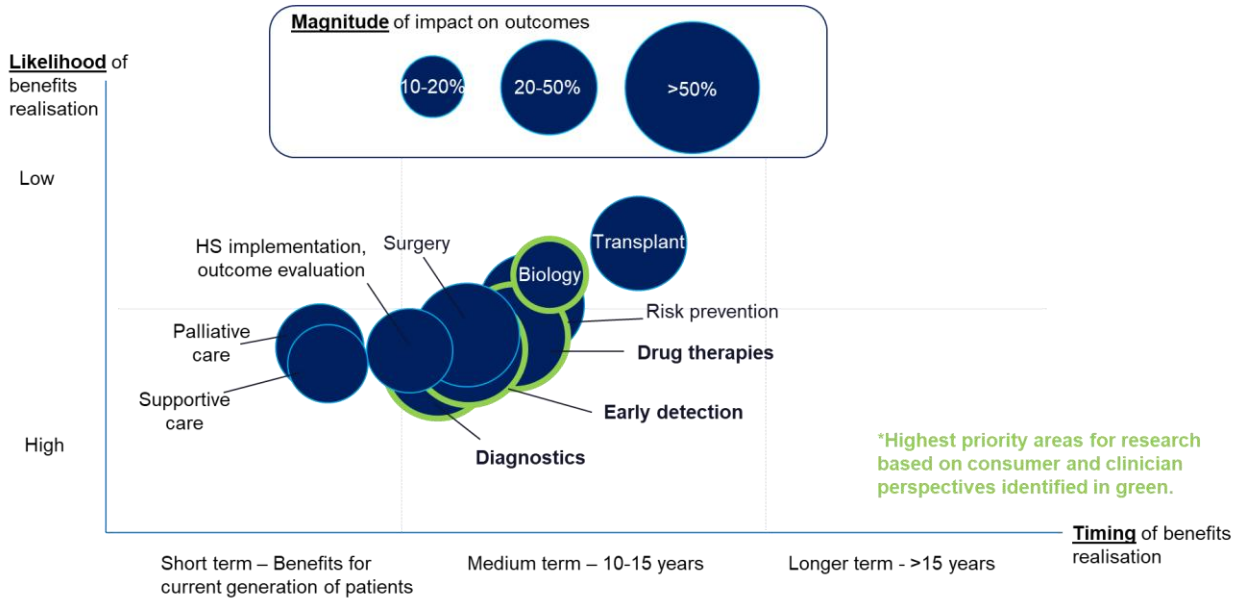
These direct effects then have wider multiplier effects throughout the economy, often leading to a significant return on investment.

For example, a 2012 RAND study commissioned by Cancer Research UK found that public and charitable investments in cancer research generated a 40 per cent per annum return for every dollar invested in perpetuity,[321] while a 2008 study by the Cancer Institute of NSW of the returns on cancer research in Australia similarly found a return of $2.34 in health gains alone (ignoring other investment or spillover effects) for every dollar expended on cancer research. [322]

Wider studies of the benefits of medical research have similarly identified significant returns on investment from medical research, including a recent 2017 study by the Australian Commission on Safety and Quality in Health Care found that Australian investigator-led clinical trials delivered a return of $5.80 for every dollar invested[323] and a study for the Association of Australian Medical Research Institute (AAMRI) in 2018 that estimated a return of $3.90 for every dollar invested in medical research,[324] of which $2.60 is estimated to be derived on average from heath gains and $1.30 is estimated to be derived from productivity spillovers.

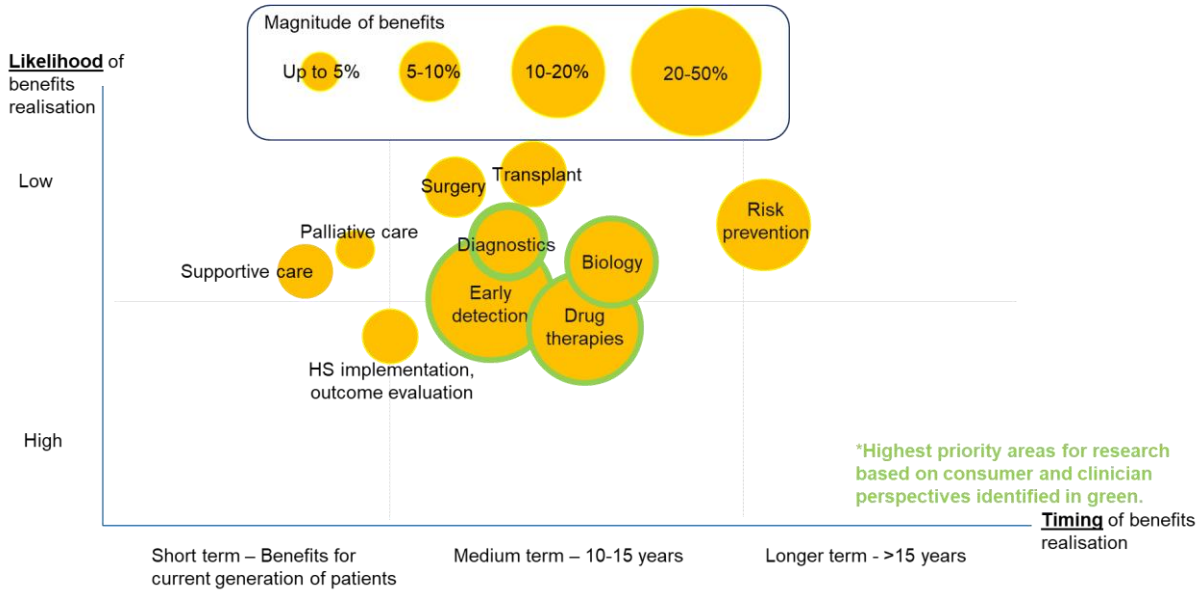
When asked for opinions on the likely benefits of different research priorities, respondents consistently considered early detection and diagnosis, as well as development of drug therapies as high impact.

Figure 5.35: Benefits realisation – consumer perspectives



[321] RAND, 2012, Medical Research: What's It Worth?, BMC Medicine
[322] CINSW, 2008, Health Returns on Cancer Research Investments
[323] Australian Clinical Trials Alliance, 2017, Economic evaluation of investigator-initiated clinical trials conducted by networks.
[324] KPMG, 2018, Economic Impact of Medical Research in Australia.

Figure 5.36: Benefits realisation – clinician and researcher perspectives



A systematic, national approach to drive synergies

Stakeholders highlighted that independently researching priorities in isolation may both waste resources and limit possible improvements in outcomes. For example, an approach which enables use of shared resources (statisticians, genomics) could both enhance specialisation and reduce duplication of resources.

Figure 5.37: Stakeholder comments on pooling resources – stakeholder perspectives

Any approach will require adequate funding, and amounts need to be readily divisible across institutions

The MoST platform is a good concept, where you can pool resources, specialise and allocated tasks, i.e., one group chases drug companies, others do sequencing, etc. I think there's room for that to be pulled together more effectively too. There's a role for an honest broker who isn't aligned with a particular research institution. I think you need a national body that isn't run out a particular institution.

Pooling data and coordinating or facilitating collaboration is important. We need to acknowledge duplication and bring everything together.

Within the context of the Brain Cancer Research Mission, I've found funders groups are a great way of staying abreast and coordinating funding, so as to prevent overlap.

We need a resource that helps coordinate research, e.g., statisticians and high end genetics resources that we can tap into We need a funding organisations which (a) have more money to fund and (b) don't select projects in isolation. They're more of a facilitator.

I'm sure there are many positions and roles duplicated across universities. You don't need one in every hospital.

This approach is more similar to a research mission or may reflect an opportunity for a trial of an Australian National Cancer Institute.

Figure 5.38: Research Mission or Australian National Cancer Institute – stakeholder perspectives

5.17 Conclusions

Substantial opportunities exist to improve the experience of patients with upper GI cancers and their family members, with the potential to improve the consistent use of evidence based best-practice and improve outcomes in the long run. These opportunities have the potential to:

- Substantially reduce the incidence of upper GI cancers, through improved primary prevention
- Improve survival in the short run, through earlier detection and improved adherence to clinical best practice today
- Improved quality of life and health services utilisation through the empowerment and support of patients and their families to navigate to the right support when they need it
- Significant breakthroughs in treatment, through a nationally coordinated approach to research
- Lead to economic benefits and savings.

The following chapter presents a plan for actioning these ideas.

Chapter 6

A Vision for the Future and Plan for Action

The modern cancer research era has demonstrated that significant improvements in survival and quality of life are possible when communities, industry and government come together to drive a sustained research and reform agenda.

What has been achieved for so many other cancers can be achieved for upper GI cancers – but it will depend on the execution of a multi-year, multidisciplinary, nationally-collaborative strategy, focused around a set of shared goals.

This chapter sets out a long-term vision and goal statement for upper GI cancers, and then maps out a high level plan for implementation in partnership with government and the wider upper GI community.

Key findings:

- **Improved outcomes require implementation of known best practice and funding for a nationally collaborative research program to improve outcomes into the future, including strategies to:**
  - **Reducing incidence through more effective primary and secondary prevention of modifiable risk factors**
  - **Increasing relative survival to >50 per cent through research and the consistent implementation of clinical best practice**
  - **Improved quality of life for patients and their carers through consistent, timely access to supportive and palliative care**
  - **Maximising research impact through an Upper GI Cancers Research Mission.**
- **Success of strategies is dependent on core enabling infrastructure and activities, which include:**
  - **The establishment of a National Upper GI Cancer Taskforce**
  - **The development of new models of care for at-risk people**
  - **The development of a National Australian Cancer Dataset and expansion of the Upper GI Cancer Registry**
  - **The development of a National Consumer Navigation Service and nationally equitable approach to nurse support**
  - **Implementation of reforms to improve access to novel therapies.**
- **Immediate actions to be actioned, supported by members from across the community, include:**
  - **Fund increased access to patient support services**
  - **Fund nationally equitable access to nursing support for Upper GI cancers nationally**
  - **Fund an Upper GI Cancer Research Mission**
  - **Expand the reform agenda for Pancreatic Cancer to include Upper GI Cancers**
  - **Establish a National Upper GI Cancer Working Group within the Australian Cancer Plan.**

6.1 A better future: a future vision and goals

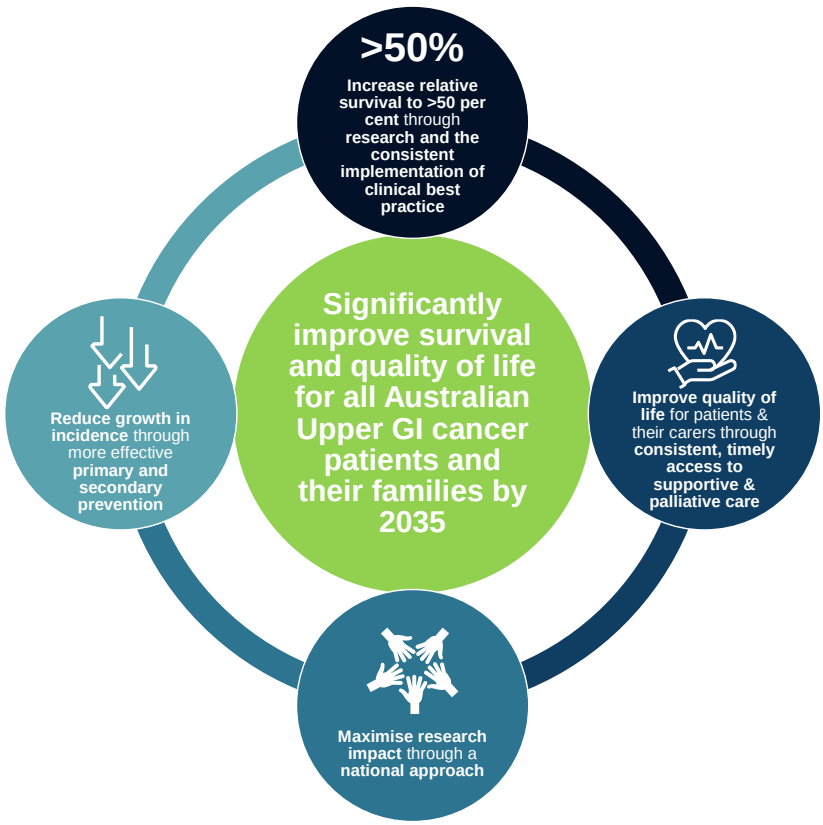
Together with upper GI patients and their carers, as well as the wider upper GI research and clinical community, the Pancare Foundation is calling on Australians to help deliver a vision for the future where fewer people are diagnosed with an upper GI cancer, and where upper GI cancer patients live longer, better lives together with their families.

To that end, this State of the Nation in Upper Gastrointestinal Cancers in Australia report (report) sets out a long-term, 2035 vision statement for upper GI cancers, underpinned by four major goals (Figure 6.1):

> ***To significantly improve survival and quality of life for all Australian Upper GI Cancer patients and their families by 2035, by:***
>
> - ***Increasing relative survival to >50 per cent by making research part of the standard of care, and improving the consistent implementation of clinical best practice***
> - ***Improving quality of life for patients and their carers through consistent, timely access to supportive and palliative care for all people diagnosed with an upper GI cancer***
> - ***Reducing growth in incidence through more effective primary and secondary prevention***
> - ***Maximising research impact in upper GI cancers through a national approach.***

Critically, this long-term 'ambition statement' cannot be achieved through a continuation of the status quo. It will require significant investment and policy reform, with new approaches to collaboration and service delivery to be implemented.

Figure 6.1: 2035 vision and priority areas for action



Mapping the opportunities identified in Chapter 5 to the major goals provides a high-level roadmap for implementation. As shown in Figure 6.2, the action plan to improve outcomes for people with upper GI cancers is comprised of:

- Investments in core enabling infrastructure and activities, which support the realisation of all goals and the broader vision, as well as
- Strategies within each goal area based on the opportunities identified in Chapter 5.

The **core enabling infrastructure and activities** needed to realise the vision include:

- The establishment of a National Upper GI Cancer Taskforce, comprised of federal and state governments as well as consumer, clinician and research leaders to support the national implementation of 'upper GI-specific' actions that will not be covered through the core Australian Cancer Plan implementation, which will necessarily be focused on actions and strategies that cut across all cancers.
- The development of new models of care for at-risk people, including in particular Aboriginal and Torres Strait Islander people, culturally and linguistically diverse communities, migrants (including refugees and asylum seekers), Australians from low socioeconomic backgrounds and regional Australians. These models of care will need to work across multiple Optimal Care Pathway domains, from improved prevention, early detection, through treatment and supportive care.
- The development of a National Australian Cancer Dataset and expansion of the Upper GI Cancer Registry, which is key to improving patient outcomes and reducing government waste and is expected to be a core priority of the Australian Cancer Plan.
- The development of a National Consumer Navigation Service and nationally equitable approach to nurse support based on an evidence-based assessment of need spanning from basic informational support about upper GI cancers through to consumer navigation support services, which could be provided by peers and trained personnel (e.g., not necessarily nurses), and increasing as appropriate to specialist GI cancer nurse support. The development of a consumer navigation support service expected to be a core priority of the Australian Cancer Plan and would seek to build on existing service capability and link to wider workforce development strategies for the health and cancer workforce generally as well as upper GI cancers specifically.
- The implementation of reforms to improve access to novel therapies, which is two-fold: the adoption of recommendations by the Zimmerman Report for a targeted fund to be established for products with rare indications and clinical trials reforms focused on increasing the number of upper GI cancer trials in Australia.

The **key strategies to realise the goal of reducing growth in incidence** through more effective primary and secondary prevention include:

- Improve prevention of modifiable risk factors, including in particular obesity and alcohol use
- Develop a National Liver Health Strategy.

The **key strategies to realise the goal of increasing relative survival to >50 per cent** through research and the consistent implementation of clinical best practice include:

- Develop a Roadmap to a Liver Cancer Screening Program
- Improve cancer symptom education and awareness
- Establish systems for rapid and informed specialist referral

- Establish a quality framework for upper GI cancers
- Conduct a review of endoscopy services
- Conduct a review of specialist service delivery in upper GI Cancers.

The **key strategies to realise the goal of improving quality of life for patients and their carers** through consistent, timely access to supportive and palliative care:

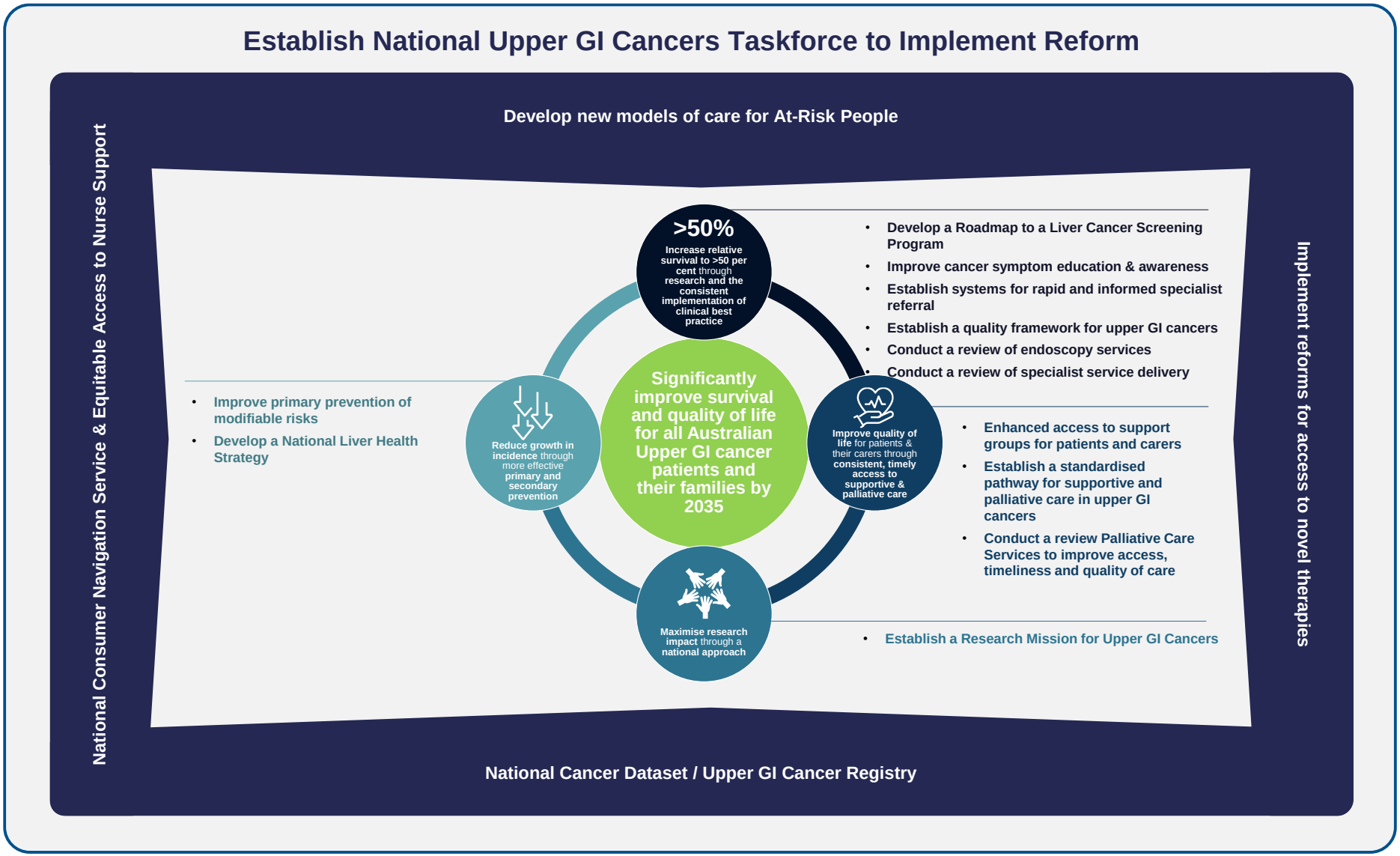
- Establish a standardised pathway for supportive and palliative care in upper GI cancers
- Enhance access to supportive care services, including support groups, for patients and carers
- Conduct a review Palliative Care Services to improve access, timeliness and quality of care.

The **key strategy to realise the goal of maximising research impact through a national approach**:

- Establish a Research Mission for Upper GI Cancers.

The following sections provide a short summary of the key strategies by goal, including activities to be completed within the short-term (a 2-year horizon) and medium-term (a 5-year horizon), as well as lead organisations, and draft performance targets to measure improvements. The alignment with proposed work in the National Pancreatic Cancer Roadmap are also identified.

Figure 6.2: A plan for action to improve outcomes for upper gastrointestinal cancers



6.2 Reducing growth in incidence through improved primary and secondary prevention: key strategies, activities and performance targets

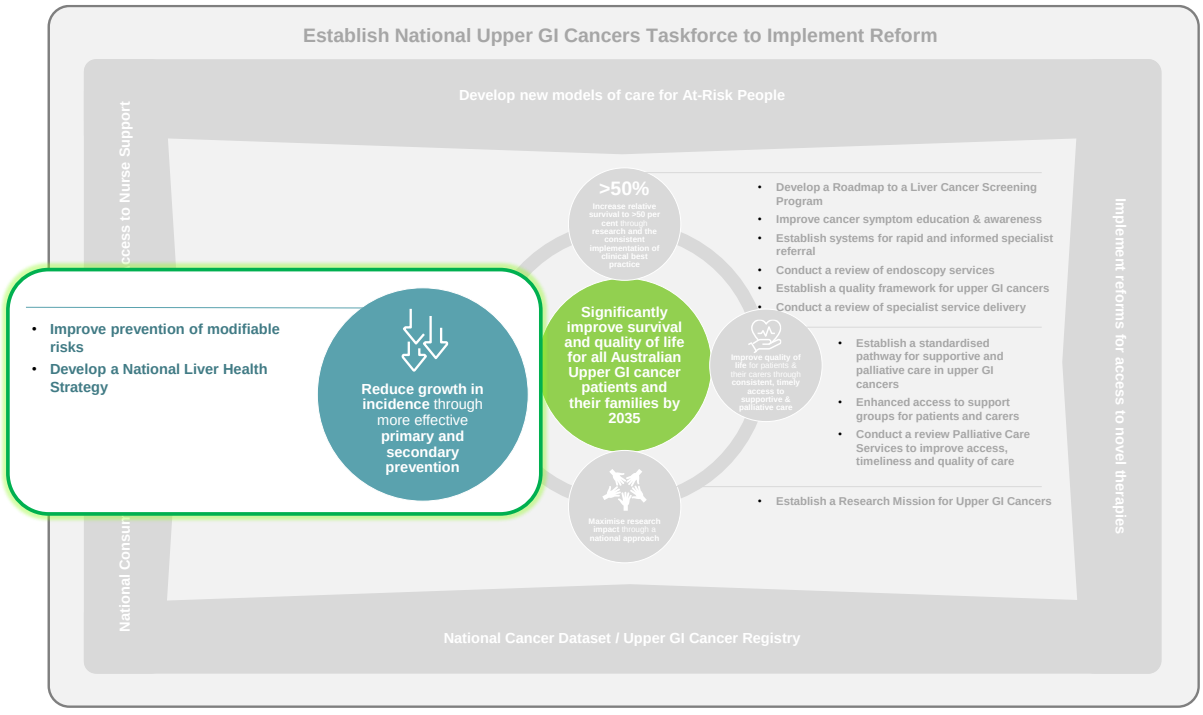
While many upper GI cancers can be sporadic, more effective prevention of cancer through improved lifestyle behaviours as well as the avoidance of infectious disease and improved surveillance and management of liver disease will be critical to meeting the goal of reducing the growth in incidence projected to 2035.

Because the risks of infectious disease are highly correlated with at-risk population cohorts, strategies to improve prevention of infectious disease are considered as part of new models of care for at-risk cohorts, alongside opportunities to improve other lifestyle factors for those cohorts.

In addition to actions needed to better engage and support at-risk groups, three specific strategies are needed to reduce growth in incidence of upper GI cancers; these are:

- Improve prevention of modifiable risks, including in particular obesity and alcohol use in the general population
- Develop a National Liver Health Strategy.

Figure 6.3: A plan for action to improve outcomes for upper gastrointestinal cancers – prevention in focus



Strategy: Improve prevention of modifiable risk, especially obesity and alcohol use

Whilst enjoying relative success in the reduction of tobacco use in the general population, and the prevention of infectious diseases such as H.pylori and hepatitis in the general population through vaccination and treatment programs, obesity and alcohol use remain black marks on Australia's public health prevention scorecard. Australia is a 'world leader' in rates of obesity and overweightness, and nearly one in five Australians drink at rates that increase lifetime risk of cancer (more than 10 drinks per week).

The recently launched National Preventive Health Strategy (2022-2032), National Obesity Strategy (2022-2032), National Alcohol Strategy (2019-2028), and Australia's Primary Health Care 10 Year Plan (2022– 2032) will be the primary mechanisms by which a national approach to reducing obesity and alcohol use will be implemented. Because these will be the primary vehicles by which improvements in lifestyle factors will be made, specific activities and targets for this strategy have not been included here.

Strategy: Develop a National Liver Health Strategy

In Australia today, hepatocellular carcinoma (HCC) has one of the fastest growing incidence rates of all cancers and is the fastest growing cause of cancer related deaths. hepatocellular carcinoma is a function of declining liver health, which is growing at an increasing rate. It is estimated that two thirds of liver cancer are potentially preventable.

To address the burden of liver disease within Australia, a National Strategy for Liver Health which systematically identifies and addresses gaps that exist within existing policy arrangements is warranted. The Liver Health Strategy would build on and extend the Cancer Council's Optimising Liver Cancer Control in Australia project which is aimed at identifying priority actions for clinicians, researchers and policy makers to improve liver cancer outcomes in Australia. The Liver Health Strategy would be developed with reference to the following elements:

- Raising awareness of importance of liver health through mass media campaigns
- Implementation of an Australian high-risk screening program for liver disease
- GP education of risk factors for liver disease, and appropriate referral
- Development of models which are culturally appropriate and successful meet the needs of high-risk groups
- Development of infrastructure and research to improve efficacy of detection.

This action is aligned with the National Pancreatic Cancer Roadmap priority area to 'Improve identification of people at high-risk of pancreatic cancer for targeted surveillance'.

The implementation of this strategy has the potential to:

- Prevent 10,000 hepatitis infections
- Reduce healthcare costs associated with hepatitis infection by $272 million by 2030
- Reduce cases of cirrhosis by 52 per cent
- Avoid hospitalisation costs associated with the treatment of cirrhosis of $976 million in $NPV_{5\%}$ terms over the 2025-2035 horizon
- Reduce the incidence of hepatocellular carcinoma by 47 per cent, preventing between 10,000 and 13,300 cases of liver cancer over the 2025-2035 period depending on the rate of hepatocellular carcinoma
- Avoid hospitalisation costs associated with the treatment of hepatocellular carcinoma patients of between $323 million and $427 million in $NPV_{5\%}$ terms over the 2025-2035 horizon (depending on the rate of hepatocellular carcinoma).

Box 6.1: Key implementation partners, activities and draft performance metrics for the Liver Health Strategy

Key implementation partners

- Federal Department of Health
- The Liver Foundation
- LiverWell
- Hepatitis Australia
- Cancer Council Australia
- National Aboriginal Community Controlled Health Organisation
- Federation of Ethnic Communities' Council of Australia
- Upper GI Cancer NGOs and consumers

Key activities to implement this strategy

- Short term activities
  - Review current federal and state policy approaches to improving liver health
  - Refresh National Hepatitis B and C strategies to better target incidence in at-risk groups
  - Develop National Liver Health Strategy based on evaluation
- Medium term activities
  - Implement National Liver Health Strategy
  - Implement refreshed National Hepatitis Strategies

Draft performance metrics

- Current performance
  - 73 per cent of people living with chronic hepatitis B in Australia are diagnosed
  - 23 per cent of people living with chronic hepatitis B are receiving care
  - 11 per cent of all those with chronic hepatitis B were receiving treatment
  - 25 per cent of Australians living with chronic hepatitis C identified
  - 49 per cent uptake in treatment for people living with chronic hepatitis C
  - 47 per cent of patients with cirrhosis undiagnosed
  - nonalcoholic fatty liver disease projected to increase by 25 per cent by 2030
- 2-year targets
  - Implement National Liver Health Strategy
  - Implement refreshed National Hepatitis Strategies
- 5-year targets:
  - 75 per cent of people living with chronic hepatitis B in Australia are diagnosed
  - 30 per cent of people living with chronic hepatitis B are receiving care
  - 20 per cent of all those with chronic hepatitis B are receiving treatment
  - Less than 40 per cent of patients with cirrhosis undiagnosed
  - Growth in nonalcoholic fatty liver disease reduced by 5 per cent
- 10-year targets:
  - 80 per cent of people living with chronic hepatitis B in Australia are diagnosed
  - 50 per cent of people living with chronic hepatitis B are receiving care
  - 20 per cent of all those with chronic hepatitis B are receiving treatment
  - 50 per cent of Australians living with chronic hepatitis C identified

- 80 per cent uptake in treatment for people living with chronic hepatitis C
- Less than 20 per cent of patients with cirrhosis undiagnosed
- 45 per cent reduction in number of hepatocellular carcinoma cases in the community
- Growth in nonalcoholic fatty liver disease reduced by 10 per cent

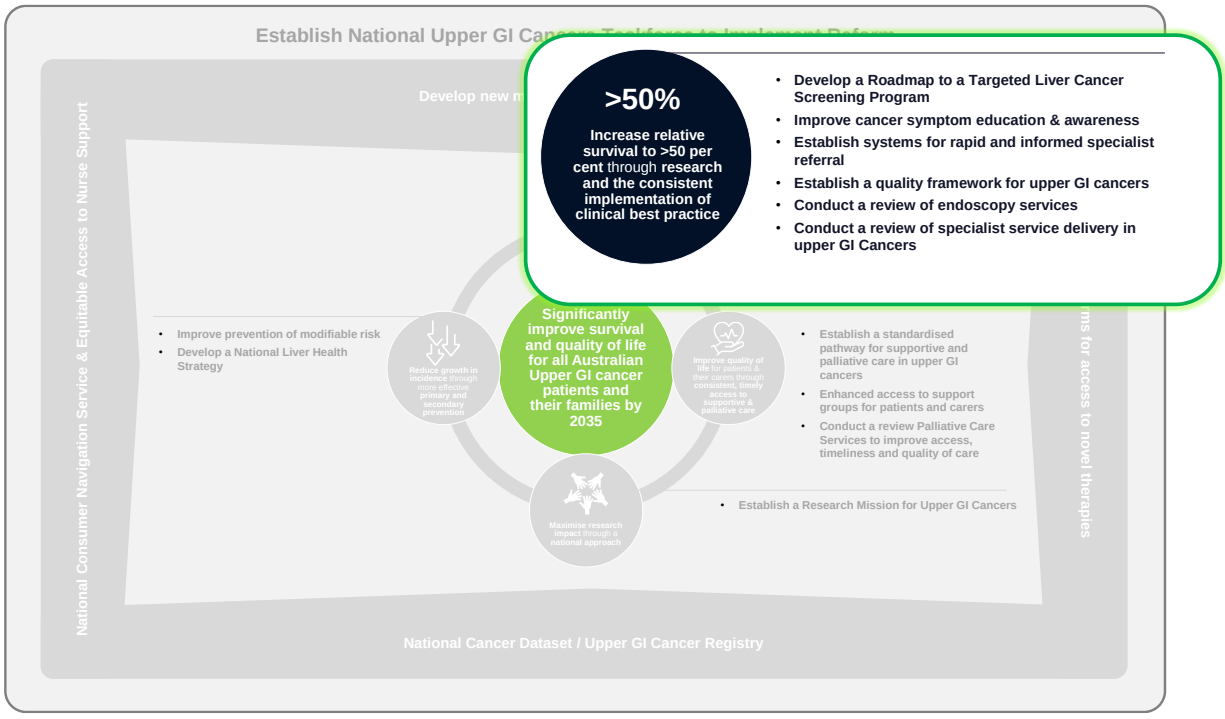
6.3 Increasing relative survival to >50 per cent through research and the consistent implementation of clinical best practice: key strategies, activities and performance targets

Improving survival to be greater than 50 per cent by 2035 will require improvements in early detection, timely diagnosis and referrals, and consistent adherence to clinical best practice as well as significant new research to develop novel treatments.

Research recommendations are addressed in the Research Mission for Upper GI Cancers strategy (see Section 6.5). This section focuses on system reforms and policy improvements required nationally to improve the detection, diagnosis and treatment of upper GI cancers; namely:

- Develop a Roadmap to a Targeted Liver Cancer Screening Program
- Improve cancer symptom education and awareness
- Establish systems for rapid and informed specialist referral
- Conduct a review of endoscopy services
- Establish a quality framework for upper GI cancers
- Conduct a review of specialist service delivery in upper GI Cancers.

Figure 6.4: A plan for action to improve outcomes for upper gastrointestinal cancers – improved survival in focus



Strategy: Develop a Roadmap to a Targeted Liver Cancer Screening Program

A Roadmap for a Liver Cancer Screening Program offers the potential to develop a targeted approach to the surveillance of liver cancer in high-risk cohorts, and thereby promote early detection of hepatocellular carcinoma. The Roadmap would seek to characterise specific risk cohorts based on genetic and environmental (behavioural) risk, and identify cost effective and evidence-based testing for these cohorts. Such an approach would follow similar approaches developed for other cancers, such as breast cancer, and would build on the work of the Cancer Council's Optimising Liver Cancer Control in Australia project.

The strategy is aligned with the National Pancreatic Cancer Roadmap priority area to 'Improve identification of people at high-risk of pancreatic cancer for targeted surveillance'.

The implementation of this strategy has the potential to:

- Increase early-stage detection and consequently increase the use of curative therapies to prolong survival
- Increase 3-year survival to 51 per cent, compared with 28 per cent for those without prior surveillance
- Contribute to the goal of increasing survival to >50 per cent by 2035 for patients with liver cancer (>31,000 patients to be diagnosed over the 2025-2035 horizon).

Box 6.2: Key implementation partners, activities and draft performance metrics for the Roadmap to Targeted Liver Cancer Surveillance Program

Key implementation partners

- Federal Department of Health
- The Liver Foundation
- Hepatitis Australia
- LiverWell
- Cancer Council Australia
- National Aboriginal Community Controlled Health Organisation
- Federation of Ethnic Communities' Council of Australia
- Primary Health Networks
- Australian College of Rural and Remote Medicine
- Upper GI Cancer NGOs and consumers

Key activities to implement this strategy

- Short term activities
  - Systematic review of trials of risk-based population screening in terms of (i) evidence about the benefits and harms for different risk groups and (ii) their potential translation to the Australian health setting.
  - Design or adapt and test existing approaches to targeted surveillance
- Medium term activities
  - Implement a targeted surveillance program

Draft performance metrics

- Current performance
  - 3-year survival for liver cancer: 29 per cent
  - Only 40 per cent of patients diagnosed with hepatocellular carcinoma under liver surveillance at the time of diagnosis

- 2-year targets
  - Review of targeted surveillance options
  - Targeted Liver Surveillance Program design and piloting
- 5-year targets:
  - Targeted Liver Surveillance Program implementation
- 10-year targets:
  - >80 per cent of patients diagnosed with hepatocellular carcinoma under liver surveillance at the time of diagnosis
  - 3-year survival for liver cancer: >50 per cent
  - 5-year survival for liver cancer: >50 per cent

Strategy: Improve education and awareness of signs and symptoms for upper GI cancers

The challenge of upper GI cancers is compounded by the absence or relative vagueness of symptoms, which can mimic a range of other potential conditions once they do appear. At the same time, accelerating the recognition of symptoms among the community and health professionals in primary care settings is essential to giving patients the best odds of accessing curative therapies and minimising the quality of life impacts of the cancer and its treatment. Many patients reported presentation with symptoms which took months and multiple referrals to resolve.

The strategy is aligned with the National Pancreatic Cancer Roadmap priority area to 'Improve primary health professional recognition of signs and symptoms for pancreatic cancer' and would ideally extend that work to include other upper GI cancers. Improving awareness of cancer symptoms is also expected to be a core component of the Australian Cancer Plan.

The implementation of this strategy has the potential to:

- Increase early stage detection, increase the use of curative therapies and prolong survival and quality of life.
- Reduce health service wastage through inappropriate referrals and investigations.

Box 6.3: Key implementation partners, activities and draft performance metrics to improve education and awareness of signs and symptoms for upper gastrointestinal cancers

Key implementation partners

- Federal Government
- Royal Australian College of General Practitioners
- National Aboriginal Community Controlled Health Organisation
- Federation of Ethnic Communities' Council of Australia
- Primary Health Networks
- Australian College of Rural and Remote Medicine
- Other interested stakeholders, potentially including Pharmacy Guild of Australia, and Australian Nursing and Midwifery Federation
- Upper GI Cancer NGOs and consumers

Key activities to implement this strategy

- Short term activities

  - Promotion and communication of signs and symptoms of upper GI cancers through existing channels
  - Develop and implement educational modules on signs and symptoms of upper GI cancers
  - Identify existing decision support tools for assessment of signs and symptoms of upper GI cancers
- Medium term activities
  - Implement upper GI cancer decision support tools

Draft performance metrics

- Current performance
  - More than 50 per cent of patients present two or more times to GP before cancer investigated
  - 18 per cent of hepatobiliary patients experienced 3-6 months from GP presentation to diagnosis
  - 5 per cent of hepatobiliary patients experienced 6-12 months from GP presentation to diagnosis
  - 10 per cent of hepatobiliary patients experienced >12 months from GP presentation to diagnosis
  - 29 per cent of oesophagogastric patients experienced 3-6 months from GP presentation to diagnosis
  - 12 per cent of oesophagogastric patients experienced 6-12 months from GP presentation to diagnosis
  - 12 per cent of oesophagogastric patients experienced >12 months from GP presentation to diagnosis
- 2-year targets
  - Education programs implemented
  - Targeted Liver Surveillance Program design and piloting
- 5-year targets:
  - Implement upper GI cancer decision support tools
- 10-year targets:
  - Less than 50 per cent of patients present two or more times to GP before cancer investigated
  - <10 per cent of patients experience >6 months from GP presentation to diagnosis

Strategy: Establish systems for rapid and informed specialist referral

Due to the relative rarity and complexity of upper GI cancer treatment, research has shown that safety and quality improves in high volume centres for key specialist services, such as surgery. Many patients continue to be referred to low volume centres, particularly for oesophagogastric cancers in some jurisdictions.

As generational change occurs within general practice over the next decade and resource shortages are met through skilled migration, particularly in regional areas, a data-driven system for rapid and informed specialist referrals will become critical.

The strategy is aligned with the National Pancreatic Cancer Roadmap strategy 'Establish systems of rapid and seamless specialist referral' within the key priority area to 'Improve the timeliness of referrals to an appropriate specialist if pancreatic cancer is suspected.'

The implementation of this strategy has the potential to:

- Reduce referrals to centres with low volumes for highly specialised services and in turn, improve patient survival at 5-years
- Improve patient empowerment and informed choice
- Improve patient experience with the health system.

Box 6.4: Key implementation partners, activities and draft performance metrics to establish systems for rapid and informed specialist referral

Key implementation partners

- Federal Government
- State Governments
- Royal Australian College of General Practitioners
- Upper GI Cancer NGOs and consumers
- National Aboriginal Community Controlled Health Organisation
- Federation of Ethnic Communities' Council of Australia
- Primary Health Networks
- Australian College of Rural and Remote Medicine

Key activities to implement this strategy

- Short term activities
  - Identify barriers and enablers to timely referrals into specialist care
  - Develop and test approaches to rapid referral
- Medium term activities
  - Implement systems of rapid and seamless referral into specialist care

Draft performance metrics

- Current performance
  - 14 per cent of oesophagogastric surgery in public hospitals occurs in centres that fail to meet clinical guideline thresholds for case volume
  - 29 per cent of oesophagogastric surgery in private hospitals occurs in centres that fail to meet clinical guideline thresholds for case volume
  - 5-year survival at low volume hospitals for gastrectomy among patients with localised cancer 11.6 per cent
  - 5-year survival at high volume hospitals for gastrectomy among patients with localised cancer 16.8 per cent
- 2-year targets
  - Pilot approaches for rapid referral complete
- 5-year targets:
  - Systems implemented nationally
- 10-year targets:
  - < 10 per cent of oesophagogastric surgery in public hospitals occurs in centres that fail to meet clinical guideline thresholds for case volume
  - < 10 per cent of oesophagogastric surgery in private hospitals occurs in centres that fail to meet clinical guideline thresholds for case volume
  - 5-year survival for all gastrectomy among patients with localised cancer >20 per cent.

Strategy: Conduct a review of endoscopy services

Gastroscopy remains the gold standard tool for diagnosing oesophagogastric cancer in Australia. Therefore, timely diagnosis is impaired to the extent that patients cannot access timely gastroscopy. The current optimal care pathway (OCP) for oesophagogastric cancer recommends that if a patient presents with red flag symptoms, they should be referred for urgent gastroscopy and be seen within two weeks between referral and gastroscopy.

Health service data and consultations indicate these wait times are routinely not met in the public sector, and access to services has been severely compromised by the COVID pandemic. These challenges were not apparent in the private sector but give rise to concerns of a two-tiered health system and again disproportionately disadvantage at-risk groups.

The strategy is aligned with the National Pancreatic Cancer Roadmap key priority area to 'Improve equity of access to appropriate diagnostic and staging modalities for pancreatic cancer,' but is more focused on strategies to increase access to gastroscopy services in the public sector rather than referral pathways and education.

The implementation of this strategy has the potential to:

- Reduce wait times for median and 90th percentiles for urgent gastroscopies in all states, territories and regions
- Improve patient experience with the health system.

Box 6.5: Key implementation partners, activities and draft performance metrics to conduct a review of endoscopy services for upper gastrointestinal cancers

Key implementation partners

- Federal Government
- State Governments
- Australian Commission for Safety and Quality in Health Care
- Gastroenterological Society of Australia
- Upper GI Cancer NGOs and consumers

Key activities to implement this strategy

- Short term activities
  - Identify barriers and enablers for gastroscopy for public patients by state, territory and region
  - Implement reforms to improve access
- Medium term activities
  - Implement systems of rapid and seamless referral into specialist care

Draft performance metrics

- Current performance
  - Median wait times (50th percentile) for urgent gastroscopies exceed two-week recommendations
- 2-year targets:
  - Identify barriers and enablers for gastroscopy for public patients by state, territory and region
  - Implement reforms to improve access
- 5-year targets:
  - Median wait times for urgent gastroscopies fulfill two-week recommendations
- 10-year targets:
  - Median wait times for urgent gastroscopies fulfill two-week recommendations

- 90th percentile wait times for urgent gastroscopies fulfill two-week recommendations

Strategy: Establish a quality framework for upper GI cancers including, OCPs for every cancer, clinical guidelines for every cancer and a clinical care standard for upper GI cancers

Improving adherence to clinical best practice is associated with improved survival and quality of life outcomes. Currently, there is:

- No optimal care pathway (OCP) for biliary cancer, and poor integration of existing OCPs into routine clinical practice
- No clinical guidelines for oesophageal, stomach or biliary cancers, and inconsistent adherence to available guidelines
- No quality framework to measure and drive adherence to clinical best practice, such as the establishment of a clinical care standard through the Australian Commission for Safety and Quality in Health Care.

This results in unwarranted variation in clinical practice, which is associated with potentially preventable adverse outcomes for patients and their families.

This strategy would develop a complete quality framework for upper GI cancers, closing existing gaps in OCPs and clinical guidelines and increasing their consistent use in clinical practice, as well as developing a performance management approach through the use of a clinical care standard to promote consistent adherence to best practice treatment and care.

The strategy is aligned with the National Pancreatic Cancer Roadmap priority area to 'Improve access to specialist multidisciplinary meetings (MDMs) for treatment planning for people diagnosed with pancreatic cancer' and the strategy to 'Strengthen clinical guidance to reduce unwarranted variations in treatments for people with pancreatic cancer.'

The implementation of this strategy has the potential to:

- Significantly contribute to the goal of increasing survival to >50 per cent by 2035 for patients with upper GI cancers.

Box 6.6: Key implementation partners, activities and draft performance metrics for the Quality Framework and Clinical Care Standard for upper gastrointestinal cancers

Key implementation partners

- Federal Department of Health
- Cancer Australia
- State Governments
- Australian Commission for Safety and Quality in Health Care
- Australian and New Zealand Gastric and Oesophageal Surgery Association
- Australian and New Zealand Hepatobiliary Association
- Gastroenterological Society of Australia
- Palliative Care Australia
- National Aboriginal Community Controlled Health Organisation
- Federation of Ethnic Communities' Council of Australia
- Upper GI Cancer NGOs and consumers

Key activities to implement this strategy

- Short term activities
  - Develop an OCP for biliary cancer
  - Develop clinical guidelines for oesophageal, stomach or biliary cancers
  - Establish baseline metrics for quality standard metrics (e.g., access to MDT, discussion of clinical trials, screening for supportive care, early access to palliative care, and define PROMs/PREMs)
- Medium term activities
  - Implement a clinical care standard for upper GI cancers to measure and promote adherence to minimum quality standards established through the clinical guidelines.

Draft performance metrics

- Current performance
  - 5-year survival for Upper GI cancers: 11 per cent to 33 per cent
- 2-year targets
  - Develop an OCP for biliary cancer
  - Develop clinical guidelines for oesophageal, stomach or biliary cancers
- 5-year targets:
  - Implementation of a clinical care standard for upper GI cancers
- 10-year targets:
  - >90 per cent of patients receive care that meets clinical care standard metrics
  - 5-year survival for upper GI cancers: >50 per cent

Strategy: Conduct a review of specialist service delivery in upper GI Cancers

Alongside the development of systems for rapid and informed referral to specialists, a review of specialist service delivery is recommended at a state level to support the implementation of service reforms required to improve survival outcomes for patients.

The strategy is aligned with the National Pancreatic Cancer Roadmap strategy to 'Improve equity of access to high-volume, specialist pancreatic cancer treatment centres.' Ideally, this action within the National Pancreatic Cancer Roadmap could be extended to include other upper GI cancers.

The implementation of this strategy has the potential to:

- Reduce referrals to centres with low volumes for highly specialised services and in turn, improve patient survival at 5-years
- Improve patient empowerment and informed choice
- Improve patient experience with the health system.

Box 6.7: Key implementation partners, activities and draft performance metrics to conduct a review of specialist service delivery in upper gastrointestinal cancers

Key implementation partners

- Federal Government
- State Governments

- Australian and New Zealand Gastric and Oesophageal Surgery Association
- Australian and New Zealand Hepatobiliary Association
- Gastroenterological Society of Australia
- Upper GI Cancer NGOs and consumers

Key activities to implement this strategy

- Short term activities
  - Establish working definition of 'high-volume centre' in order to map and categorise existing centres
  - Create a registry of treatment centres that are considered high-volume/specialised in upper GI cancer treatment across each state and region
- Medium term activities
  - Develop national standards of clinical capability for high-volume, specialist centres in upper GI cancers
  - Develop a nationally agreed minimum dataset and framework for data collection, collation and reporting on clinical quality indicators and national benchmarking

Draft performance metrics

- Current performance
  - 14 per cent of oesophagogastric surgery in public hospitals occurs in centres that fail to meet clinical guideline thresholds for case volume
  - 29 per cent of oesophagogastric surgery in private hospitals occurs in centres that fail to meet clinical guideline thresholds for case volume
  - 5-year survival at low volume hospitals for gastrectomy among patients with localised cancer 11.6 per cent
  - 5-year survival at high volume hospitals for gastrectomy among patients with localised cancer 16.8 per cent
- 2-year targets
  - Establish working definition of 'high-volume centre' in order to map and categorise existing centres
  - Create a registry of treatment centres that are considered high-volume/specialised in upper GI cancer treatment across each state and region
- 5-year targets:
  - Develop national standards of clinical capability for high-volume, specialist centres in upper GI cancers
  - Develop a nationally agreed minimum dataset and framework for data collection, collation and reporting on clinical quality indicators and national benchmarking
- 10-year targets:
  - < 10 per cent of oesophagogastric surgery in public hospitals occurs in centres that fail to meet clinical guideline thresholds for case volume
  - < 10 per cent of oesophagogastric surgery in private hospitals occurs in centres that fail to meet clinical guideline thresholds for case volume
  - 5-year survival for all gastrectomy among patients with localised cancer >20 per cent.

6.4 Improving quality of life for patients and their carers through consistent, timely access to supportive and palliative care: key strategies, activities and performance targets

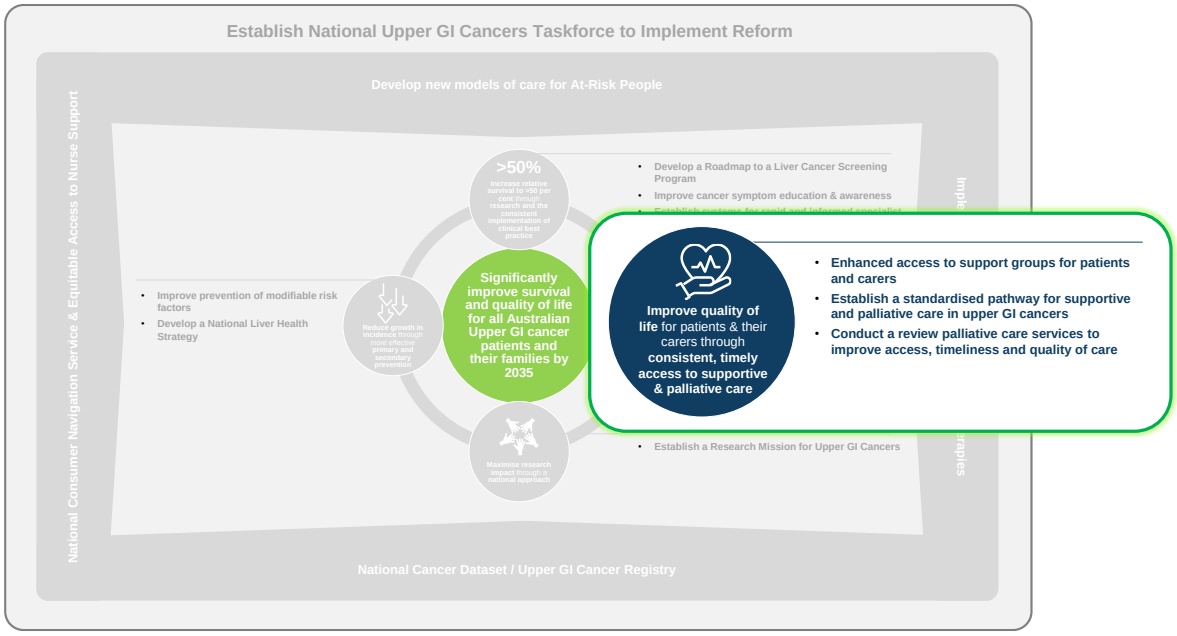
The high symptom and side effect burden of upper GI cancers points to the need for systematic, early and ongoing supportive care interventions for patients and carers; and yet,

there is no standard of supportive care in upper GI cancer patients, critical enabling infrastructure for peer support is needed and there is mixed access to quality palliative care nationally.

Key strategies to meet the goal of improving quality of life for patients and their carers include:

- Enhance access to supportive care, including support groups, for patients and carers
- Establish a standardised pathway for supportive and palliative care in upper GI cancers
- Conduct a review palliative care services to improve access, timeliness and quality of care.

Figure 6.5: A plan for action to improve outcomes for upper gastrointestinal cancers – supportive care in focus



Strategy: Establish a standardised pathway for supportive and palliative care in upper GI cancers

Reflecting recognition that supportive and palliative care is an important element of cancer care, existent gaps in service provision identified within this report should be filled. Research has shown that the optimal provision and/or combination of supportive care services is not well defined and health services implementation research is needed to develop an optimal supportive care service for patients with upper GI cancers.

The strategy is aligned with the National Pancreatic Cancer Roadmap strategy to 'Establish standardised pathway for coordinated supportive care,' 'Promote awareness of pancreatic-specific supportive care services,' 'Educate health professionals on best-practice supportive care,' 'Establish standardised pathway for access to pain management,' 'Promote patient and clinician awareness of interventional pain management,' and 'Educate health professionals on interventional pain management.' Ideally, these actions within the National Pancreatic Cancer Roadmap could be extended to include other upper GI cancers.

The implementation of this strategy has the potential to:

- Reduced presentations prior to treatment (e.g., due to nutrition deficits)

- Increased access to therapies and/or completion of therapies
- Reduced frequency and/or severity of complications
- Shortened postoperative hospital stay
- Reduced hospital readmissions (e.g., due to nutrition deficits)
- Improved quality of life for patients and their families
- Reduction in mortality
- Improved patient experience with health services
- Promote death is preferred place of death.

Box 6.8: Key implementation partners, activities and draft performance metrics to establish a standardised pathway for supportive and palliative care in upper gastrointestinal cancers

Key implementation partners

- Federal Government
- State Governments
- Royal Australian College of General Practitioners
- Primary Health Networks
- Australian College of Rural and Remote Medicine
- Upper GI Cancer NGOs and consumers

Key activities to implement this strategy

- Short term activities
  - Develop structured pathway for supportive care services
  - Enhance provision and strengthen awareness of supportive care services through improved funding of patient support
  - Identify current status and gaps in access to coordinated supportive care
  - Design or adapt and test standardised supportive and palliative care pathway, incorporating rapid access models, for access to supportive and palliative care
  - Develop and implement educational modules on best-practice supportive and palliative care for upper GI cancers
- Medium term activities
  - Strengthen linkages between primary health professionals and specialist multidisciplinary teams
  - Implement standardised supportive care pathway
  - Promote awareness of upper GI supportive care services to health professionals

Draft performance metrics

- Current performance
  - 38 per cent of services do not screen for supportive care services
- 2-year targets
  - Identify current status and gaps in access to coordinated supportive care
  - Design or adapt and test standardised supportive care pathway, incorporating rapid access models, for access to supportive care
  - Develop and implement educational modules on best-practice supportive care for upper GI cancers

  - <20 per cent of service providers do not screen for supportive care services
- 5-year targets:
  - Strengthen linkages between primary health professionals and specialist multidisciplinary teams
  - Implement standardised supportive and palliative care pathways
  - Promote awareness of upper GI supportive care services to health professionals
  - <10 per cent of services do not screen for supportive care services
- 10-year targets:
  - < 5 per cent of patients not screen for supportive care services

Strategy: Enhanced access to support groups for patients and carers

People with cancer and their carers can suffer significant psychological morbidity, including clinically significant anxiety and depression. These disorders have a major impact on the person's functioning, and that of their family.[325] Negative emotions experienced by patients and their carers can include fear, anxiety, sadness, depression, and anger. Many patients and their carers can come to feel isolated with these negative emotions and can find it hard to discuss it with health professionals, family, or friends.

Consistent screening for supportive care needs and referrals to supportive care services, including support groups are essential to improving patient and carer quality of life. Stakeholders reported consistent poor awareness of available patient support services, with inconsistent referral to critical allied health, psychosocial and palliative care services.

In addition to improving awareness and referral of patient support services, there was a significant gap in the availability of support groups. Support groups can help patients and carers in a variety of ways, including the transfer of information, practical assistance and emotional empathy and comfort:

- *Informational support* can increase knowledge, understanding and coping skills, thus enhancing a sense of control
- *Practical support* provides practical assistance with activities of daily living, finances, transportation and other illness related tasks
- *Emotional support* is based on empathetic communications between patients and their support network, intended to enhance self-confidence and self-esteem, reduce negative feelings, and improve relationships.

Done well, support groups can significantly improve quality of life across a number of domains, including improvements in depression, anxiety and social functioning.

There are limited support groups for upper GI cancers available in Australia, which represents a critical gap in the core supportive care infrastructure for these patients and their families. This strategy would see the consistent referral of patients to patient support services and the formal establishment of a support group infrastructure, potentially linked to international support group networks as well. Furthermore, it would see expansion of existing support groups, and investment in new support groups to reach additional patients and carers.

[325] Clinical practice guidelines for the psychosocial care of adults with cancer, prepared by the National Breast Cancer Centre and the National Cancer Control Initiative Funded by the Department of Health and Ageing, A National Health Priority Area Initiative, 2003, https://www.canceraustralia.gov.au/sites/default/files/publications/pca-1-clinical-practice-guidelines-for-psychosocial-care-of-adults-with-cancer_504af02682bdf.pdf

There is no equivalent strategy recommended in the National Pancreatic Cancer Roadmap.

The implementation of this strategy has the potential to:

- Improve quality of life for patients and their families
- Improve health service utilisation
- Reduce morbidity and mortality from adverse psychosocial effects of upper GI cancers
- Improve patient experience with health services
- Contribute to reduced burden on the health care system.

Box 6.9: Key implementation partners, activities and draft performance metrics to enhance access to support groups for patients and carers

Key implementation partners

- Upper GI Cancer NGOs and consumers
- Federal Government
- State Governments

Key activities to implement this strategy

- Short term activities
  - Expand access to patient support services
  - Review Australian and international best practice models for support groups in upper GI cancers, including peer support and professionally-led support groups
  - Develop and implement first generation support network for upper GI cancers
  - Promote support networks with health professionals
- Medium term activities
  - Review support network strategy and refine as required

Draft performance metrics

- Current performance
  - Less than five per cent of patients access patient support services
  - Limited to no support groups for upper GI cancers in Australia
- 2-year targets
  - Support enhanced access to patient support services
  - Develop and implement first generation support network for upper GI cancers
  - Promote support networks with health professionals
  - Implement consistent screening for supportive care services
  - >50 per cent of patients screened for supportive care services
  - >50 per cent of patients made aware of support group options at diagnosis
  - >10 per cent of patients access patient support services
- 5-year targets:
  - >90 per cent of patients screened for supportive care services
  - >90 per cent of patients made aware of support group options at diagnosis
  - >20 per cent of patients access patient support services

- 10-year targets:
  - >90 per cent of patients made aware of support group options at diagnosis
  - >90 per cent of patients screened for supportive care services
  - >50 per cent of patients access patient support services

Strategy: Conduct a review palliative care services to improve access, timeliness and quality of care

Palliative care was reported to be rarely included in MDTs, most often due to reported shortages of palliative care specialists. Patients and carers highlighted concerns regarding the quality of palliative care in some institutions, with one suggesting that an inquiry may be warranted. Beyond the improved quality of life for patients, the appropriate provision of palliative care can also prevent hospital admissions and shift care away from expensive inpatient settings.

A review of palliative care services to ensure sufficient supply and training for specialists and nurses is needed to improve equitable and timely access to palliative care services for upper GI cancer patients.

The strategy is aligned with the National Pancreatic Cancer Roadmap strategy to 'Improve equity of access to specialist expertise in early intervention pain management for people with pancreatic cancer.'

The implementation of this strategy has the potential to:

- Improved quality of life for patients and their families
- Improve health services utilisation
- Improved patient experience with health services.

Box 6.10: Key implementation partners, activities and draft performance metrics to review palliative care services to improve access, timeliness and quality of care

Key implementation partners

- Federal Government
- State Governments
- Palliative Care Australia
- Upper GI Cancer NGOs and consumers

Key activities to implement this strategy

- Short term activities
  - Identify current status and gaps in access to early intervention pain management by state, territory, region and setting (public and private)
  - Design or adapt and test standardised supportive care pathway incorporating rapid access and quality models to pain management expertise
- Medium term activities
  - Implement standardised supportive care pathway
  - Implement workforce strategy for palliative care specialists as appropriate

Draft performance metrics

- Current performance
  - 0.9 full time equivalent specialist palliative medicine physicians per 100,000 population

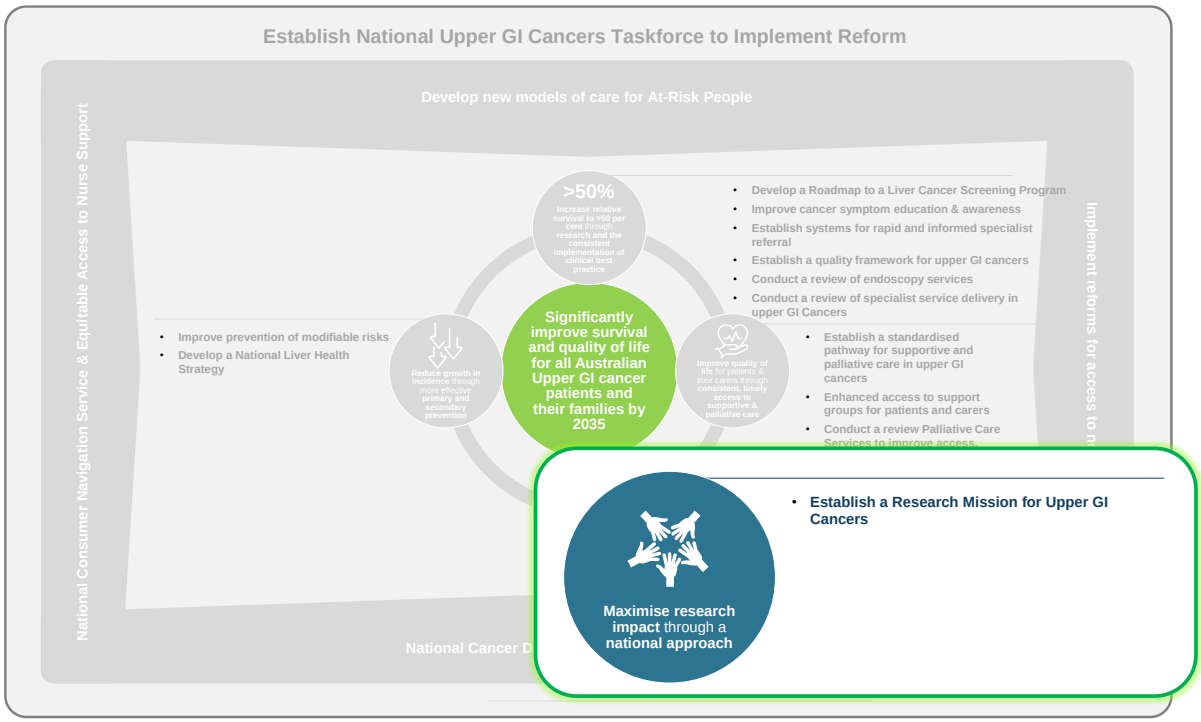
  - 12.0 full time equivalent palliative care nurses per 100,000 population, which is equivalent to the number of palliative care nurses in 2013
- 2-year targets
  - Identify current status and gaps in access to early intervention pain management by state, territory, region and setting (public and private)
  - Design or adapt and test standardised supportive care pathway incorporating rapid access and quality models to pain management expertise
- 5-year targets
  - Implement standardised supportive care pathway
  - Implement workforce strategy for palliative care specialists as appropriate

6.5 Maximising research impact through a national approach: key strategies, activities and performance targets

Funding for upper GI cancer research has been shown to be historically underfunded in Australia and this contributes to the poor outcomes observed for patients and their families. To correct the persistent disparity in survival observed for upper GI cancers, a nationally coordinated approach is needed and has been recommended by the Senate Select Committee in 2017. Moreover, because upper GI cancers are relatively rare cancers, this frustrates commercial incentives for research funding and increases the returns from publicly funded collaboration to correct these market barriers to investment.

The development of a Research Mission for Upper GI Cancers naturally follows from the Senate Select Committee's calls for a national research program for low survival cancers. Research Missions are long-term, 10-year strategies that include major funding for research directed at a series of priority areas. Significant examples include Research Missions funded for cardiovascular disease and brain cancer, among others. These Research Missions provide the national infrastructure needed to execute successfully a large, multi-site, multi-year program.

Figure 6.6: A plan for action to improve outcomes for upper gastrointestinal cancers – research in focus



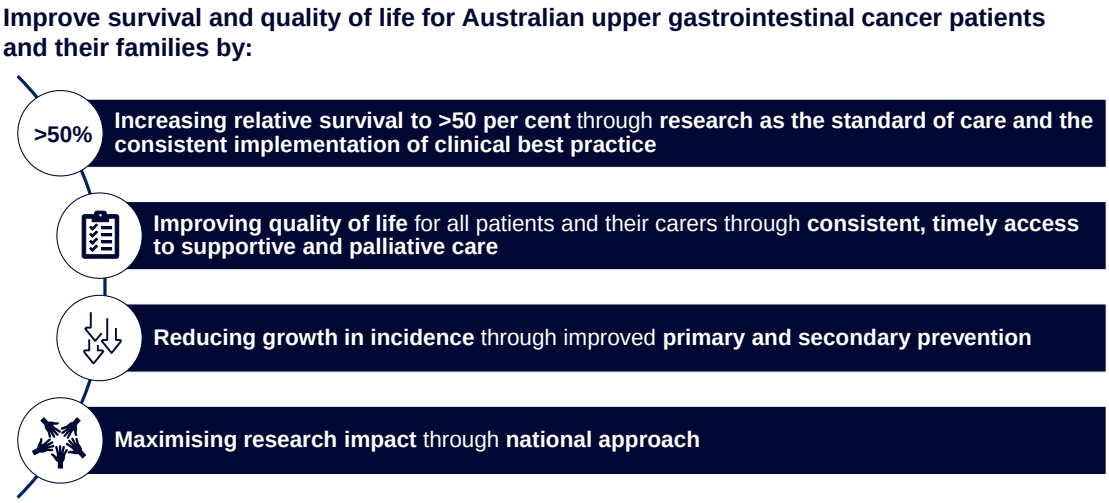
Research Missions typically articulate long-term, aspirational visions or ambition statements, which are then underpinned by a series of mission goals and include funding for core enabling infrastructure and the establishment of governance models that facilitate a nationally coordinated approach. Together with upper GI cancer community leadership, including leading clinicians, researchers and consumers as well as government organisations and a range of charitable organisations, a vision and goals statement, priority areas for investment, governance model and infrastructure were debated and agreed.

Such an approach is also aligned to the National Pancreatic Cancer Roadmap, which similarly recommended the development of a Pancreatic Cancer Research Strategy.

Vision and goals for the Upper GI Cancer Research Mission

The vision and goals for the Upper GI Cancer Research Mission was refined in partnership with the Research Summit participants, and mirrors the State of the Nation vision and goals for upper GI cancers (Figure 6.7).

Figure 6.7: Upper Gastrointestinal Cancer Research Mission vision and goals



Priority areas for research investment

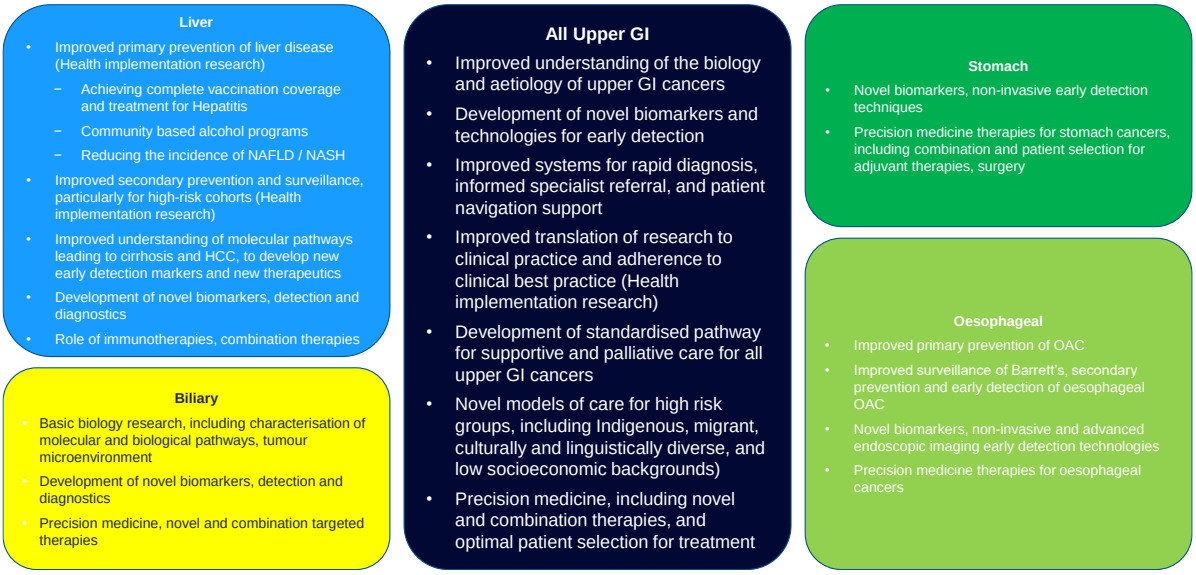
Research priority areas for investment were then discussed and refined. It was agreed that priorities should be defined that were shared across all Upper GI cancers, in addition to cancer-specific research priorities. Research objectives common to all upper GI cancers (Figure 6.8) included:

- Improved understanding of the biology and aetiology of upper GI cancers
- Development of novel biomarkers and technologies for early detection
- Improved systems for rapid diagnosis, informed specialist referral, and patient navigation support
- Improved translation of research to clinical practice and adherence to clinical best practice (health implementation research)
- Development of standardised pathways for supportive and palliative care for all upper GI cancers
- Novel models of care for high-risk groups, including Indigenous, migrant, culturally and linguistically diverse, and low socioeconomic backgrounds)

- Precision medicine, including novel and combination therapies, and optimal patient selection for treatment

Critically, these research priorities align to the strategies identified as part of the wider action plan for upper GI cancers. The Research Mission should be developed to support evidence development and health services implementation reform in addition to basic science and treatment research needed to deliver further improvements in survival compared to current best practice capabilities.

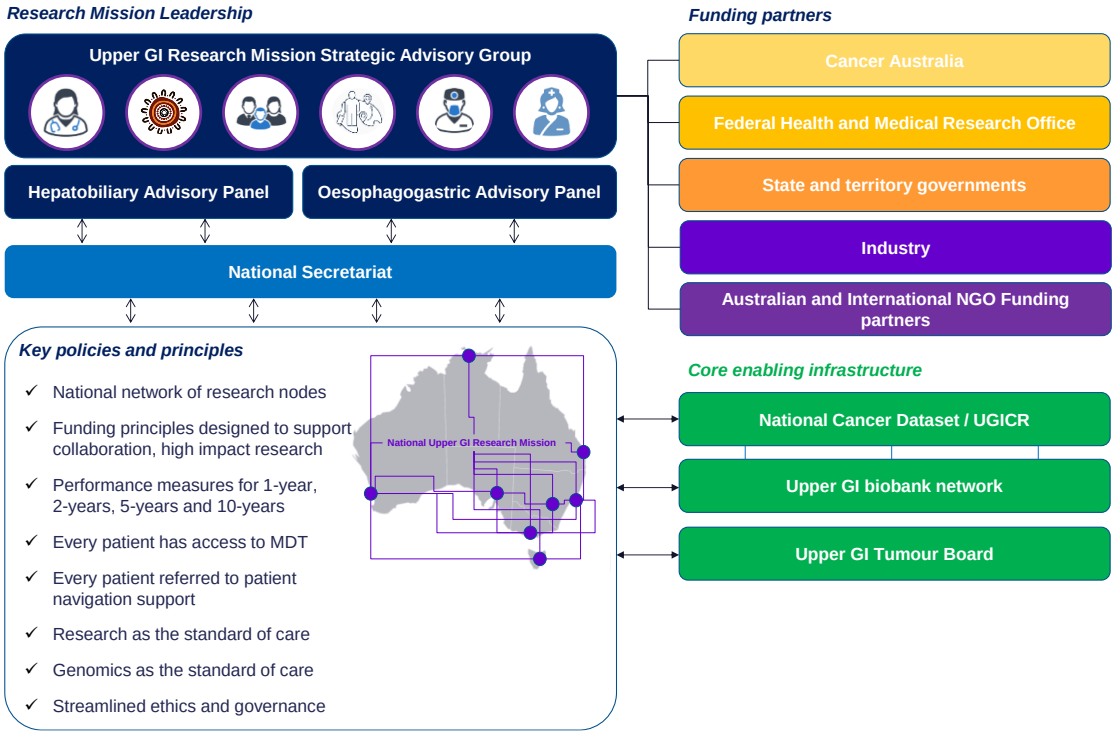
Figure 6.8: Upper Gastrointestinal Cancer Research Mission priority areas for investment



Governance model and enabling infrastructure, policies

A governance model was proposed following precedent Research Mission governance approaches; four key elements to the Research Mission operational model included: Research Mission leadership and organizational considerations, potential funders, key policies and principles as well as core enabling infrastructure.

Figure 6.9: Upper Gastrointestinal Cancer Research Mission governance model



Organisational considerations for Research Mission Leadership

To support and lead the development of the Research Mission's a first order of business would be to form a Strategic Advisory Group, which should be co-chaired by a researcher and a consumer representative, with the membership of the Advisory Group to include:

- Research and clinical leaders from across a cross section of cancers, research fields and disciplines, including oncology, surgery, nursing, palliative care, primary health and other allied health services
- Patients and carers
- Aboriginal health leaders
- Leaders from FECCA's Multicultural Health Collaborative.

This will allow the explicit consideration of, and engagement with, patients and carers, including at-risk communities in particular. The Advisory Group should reflect the multidisciplinary nature of treatment and care in upper GI cancers.

The Strategic Advisory Group will:

- Establish a national, virtual network of research nodes across Australia, organised around cancer focus and research themes. This is aligned with the National Pancreatic Cancer Roadmap recommendations for research.
- Establish cancer and research theme working groups to advise and report to the Strategic Advisory Group on the allocation of research funding.
- Work in partnership with, and report to, funding organisations.
- Develop funding principles for the allocation of Research Mission funding based on precedent Research Mission model approaches.
- Form a national secretariat to manage the administration of the Research Mission and facilitate applications and collaboration across the research network, thereby maximising the output of the Mission and reducing administrative cost duplication.
- Develop a performance reporting framework for the Research Mission.

Funding model

Due to the significant research task for the Upper GI Cancer Research Mission, funding of 10 years with ongoing annual, 2-year and 5-year reporting to be required.

Because benefits from the Research Mission will be captured across health system, a partnership model of funding is recommended bringing together federal (MRFF), state and NGO sector funding.

Policies and principles

The Research Mission will operate according to agreed policies and principles.

Funding will be allocated in accordance with principles established by the Strategic Advisory Group. Examples of the types of principles that have been developed for other Research Missions are provided in Box 6.11.

Box 6.11: Example funding principles – Cardiovascular Research Mission principles

- Foster collaboration and harness resources across the system to deliver improved health outcomes for Australians, and to minimise duplication

- Support excellence and novelty, including through competitive and transparent peer-review processes
- Support people, programs, platforms and urgent capacity-building initiatives; enhance collaboration and translation across the research system
- Facilitate the best cross-disciplinary teams to tackle identified inequalities in health care access, provision and outcomes, with particular consideration of sex and ethnicity
- Develop innovative and cost-effective approaches to primary and secondary prevention, early detection, treatment and long-term care, including reducing duplication and waste in research
- Promote deep engagement with health services, government and nongovernment organisations, industry, patients and caregivers
- Support leverage from other funding sources, including philanthropic, industry and international contributions
- Support a vibrant and enduring research ecosystem.

Services participating in the Research Mission will follow clinical best practice as a member of the Research Mission, with research to be the standard of care:

- Every patient will be consented to participate in research
- Every patient will have access to a multidisciplinary team (MDT)
- Every patient will receive genetic and genomic testing
- Every patient and their family will be assessed for supportive and palliative care needs
- Every patient and carer will be referred to consumer navigation support
- Eligibility for clinical trials enrolment reviewed for every patient in the Research Mission (noting not all patients will be able to be enrolled)

As part of the Mission's establishment, ethics and governance pre-approval for all research nodes will be agreed and coordinated by the secretariat function.

Core enabling infrastructure required

The Research Mission will specify a national network of accredited laboratories and biobanks to ensure technical capability, quality, economies of scale in diagnostics, with sequencing to be reviewed by a National Upper GI Tumour Board.

All data from the national network will be captured and reported into the Upper GI Cancer Registry (UGICR) and a national, cloud-based Upper GI cancer dataset.

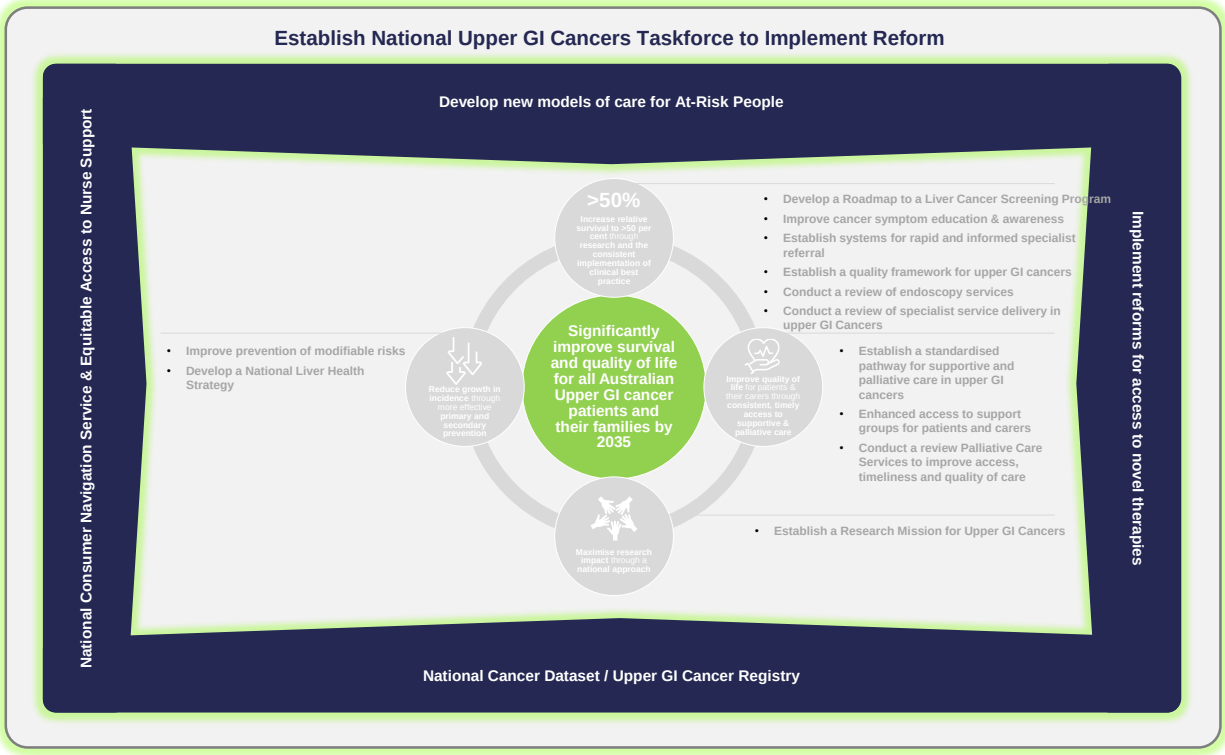
6.6 Core enabling activities and infrastructure needed

In addition to the key strategies and activities required to realise the vision and goals for upper GI cancers by 2035, there is also core enabling infrastructure and activities that must be funded to deliver the vision and goals. These include:

- The establishment of a National Upper GI Cancer Taskforce
- The development of new models of care for at-risk people, including in particular Aboriginal and Torres Strait Islander people, culturally and linguistically diverse communities, new migrants, Australians from low socioeconomic backgrounds and regional Australians
- The development of a National Australian Cancer Dataset and expansion of the Upper GI Cancer Registry

- The development of a National Consumer Navigation and Nurse Support Service
- The implementation of reforms to improve access to novel therapies.

Figure 6.10: A plan for action to improve outcomes for upper gastrointestinal cancers – enablers in focus



Governance model for national implementation of policy reform and investment

The Australian Cancer Plan will bring together stakeholders nationally to deliver reforms aimed at improving outcomes across all cancers; this is an effective and efficient approach. Building off this national model is the opportunity to bring together stakeholders to similarly deliver reforms that are upper GI specific. The development of such a model is particularly important in light of the absence of a CoAG style model for collaborative reform in Australia's federated model of health care. It is recommended a National Upper GI Cancer Working Group is established to implement recommended reforms that are not addressed through a pan-cancer focus as part of the Australian Cancer Plan.

Establish National Cancer Dataset and Expand Upper GI Cancer Clinical Registry

This *ad hoc* and duplicative approach to data collection impedes a national research agenda and enables variability in cancer care.

The Upper GI Cancer Registry (UGICR) represents important national infrastructure aimed at addressing this fundamental barrier to improving treatment and care in upper GI cancers. The UGICR is limited to participating institutions, which leaves out important elements of Australia's health care system.

Investment is urgently needed to develop a complete dataset through the development of a National Cancer Dataset and complete clinical quality dataset through the UGICR.

Developing a National Australian Cancer Dataset would involve:

- The development of a shared cancer record for cancer patients, potentially leveraging the MyHealth Record functionality

- A software service to link source systems and report data into a National Cancer Dataset
- A clinician portal for clinical staff involved in delivery of care to cancer patients
- Tools to enhance the delivery of multi-disciplinary meetings by tumour streams
- A research portal for cancer researchers to access research information and gain access to collaboration tools
- A data governance model and data profile to enable implementation of a cancer research information exchange.

The technical solutions needed to deliver such a service are mature and ready to be implemented. Australia does not need to develop these technologies, rather, it should work with 'off-the-shelf' technologies already in use overseas, such as the approach being pursued by the National Cancer Institute to develop a National Cancer Data Ecosystem.

This is a core, national service that should be delivered as part of the Australian Cancer Plan with an ambitious 5-year target for operations.

Establish a National Consumer Navigation Service and Equitable Access to Nurse Support

The development of a Consumer Navigation Service, integrated with specialist upper GI cancer nurse support is core infrastructure to enable timely, equitable access to safe, quality cancer care for people diagnosed with upper GI Cancers and their families. Consumer navigation services are particularly important for patients with high unmet needs and low health literacy, and offer an important tool to improve engagement and support to at-risk groups.

Critically, the service should developed to allow for the triaging of support, with basic online and telephone based support able to be delivered through a range of platforms and services to most patients, focused on better understanding their cancer and simple service navigation requests. More complex queries could be referred to increasing levels of support, beginning with trained cancer care coordinators, which would not need to hold nursing qualifications, through to oncology and specialist upper GI nurse support. The national service should leverage and integrate available patient support services (including peer support) to optimise service delivery outcomes.

An integrated nurse support service should also be developed with reference to the development of nationally equitable approach to nurse funding. Applying similar nurse-to-incidence ratios applied in breast cancer to liver, biliary, stomach and oesophageal cancers would, for example, would see approximately 45 additional specialist upper GI cancer nurses funded nationally, at a cost of $24 million over four years. This nursing support should be allocated across health services nationally in accordance with need based on a review of current capabilities and service requirements.

The recommendation for the development of a Consumer Navigation service is aligned with the National Pancreatic Cancer Roadmap key priority area to 'Improve patient navigation and care coordination at point of diagnosis for patient support' and is expected to be a core deliverable of the Australian Cancer Plan.

Key activities:

- Short term activities:
  - Review service needs for upper GI cancer patients ranging from basic informational requirements through to complex supportive care with reference to existing services and potential access gaps nationally

  - Design or adapt and test existing models of cancer care coordination, including virtual care models
  - Expand access to specialist upper GI nurses based on national model
- Medium term activities
  - Implement models of care coordination from the point of diagnosis.

Develop new models of care for at-risk people

This report has shown the risks for key at-risk people are disproportionately large (Figure 6.13):

- Aboriginal and Torres Strait Islander and Asian populations are 2.8 times more likely to be infected with H. pylori
- New migrants and Aboriginal and Torres Strait Islanders account for 75 per cent of people with hepatitis B
- 8 in 10 new cases of Hepatitis C in Australia result from the unsafe injecting of drugs
- Rates of daily smokers is between 4 and 10 times higher for persons from low socioeconomic backgrounds, diverse cultural backgrounds and in regional areas.
- Lifetime risk from excess alcohol consumption is 70 per cent higher among Aboriginal males than the general population.

These communities engage less readily with existing health services, facing range of barriers to access and often present later for treatment. Due to the complexity of curative treatment provided for upper GI cancers, vulnerable patient groups with poorer performance scores, and more comorbidities, are less likely to receive curative treatment and have worse outcomes. Further, Indigenous Australians, rural patients, culturally and linguistically diverse and those with low health literacy have low reduced access to clinical trials and are less empowered to obtain best practice treatment.

New models of care are required from primary and secondary prevention through to diagnosis, treatment and supportive care.

This strategy is aligned to the National Pancreatic Cancer Roadmap Key Priority Area to 'Improve the provision of culturally appropriate models of care for Aboriginal and Torres Strait Islander people and people from culturally and linguistically diverse backgrounds affected by pancreatic cancer and their carers' strategy to 'Establish culturally appropriate care models.'[326]

Within the next two years, key short-term activities to deliver this strategy include:

- Engage with FECCA and the Council of Peaks / NACCHO to codesign more effective models of care for new migrants and Aboriginal and Torres Strait Islander people as part of a refresh of National Hepatitis Strategies
- Explore new models of primary care for at-risk groups through the Primary Health Care Plan 2022-2032, including potential enrolment models
- Develop new models of care for rapid diagnosis and specialist referral

[326]See: https://pancreaticroadmap.canceraustralia.gov.au/key-priority-area/improve-the-provision-of-culturally-appropriate-models-of-care-for-aboriginal-and. Short term activities for this strategy included: Codesign or adapt and test models of culturally appropriate care. Medium term activities included Implementation of models of culturally appropriate care and increased inclusion of cultural experts on specialist MDTs aligned to the OCPs.

- Develop new models of care for treatment and supportive care.

Within five years, key medium-term activities to deliver this strategy include:

- Implement new models of culturally appropriate care
- Strengthen inclusion of cultural experts on specialist multi-disciplinary teams (MDTs) aligned to the OCPs.

Implement reforms to enable access to novel therapies

To substantially improve outcomes for patients within the 2035 horizon, improved access to novel therapies is needed, this will require the timely implementation of reforms recommended by the Zimmerman Review in 2021 and clinical trials reforms being implemented by the Australian Commission for Safety and Quality in Health Care:

- Improving routine access and pathways for novel therapies with the implementation of Zimmerman Review recommendations, including recommendations for the establishment of a Centre for Precision Medicine and Rare Diseases, a National Genomics Testing Program, an Office of Clinical Evaluation, a Breakthrough Devices Program, and an annually capped fund to support access to novel therapies where there is no private incentive for listing as well as other reforms to streamline access to novel diagnostics and therapies.
- Improving access through rapid clinical trials reforms to develop a National One Stop Shop for health-related human research approvals and the National Clinical Trials Front Door.

The rapid implementation of these reforms to improve access to novel technologies is particularly important in upper GI cancers where significant innovation is needed to improve outcomes.

6.7 Conclusion: immediate next steps for action

Working together, with long-term funding support from governments and the NGO sector, this plan has the potential to deliver significant improvements for patients and their families, as well as the wider health care system and to Australian community. This plan will prevent disease and cancer in the community, substantially increase long-term survival, and improve quality of life for patients and their families today through consistent and enhanced access to supportive care.

The Pancare Foundation calls on the Australian Government to:

- Improve outcomes for patients immediately by funding increased access to patient support services to close gaps in access to supportive care
- Fund increased access to specialist nursing support for Upper GI cancers nationally
- Fund an Upper GI Cancer Research Mission
- Respond to the recommendations of this report with a plan for expanding the reform agenda for Pancreatic Cancer to include Upper GI Cancers, reflecting their low survival outcomes and high unmet supportive care needs
- Establish a National Upper GI Cancer Working Group as part of the Australian Cancer Plan to support interjurisdictional policy reform and investment for upper-GI specific actions.

Appendix A
Care pathways for Upper GI cancers

A.1 Risk factors, prevention and early detection

Global patterns in upper GI cancer incidence are driven by risk factors.

Upper GI cancers have many common lifestyle risk factors, e.g., obesity, tobacco smoking and alcohol consumption. However, the strength of relation varies. Infectious risk factors are major risk factors for a subset of cancers, particularly hepatitis for liver cancer and H. pylori for gastric cancer. Notwithstanding, there are few medical conditions which are risk factors for all upper GI cancers.

Some of these risk factors are preventable or manageable, through either primary or secondary prevention, e.g., lifestyle risk factors (and resultant medical conditions), and viral risk factors.

Table A.1: Risk factors

Risk factors	Oesoph. AC	Oesoph. SCC	Stomach	Liver (HCC)	Biliary / Liver iCCA	Biliary eCCA, gallbladder and other
Lifestyle factors						
Tobacco use	✓·	✓·	✓·	✓·	✓·	✓·
Alcohol consumption	✓·	✓·	✓·	✓·	✓·	✓·
Obesity	✓·	✓·	✓·	✓·	✓·	✓·
Low fresh fruit and vegetables, overconsumption of highly processed meats	✓		✓·			
Frequent consumption of very hot liquids		✓				
Overconsumption of salted foods			✓			
Insufficient physical activity	✓	✓	✓			
Substance exposure, including: Thorium dioxide and thorotrast, Ethylene dichloride or 1,2-Dichloropropane, Trichloroethylene (TCE),	✓ (Soots, Thorotrast)	✓ (Thorotrast)	?(Asbestos)	✓ (Anabolic steroids, Aflatoxins, Thorotrast. Trichloroethylene, Tetrachloroethylene)	✓ (Thorotrast, 1,2-Dichloropropane, Asbestos)	✓ (Thorotrast, 1,2-Dichloropropane, Asbestos)

Risk factors	Oesoph. AC	Oesoph. SCC	Stomach	Liver (HCC)	Biliary / Liver iCCA	Biliary eCCA, gallbladder and other
Tetrachloroethylene (perchloroethylene, PCE), Vinyl chloride, Asbestos, Anabolic steroids, Aflatoxins, Soots						
Viral, bacterial or parasitic						
Viral hepatitis B (HBV)			?	✓✓·	✓✓·	✓·
Viral hepatitis C (hepatitis C)			?	✓✓·	✓✓·	✓·
Helicobacter pylori			✓·			
Epstein Barr virus			✓·			
Liver fluke					✓✓·	✓✓·
Human papillomavirus (HPV)		✓✓·	?			
Human immunodeficiency virus (HIV)			?		?	
Medical conditions						
Reflux / GORD	✓·	✓·	✓·			
Barrett's oesophagus	✓·					
Other oesophageal conditions and related diseases	✓· (Achalasia)	✓· (Achalasia, Plummer-Vinson syndrome)				
Gastritis, or long-term stomach inflammation			✓·			
Gastric polyps (hyperplastic, adenomas and early adenocarcinoma)			✓·			
Cirrhosis and non-alcoholic fatty liver disease (NAFLD)				✓·	✓iCCA	

Risk factors	Oesoph. AC	Oesoph. SCC	Stomach	Liver (HCC)	Biliary / Liver iCCA	Biliary eCCA, gallbladder and other
Fatty liver disease (FLD), non-alcoholic steatohepatitis (NASH)				✓·		
Other diseases such as Tyrosinemia, Alpha1-antitrypsin deficiency, Porphyria cutanea tarda, Glycogen storage diseases and Wilson disease.				✓·		
Choledochal or bile duct cysts					✓·	✓·
Cholelithiasis and cholecystolithiasis, hepatolithiasis and choledocholithiasis					✓·	✓ No hepatolithiasis
Primary sclerosing cholangitis					✓·	✓·
Other diseases such as Caroli disease, chronic pancreatitis, inflammatory bowel disease, hemochromatosis					✓·	✓·
Diabetes	✓·	✓·	✓·	✓·	✓·	✓·
Genetic and other risk factors						
Male sex	✓·	✓·	✓·	✓·		
Age	✓·	✓·	✓·	✓·	✓·	✓·
Family history	✓·	✓·	✓·	✓·	? (mixed)	? (mixed)
Tylosis (Howel-Evans syndrome) Bloom syndrome Fanconi anemia Familial Barrett's esophagus	✓·	✓·				
Lynch syndrome			✓·		✓·	✓·

Risk factors	Oesoph. AC	Oesoph. SCC	Stomach	Liver (HCC)	Biliary / Liver iCCA	Biliary eCCA, gallbladder and other
Familial adenomatous polyposis (FAP) Gastric adenoma and proximal polyposis of the stomach Li-Fraumeni syndrome Peutz-Jeghers syndrome (PJS)			✓·			
Hereditary hemochromatosis				✓·		
Glycogen storage diseases,				✓·		
Cystic fibrosis						✓·

Among all upper GI cancers, symptoms are often limited in early stages. This means that early detection can be difficult. Symptoms are also ambiguous and can be misdiagnosed.

Table A.2: Symptoms

Risk factors: Medical conditions	Oesophageal AC	Oesophageal SCC	Stomach	Liver (HCC)	Biliary / Liver iCCA	Biliary eCCA, gallbladder and other
Difficulty swallowing	✓·	✓·				
Reflux / GORD / Heartburn	✓·	✓·	✓·			
Hoarseness	✓·	✓·				
Long lasting cough	✓·	✓·				
Vomiting	✓·	✓·	✓·	✓·	✓·	✓·
Coughing up blood	✓·	✓·	✓·	✓·		
Nausea	✓·	✓·	✓·	✓·	✓·	✓·
Itching				✓·	✓·	✓·
Jaundice				✓·	✓·	✓·
Pain in throat	✓·	✓·				
Dark urine and pale stools				✓·	✓·	✓·
Unexpected weight loss	✓·	✓·	✓·	✓·	✓·	✓·
Pain in tummy			✓·	✓·	✓·	✓·
Swollen or bloated tummy / abdomen			✓·	✓·	✓·	✓·
Loss of appetite	✓·	✓·	✓·	✓·	✓·	✓·

While Australia does not have any nation wide screening programs, surveillance is encouraged for at-risk cohorts. Specifically, for patients with Barrett's oesophagus (for oesophageal cancer) and with cirrhosis or hepatitis B (for liver cancer).

Table A.3: Surveillance and early detection

Surveillance and early detection	Australian approach
Oesophageal cancer	For oesophageal AC, high-risk populations include patients with Barrett's oesophagus. Patients should undergo surveillance based on dysplasia. Patients with high grade dysplasia should undergo treatment (endoscopic eradication therapy).
Stomach cancer	NA
Biliary cancer	NA

Liver cancer (HCC specifically)	Australia does not have a population screening program for HCC. Surveillance in high-risk groups (biannual liver US with or without AFP), including:
	• All patients with cirrhosis
	• In patients with HBV (without cirrhosis):
	  ○ African-background patients from age 20
	  ○ Asian-background males from age 40
	  ○ Asian-background females from age 50
	  ○ Caucasian patients from age 50
	• Patients with chronic viral hepatitis or family history of HCC

A.2 Investigations and Diagnosis

After realising symptoms, patients present to the GP or emergency department.

Optimal care pathways for oesophagogastric cancer highlight several alarm symptoms whereby urgent gastroscopy should be referred, including dysphasia. These should be obtained within two weeks of referral.

Among upper GI cancers, there is general homogeneity among diagnostic imaging tools used. Endoscopy, with or without ultrasound are frequently used for diagnosis, paired with CT scans or MRIs for detecting spread and metastases. Gastroscopies are generally considered the gold standard tool for diagnosing oesophageal and stomach cancer.

Histopathological analysis of biopsies is used to diagnose upper GI tumours where there remains uncertainty regarding cancer stage, and where there are benefits for cancer management. Historically, limited biopsy has been done due to limited use. However, reflecting innovations in targeted therapies and immunotherapies, there is increasing emphasis on taking biopsies, and undertaking further pathological testing.

Table A.4: Diagnostic testing

Tests/information	Oesophageal	Stomach	Liver (HCC)	Biliary
Initial investigations				
Medical history	✓·	✓·	✓·	✓·
Recent issues	✓·	✓·	✓·	✓·
Family history	✓·	✓·	✓·	✓·
Nutritional status (weight, appetite, stool and bowel changes)	✓·	✓·	✓·	✓·
General wellbeing	✓·	✓·	✓·	✓·
Physical examination (Chest, Abdomen, Lymph)	✓·	✓·	✓·	✓·
Send for blood tests (full blood count, liver, kidney and renal function)	✓·	✓·	✓·	✓·
Send for biomarker or tumour tests (CA19-9, CEA, AFP)			AFP	CA19-9, CEA

Diagnostic imaging				
Endoscopy	✓·	✓·	(Increasing use)	✓·
Endoscopic ultrasound (EUS)	✓ (limited)	✓·		✓·
Ultrasound			✓·	✓·
Barium swallow	✓·			
MRI with or without contrast, magnetic resonance cholangiopancreatography (MRCP)			✓(four phase contrast enhanced)	✓ (+MRCP)
PET scan, CT scan, chest X-ray	✓·	✓·	✓·	CT
Biopsy				
Endoscopic resection; EUS-guided biopsy	✓·	✓·		
Endoscopic retrograde cholangiopancreatography (ERCP)-guided biopsies				✓·
EUS-guided fine needle aspiration (FNA		✓·		✓·
Laparoscopy	✓ (OGJ)	✓·	✓(not often)	
Percutaneous biopsy			✓(not often)	
Peritoneal washing cytology		?		
Histopathological and pathological analysis				
Histological type, invasion, grade, etc	✓·	✓·	✓·	✓·
Immunohistochemistry (IHC); Fluorescence/other in situ hybridisation (FISH); Polymerase chain reaction (PCR)	✓·	✓·	✓·	✓·
Next generation sequencing (NGS)	✓·	✓·		✓·

A.3 First line treatment

The choice of staging system varies internationally and domestically, between and within cancers. Often it reflects a variation on the TNM system, with acknowledgement of grade (G). Furthermore, there is focus on patient health – especially in HCC, where Child-Pugh scores are embedded within popular staging systems.

Table A.5: Staging

Oesophageal	Stomach	Liver (HCC)	Biliary
Oesophageal cancer can be staged according to the TNM system, outlined in the 8th edition of the AJCC Cancer Staging Manual. Specifically: • Stage 1 – tumor is small (7 cm or less across) and limited to the oesophagus. • Stage 2 – tumor has grown but still remains within the oesophagus; there is no evidence of spread to lymph	In Western countries, the TNM system is often utilised to stage stomach cancer. Specifically: • Stage 1 – tumor is either small, small and has spread to few lymph nodes, or larger (growing into muscularis propria) but has not spread into lymph nodes • Stage 2 – tumor has grown but still remains within the stomach, there is no	Although there is global variation, staging of HCC in Australia is frequently done via the Barcelona Clinic Liver Cancer (BCLC) system. This system accounts for tumour stage, as well as liver function. Liver fundtion is measured using the Child-Pugh score, which is a cirrhosis staging system. This observes factors including levels of bilirubin and albumin, as well as the prothrombin time (how	TNM is the standard system used for staging. Although TNM provides clinically meaningful classification, it has limitations which raise concerns as to is efficacy when used in isolation. For example: • It has limited discriminatory ability between T2 and T3 tumours in surgically resected iCCAs • There is evidence supporting a negative

Oesophageal	Stomach	Liver (HCC)	Biliary
nodes or distant sites. • Stage 3 – tumor has grown beyond the oesophagus and extends into nearby tissues or organs; may or may not have spread to nearby lymph nodes. • Stage 4 – tumor of any size that has grown beyond the oesophagus; may have spread to lymph nodes or distant sites. In addition, stage 0 tumours are considered to be those that contain abnormal cells called high-grade dysplasia. The location of the tumour is used to determine whether it is classified as oesophageal or stomach. This places importance on identifying the OGJ, which is the borderline between the muscular structures of the oesophagus and the stomach.	evidence of spread to distant sites and limited spread to lymph nodes • Stage 3 – tumor has grown beyond the stomach and extends into nearby tissues or organs and may or may not have spread to nearby lymph nodes, but has not spread to distance parts of the body • Stage 4 – stomach tumor of any size that has metastasised. In addition, stage 0 tumours are considered to be those that contain abnormal cells called high-grade dysplasia.	well liver is making clotting factors), whether there is fluid in the abdomen and whether the liver disease is affecting brain function. • Stage 0 (Very early stage) – means the tumour is less than 2cm, the patient is relatively healthy (PS 0) and liver works normally (Child-Pugh A). • Stage A (Early stage) – there is a single tumour of any size, or up to 3 tumours all less than 3 cm, the patient feels well (PS 0), and the liver is working well (Child-Pugh A or B). • Stage B (Intermediate Stage) – there are many tumours in the liver, but the patient feels well (PS 0) and their liver is working well (Child-Pugh A or B). • Stage C (Advanced stage) –the cancer has spread into the blood vessels, lymph nodes or other body organs, or the patient is unwell (PS 1 or 2), but the liver is still working well (Child-Pugh A or B). • Stage D – severe liver damage (Child-Pugh C), or patient is not well and needs assistance (PS 3 or 4).	effect of multifocal cancer on prognosis, which is not captured by the TNM system • Size as a factor is relevant and not appropriately accounted for by the TNM system; although it captures cut off size of 5 cm in T1 tumours, some considered that a 2 cm cut off might have merit • It fails to account for prognostic factors such as symptoms and liver function impairment.

Once the cancer is staged, the appropriate therapy should be approved by an MDT, with includes a diverse group of medical professionals and can vary by cancer stage. Decisions also reflect patient input regarding preferred treatment. The appropriate therapy is limited by the health of the patient, including the presence of comorbidities. Indicators of health may already be captured in the staging system utilised. It is often recognised that therapy should be performed by an experienced professional in a high-volume clinic/hospital.

Surgery is often the only curative therapy available to patients, while ablation is potentially curative for HCC and as secondary prevention of Barrett's oesophagus. Choice of surgery is a function of tumour location, surgeon experience and patient preference. Curative resection is only possible to the extent that the cancer has not spread distantly (including, if positively reacts due to neoadjuvant or palliative therapies).

Table A.6: Overview of first line therapies

	Oesophageal AC	Oesophageal SCC	Stomach	Liver (HCC)	Biliary / Liver iCCA	Biliary eCCA, gallbladder and other
Surgery						
Endoscopic resection	Endoscopic mucosal resection; eradication of Barrett's		Endoscopic mucosal resection; endoscopic submucosal dissection			
Surgery	Radical resection, open or minimally invasive oesophagectomy, plus lymph node dissection		Gastrectomy and (distal, subtotal, total), removal of nearby lymph nodes (perigastric and those along named vessels of celiac axis), removal of spleen (if involved or extensive hilar adenopathy)	Left hepatectomy, extended right or left hepatectomy, segmentectomy	Various (bile duct, liver, gallbladder, lymph nodes); may offer PVE	
Transplant				✓.		
Non systemic therapies						
Ablation (thermal)				✓ (radio- or micro-wave) ?(cryoablation, percutaneous alcohol injection)		
Radiotherapy High dose rate (HDR) brachytherapy External beam radiation therapy (EBRT) Stereotactic body radiotherapy (SBRT) Selective internal radiotherapy (SIRT)				✓ (SIRT)	✓ (EBRT with concurrent fluoropyrimidine possible option)	
Transarterial chemoembolisation (TACE)				✓.		
Radioembolisation					? iCCA: yttrium-90	
Systemic therapies						
Chemotherapy	Various, including: cisplatin and 5-fluorouracil		Doublet or triplet: platinum agent, anthracyclines,	FOLFOX	Good health: cisplatin (oxaliplatin) and gemcitabine Bad health: gemcitabine,	

	Oesophageal AC	Oesophageal SCC	Stomach	Liver (HCC)	Biliary / Liver iCCA	Biliary eCCA, gallbladder and other
			pyrimidines, taxanes		fluorouracil or capecitabine	
Chemoradiation	✓ (Cisplatin and 5-fluorouracil; 60 Gy and higher)					
Targeted therapies	Trastuzumab (not with anthracyclines)		If HER2, trastuzumab	Sorafenib, Lenvatinib, Nivolumab	Entrectinib, Larotrectinib, pembrolizumab	
Immunotherapy				Atezolizumab with bevacizumab		

Surgery is often accompanied by adjuvant, neoadjuvant or perioperative radiation and/or chemotherapy.

A.4 Disease recurrence and management

In cases of recurrence, assuming best supportive care is not the appropriate strategy, numerous subsequent-line therapy options are available. The appropriate therapy option is dependent on the success of prior therapies and performance status. A wider array of targeted therapies are utilised as subsequent-line therapies. Evidence for these treatments is variable and developing, and therefore clinical trials are commonly recommended.

- Post treatment, follow up should occur:
- Every three months for first two years
- Every six months thereafter.

Follow ups should consider clinical history, undertake physical tests, send for blood tests and radiological exams

Table A.7: Overview of management and recurrence

	Oesophageal AC	Oesophageal SCC	Stomach	Liver (HCC)	Biliary / Liver iCCA	Biliary eCCA, gallbladder and other
Chemotherapy	✓·	✓·	✓·	✓·	✓·	✓·
Targeted therapies, immunotherapy etc.	Pembrolizumab (MSI or PD-L1)	Nivolumab (second line)	NCCN lists numerous possible targeted therapies, including entrectinib or larotrectinib (NTRK). Pembrolizumab (MSI or PD-L1)	Following sorafenib, regorafenib, cabozantinib and ramucirumab Following atezolizumab + bevacizumab/Lenvatinib, sorafenib, lenvatinib, regorafenib, cabozantinib and ramucirumab	Atezolizumab, nivolumab and pembrolizumab iCCA: IDH1 and FGFR2 mutations –Ivosidenib, Pemigatinib, Entrectinib + Larotrectinib (NTRK), Regorafenib, Infigratinib, Radioembolisation	

A.5 Supportive care, survivorship and long-term follow up

Supportive care should be provided from diagnosis, up to and following treatment. There are numerous supportive care issues that must be accounted for in the context of upper GI cancers.

Table A.8: Overview of support requirements

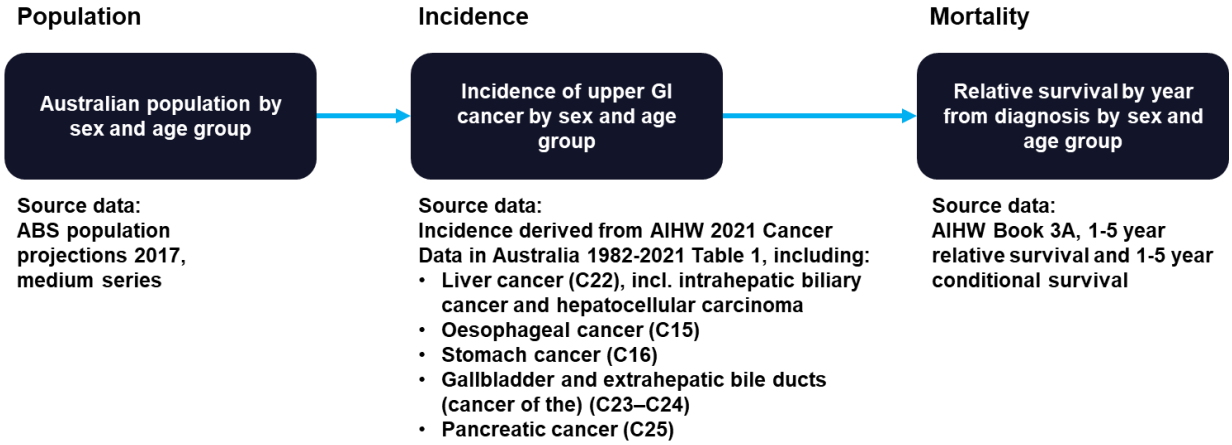
	Oesophageal AC	Oesophageal SCC	Stomach	Liver (HCC)	Biliary / Liver iCCA	Biliary eCCA, gallbladder and other
Nutritional care	✓·	✓·	✓·	✓·	✓·	✓·
Social and emotional support (psychologist appointments, social prescribing, etc)	✓·	✓·	✓·	✓·	✓·	✓·
Financial assistance (travel, treatments)	✓·	✓·	✓·	✓·	✓·	✓·
Symptom and physical side effect or pain management	Oesophageal obstruction or bleeding (needle catheter, not endoscopic stenting)		Management of gastric obstruction or bleeding.	Management of issues associated with liver disease (e.g., varices)	Biliary obstruction (endoscopic stenting; percutaneous transhepatic drainage)	
Information support	✓·	✓·	✓·	✓·	✓·	✓·
Oral hygiene	✓·	✓·	✓·	✓·	✓·	✓·
Exercise	✓·	✓·	✓·	✓·	✓·	✓·
Fertility planning	✓·	✓·	✓·	✓·	✓·	✓·

Appendix B
Incidence and mortality projections

B.1 Data sources

Incidence and mortality of upper GI cancer were projected by sex and age, using sex and age cohorts. Expected mortality was estimated using Australian Institute of Health and Welfare relative survival rate data.

Figure B.1: Key datasets used for forecast



B.2 Incidence projections

Population is estimated to grow in line with ABS's population projections medium series (2017). ABS forecasts were broken down into five year groups (summarised below), for both female and males.

Table B.1: ABS population forecasts, Females (per 100,000)

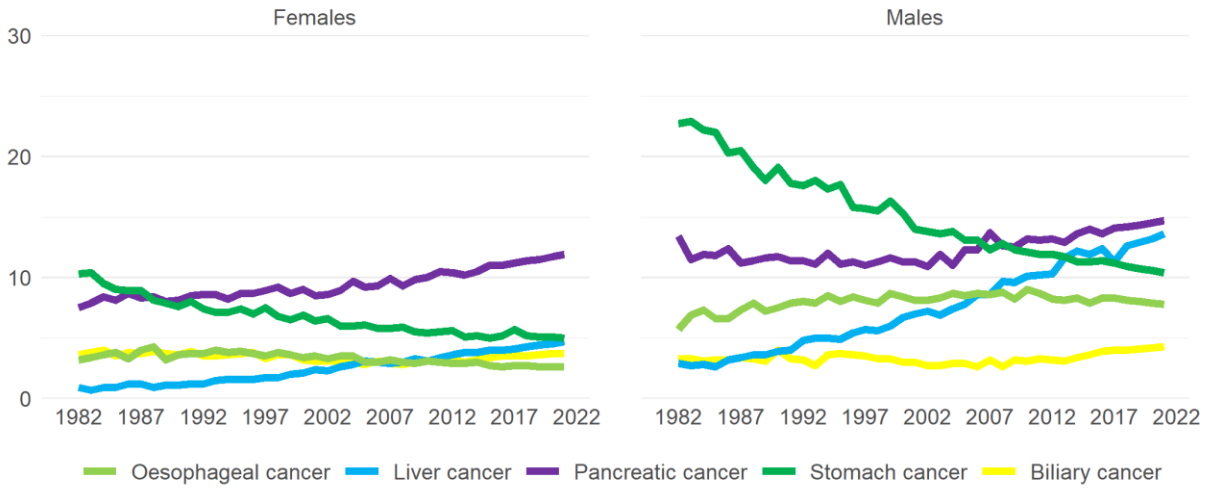
Cohort	00-14	15-29	30-44	45-59	60-74	75-84	85+
2017	22.57	24.87	25.64	23.90	17.77	6.15	3.08
2018	22.95	25.16	26.09	24.11	18.33	6.33	3.11
2019	23.36	25.47	26.62	24.27	18.82	6.58	3.14
2020	23.76	25.74	27.26	24.35	19.31	6.86	3.18
2021	24.12	26.05	27.90	24.38	19.80	7.14	3.23
2022	24.43	26.41	28.54	24.41	20.13	7.57	3.29
2023	24.74	26.76	29.18	24.45	20.49	7.94	3.36
2024	25.06	27.04	29.81	24.54	20.85	8.28	3.44
2025	25.36	27.31	30.41	24.74	21.12	8.63	3.53
2026	25.67	27.57	30.91	25.02	21.36	8.98	3.63
2027	25.98	27.82	31.36	25.36	21.60	9.29	3.75
2028	26.28	28.08	31.74	25.73	21.84	9.63	3.86
2029	26.60	28.33	32.08	26.08	22.11	9.91	4.02
2030	26.91	28.58	32.41	26.45	22.38	10.19	4.18
2031	27.20	28.88	32.68	26.75	22.72	10.46	4.36
2032	27.56	29.13	32.93	27.08	23.02	10.63	4.64
2033	27.86	29.46	33.13	27.51	23.21	10.85	4.88
2034	28.14	29.80	33.32	28.01	23.36	11.09	5.08
2035	28.40	30.16	33.46	28.60	23.43	11.33	5.29

Table B.2: ABS population forecasts, Males (per 100,000)

Cohort	00-14	15-29	30-44	45-59	60-74	75-84	85+
2017	23.82	25.64	25.34	23.00	17.06	5.32	1.85
2018	24.23	25.98	25.75	23.19	17.51	5.51	1.90
2019	24.64	26.36	26.22	23.34	17.91	5.77	1.95
2020	25.05	26.69	26.79	23.43	18.29	6.04	2.00
2021	25.42	27.06	27.38	23.47	18.68	6.33	2.06
2022	25.75	27.46	27.98	23.49	18.92	6.75	2.14
2023	26.07	27.83	28.60	23.53	19.19	7.11	2.22
2024	26.40	28.14	29.24	23.61	19.47	7.43	2.30
2025	26.72	28.41	29.85	23.82	19.67	7.73	2.40
2026	27.05	28.68	30.36	24.11	19.85	8.02	2.50
2027	27.37	28.96	30.81	24.46	20.01	8.27	2.62
2028	27.68	29.24	31.22	24.84	20.19	8.53	2.72
2029	28.02	29.49	31.61	25.20	20.41	8.72	2.86
2030	28.35	29.77	31.98	25.55	20.64	8.91	3.01
2031	28.65	30.08	32.32	25.85	20.90	9.11	3.17
2032	29.03	30.35	32.63	26.15	21.16	9.21	3.41
2033	29.34	30.70	32.90	26.54	21.33	9.36	3.61
2034	29.64	31.05	33.16	26.97	21.47	9.54	3.77
2035	29.91	31.41	33.38	27.51	21.56	9.72	3.92

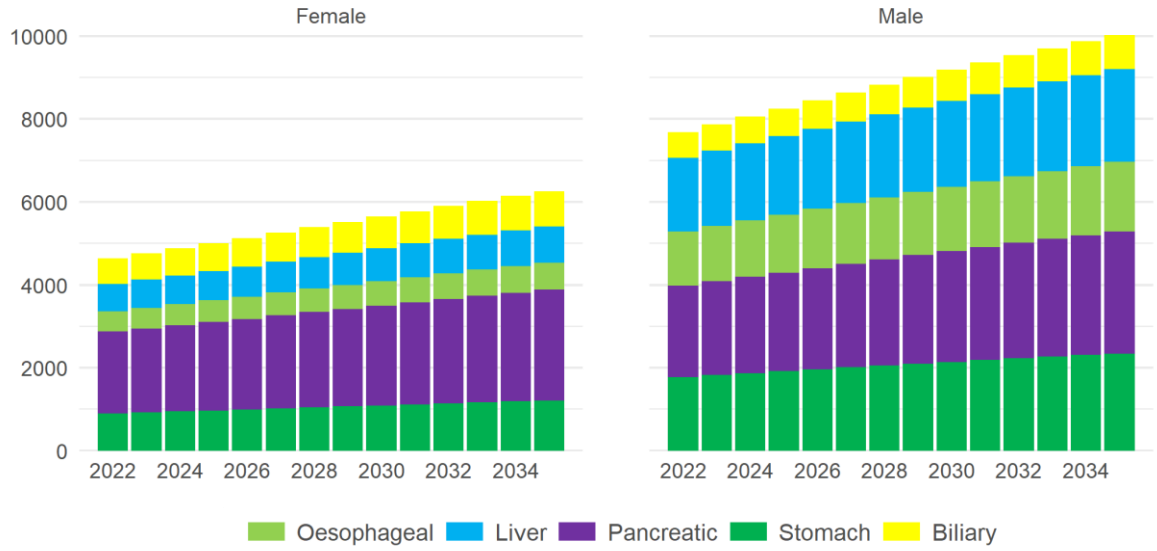
Incidence rate forecasts were generated using AIHW's historical incidence rate series, per five year age group and by sex. Incidence rates were held constant from the last year of actuals (i.e., 2017). For stomach cancer, this was overridden by the average of the last five years of actuals to account for volatility. Data from the AIHW's Cancer in Australia 2021 series was adopted as this was available at time of modelling.

Figure B.2: Historical incidence rates (aggregated)



Incidence projections were calculated as the multiplication of forecast incidence rates and ABS population estimates.

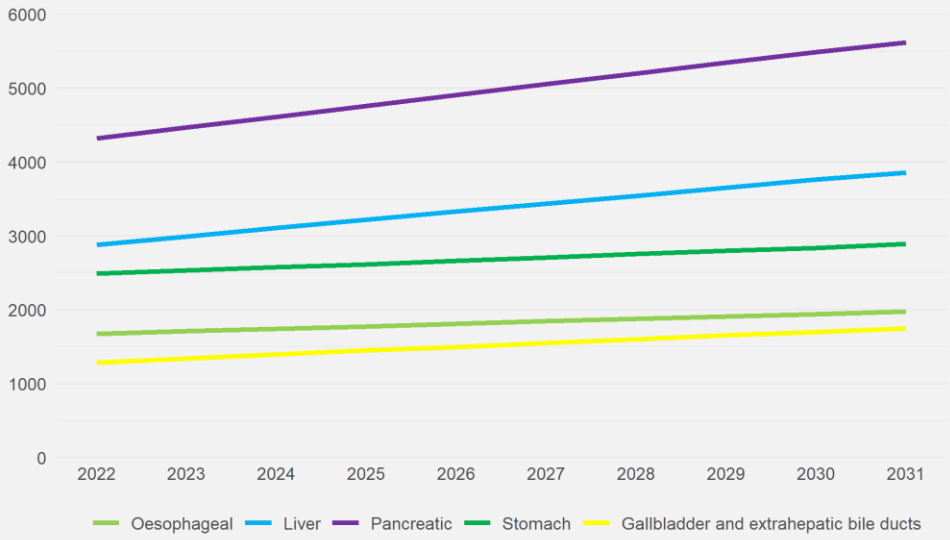
Figure B.3: Incidence forecasts per cancer



Box B.1: AIHW Incidence estimates

Over the next 10 years, estimates published by the AIHW indicate that incidence of these cancers is expected to increase.

Figure B.4: AIHW 10 year incidence forecast – 2022 to 2031



Source: AIHW, Cancer in Australia 2021

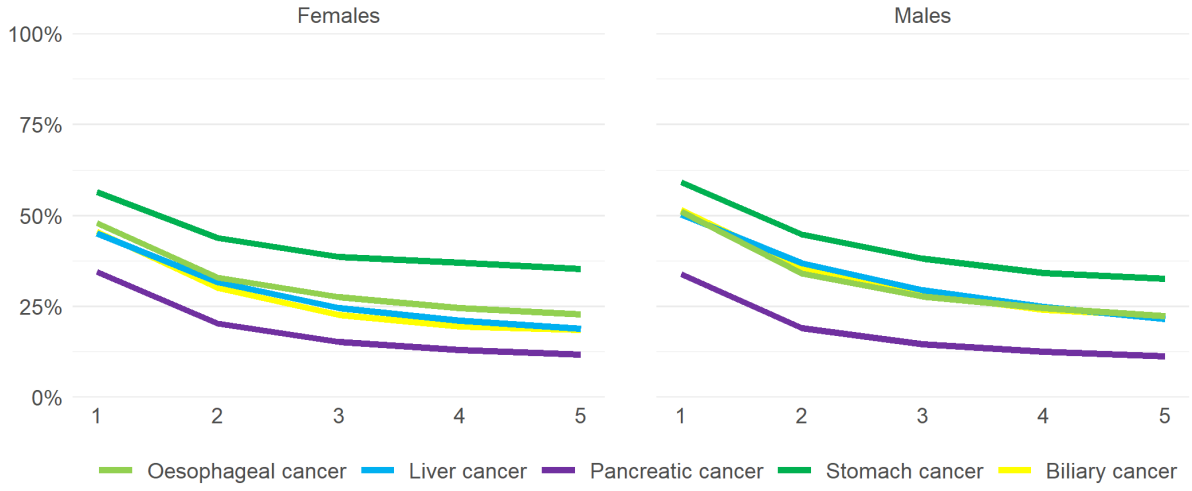
These estimates predict that over the 10 year period spanning 2022 to 2031, nearly 144,000 (143912) will be diagnosed with an upper GI cancer:

- Almost 50,000 people (49,776) will have been diagnosed with pancreatic cancer
- Almost 34,000 people (33,783) will be diagnosed with liver cancer
- Almost 27,000 (26,873) people will be diagnosed with stomach cancer
- Over 18,200 (18,258) people will be diagnosed with oesophageal cancer
- Over 15,000 (15,222) people will be diagnosed with cancers of the gallbladder and extrahepatic bile ducts.

B.3 Mortality projections

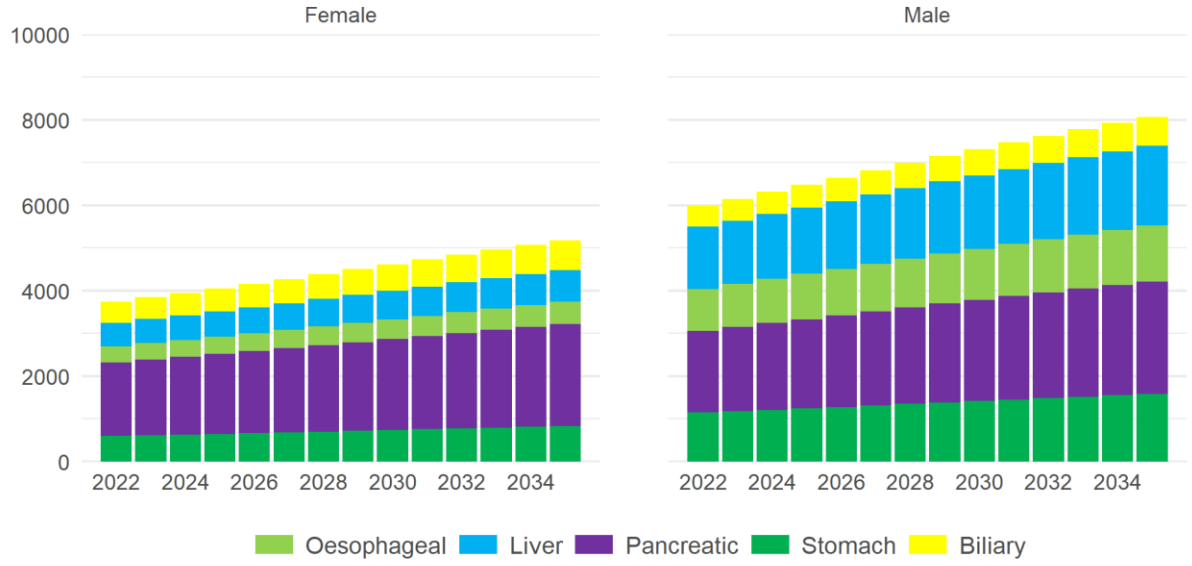
Mortality projections were developed using the AIHW's published five year relative survival rate data (Cancer in Australia 2021), by sex and five year age group. Five year relative survival rates are summarised below. In addition, conditional survival rates were used to estimate mortality in years six through ten following diagnosis.

Figure B.5: Five year relative survival rates



Resultant mortality estimates are depicted in the figure below.

Figure B.6: Mortality forecasts per cancer



Appendix C
Surveys

C.1 Overview of Patient and Carer Survey

Between October and December 2021, a Patient and Carer Survey was distributed by Pancare Foundation. The survey was multiple-choice and designed using a page-logic format. Drafts of the survey were piloted with consumers and revised according to pilot results feedback. The survey took between 30 minutes and 1 hour to complete. Responses were confidential and analysed by Insight Economics.

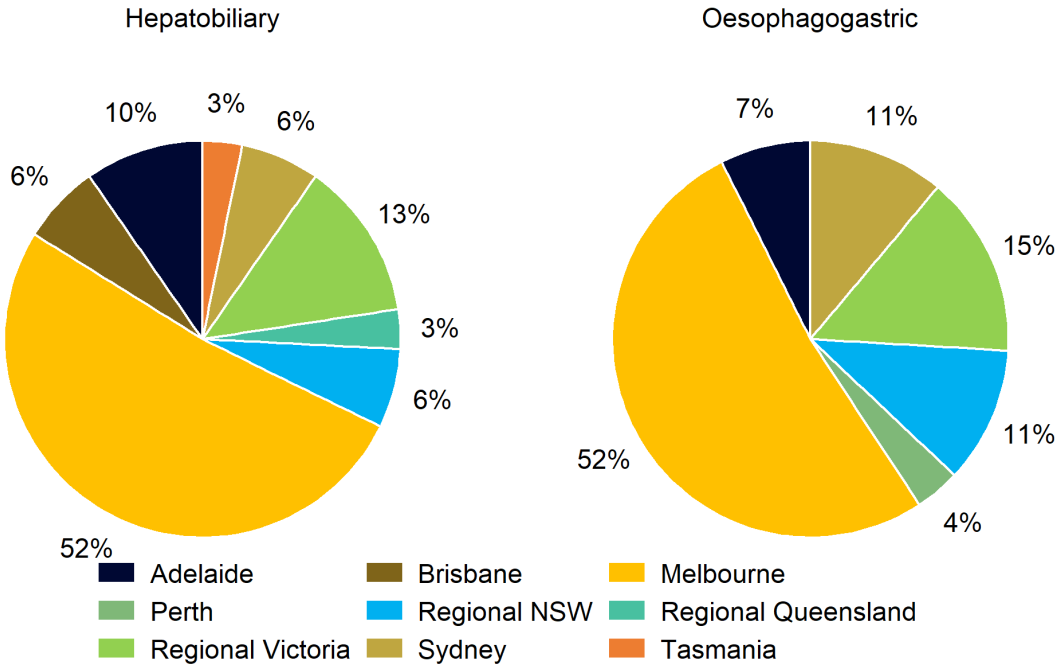
31 hepatobiliary and 27 oesophagogastric cancer patients and carers responded to the Patient and Carer survey; specifically:

- 14 oesophagogastric cancer patients responded and 13 carers responded.
- 20 hepatobiliary cancer patients responded and 11 carers responded.

The small sample is a limit to the analysis, but provides important data that is not otherwise available.

In both groups, Victorian respondents are most highly represented. The consequence is a divergence from the true population distribution. Lack of representation from these areas is therefore an additional limitation of this analysis.

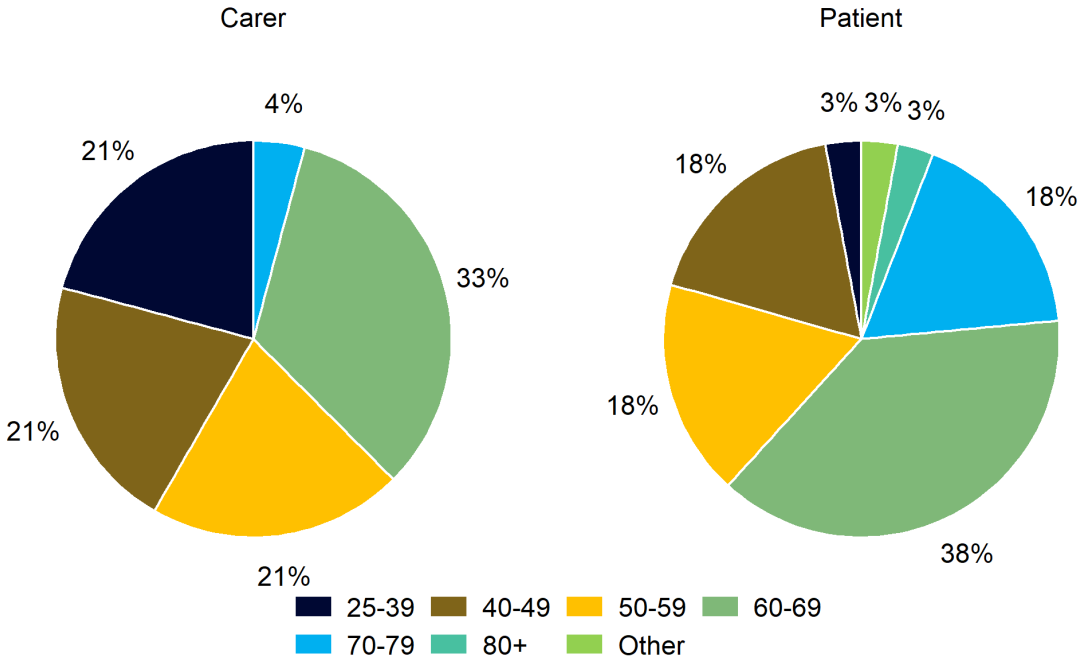
Figure C.1: Geographic distribution of respondents to Patient and Carer survey



For both cancer groups, responses were relatively concentrated within the 60-69 age range. There was a relatively even distribution of care givers across age groups between 25 and 69 years old. Patient respondents were most commonly from age groups between 40-49 and 70-79; among patient respondents, there was a relatively high proportion of responses from the

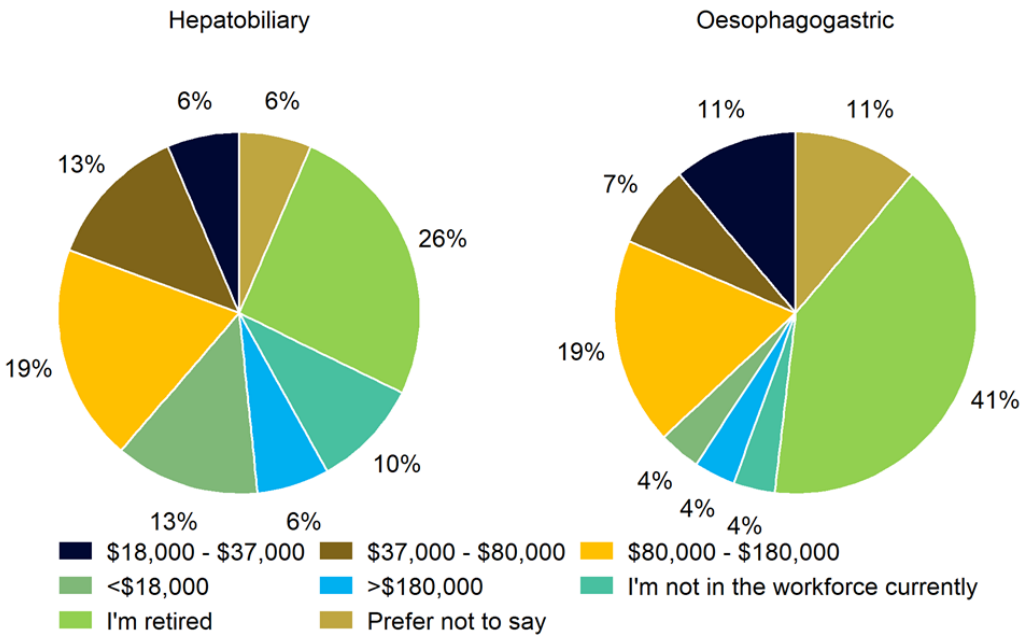
40-49 age group (relative to incidence) and a relatively low proportion of responses from the 80-89 age group. Again, the caveat here is that the sample size is ~30 for each cancer.

Figure C.2: Age distribution of respondents to Patient and Carer survey



There were a range of responses from people within different income brackets, as well as retired and people who identify as not being in the workforce. Retired persons were relatively frequently observed in both groups; while this diverges from Australia wide statistics, it is less surprising when accounting for age distribution of respondents. Controlling for being within the workforce, across both groups the responses are relatively strongly represented in the $80,000-$180,000 income bracket.

Figure C.3: Income distribution of respondents to Patient and Carer survey



Other characteristics include:

- *Insurance status* — Persons with PHI were over-represented in the survey (81 per cent and 71 per cent, oesophagogastic and hepatobiliary, respectively) compared to the wider population (44 per cent, APRA 2020).
- *Carer status* – 85-86 per cent of patients reported having a carer / family member who fills that role.
- *Background* — The majority of respondents identified as non-indigenous Australian (74.1 per cent and 77.4 per cent, oesophagogastic and hepatobiliary, respectively), with 18.5 per cent of oesophagogastric respondents identifying as North-West European and 10 per cent of hepatobiliary respondents identifying as South-East Asian.

C.2 Overview of Researcher and Clinician survey

Between October and December 2021, researchers and clinicians were invited to respond to the researcher and clinician survey.

46 researchers and clinicians responded to the survey.[327] The respondents comprised:

- 13 self-identified researchers, 15 self-identified surgeons, 7 self-identified medical oncologists, as well as several others
- Allowing for multiple specialities, there were as many as 18 professionals with expertise in stomach cancer, 13 with expertise in biliary cancer, 12 with expertise in oesophageal cancer, 9 with expertise in liver cancer and 7 with expertise across the upper GI region.

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The majority of respondents were professionals in Victoria (53 per cent), followed by NSW (22 per cent) and South Australia (15 per cent).

[327] As proxied by independent response ID and having answered the first non-demographics question of the survey.

Appendix D
Research Audit

D.1 Overview of Research Audit methodology

In mid-late 2021, Insight Economics contacted more than 50 organisations and invited them to provide details of funding for upper GI cancer research projects, programs and key enabling infrastructure.

Information was requested to be supplied in the form of an electronic spreadsheet or text document which would include:

- Year of award or funding allocation
- A summary or abstract of the research funded
- Details of the Chief Investigator and named collaborators
- Amount of funding granted to each funded cancer research project or fellowship
- The source of funding, be it government programs, charitable foundations or trusts, other philanthropy, industry, or individual donations.

All data received from performers of upper GI cancer was reviewed to ensure that the data focused on the upper GI cancers within the scope of the research audit.

In parallel to the research request, a desktop review of publicly available data reporting of upper GI cancers was also undertaken. This included grants reporting by the Australian Government, State Governments, Cancer Councils and other relevant organisations and institutes. All data received was consolidated and coded based on a Common Scientific Outline framework developed by the International Cancer Research Partnership to enable analysis by phase of research and funder type over time.

The Research Audit of brings together responses and data from 39 organisations (listed below):

- Australian National University
- AGITG
- Burnet Institute
- Cancer Council Australia
- Centenary Institute
- Charles Sturt University
- Deakin University
- Edith Cowan University
- Flinders University
- Garvan Institute of Medical Research

- Hanson Institute, SA / CALHN Research Services
- Harry Perkins Institute of Medical Research
- Hudson Institute of Medical Research
- Hunter Medical Research Institute
- Ingham Institute for Applied Medical Research
- James Cook University /AITHM
- LaTrobe University
- Macquarie University
- Menzies School of Health Research
- Monash University
- Murdoc University
- National Health and Medical Research Council (NHMRC)
- Office of Health and Medical Research
- Olivia Newton-John Cancer Research Institute
- Peter MacCallum Research Foundation
- South Australian Health and Medical Research Institute
- The John Curtin School of Medical Research
- University of Adelaide
- University of Canberra
- University of Melbourne
- University of Western Australia
- University of Wollongong
- University of Newcastle
- University of Notre Dame Australia
- University of Queensland
- University of South Australia
- University of Sydney
- Victorian Cancer Agency
- Walter and Eliza Hall Institute

Other data sources relied upon include:

- MRFF

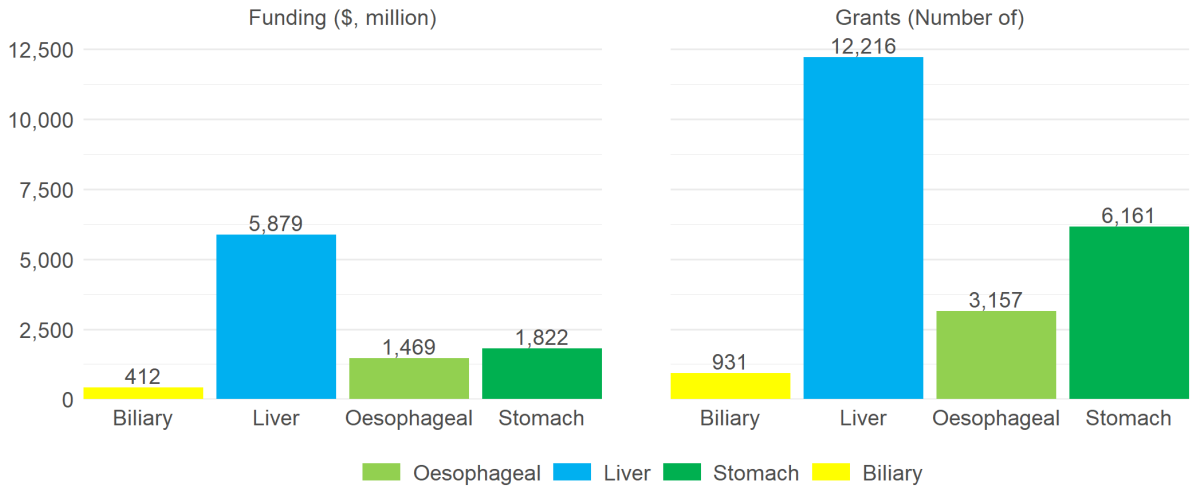
- ARC
- GrantsConnect
- Dimensions
- SciVal citation data
- NCI and international funders.

D.2 Research Audit findings

Global funding context

The quantum of funding received across the upper GI cancers of focus (oesophageal, stomach, liver and biliary cancers) is variable since 2000; historically, liver cancer has received the most focus while biliary cancer has received the least focus.

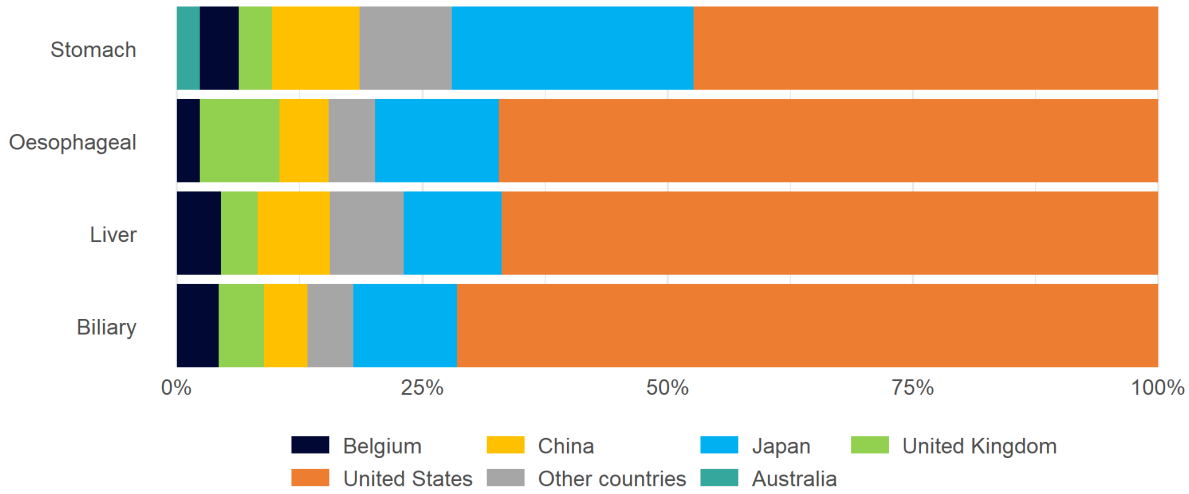
Figure D.1: Quantum of funding for upper GI cancer research, global (2000-present)



Note: Search terms: oesophageal ("oesophageal cancer" OR "oesophageal adenocarcinoma" OR "oesophageal Squamous cell carcinoma" OR "esophageal cancer" OR "esophageal adenocarcinoma" OR "esophageal Squamous cell carcinoma"), liver ("Liver Cancer" OR "Hepatocellular carcinoma" OR "Hepatocellular carcinoma"), stomach ("stomach cancer" OR "gastric cancer") and biliary ("biliary cancer" OR "bile tract cancer" OR "cholangiocarcinoma" OR "gallbladder cancer" OR "gall bladder cancer"). Dimensions data sourced by Pancare Foundation.

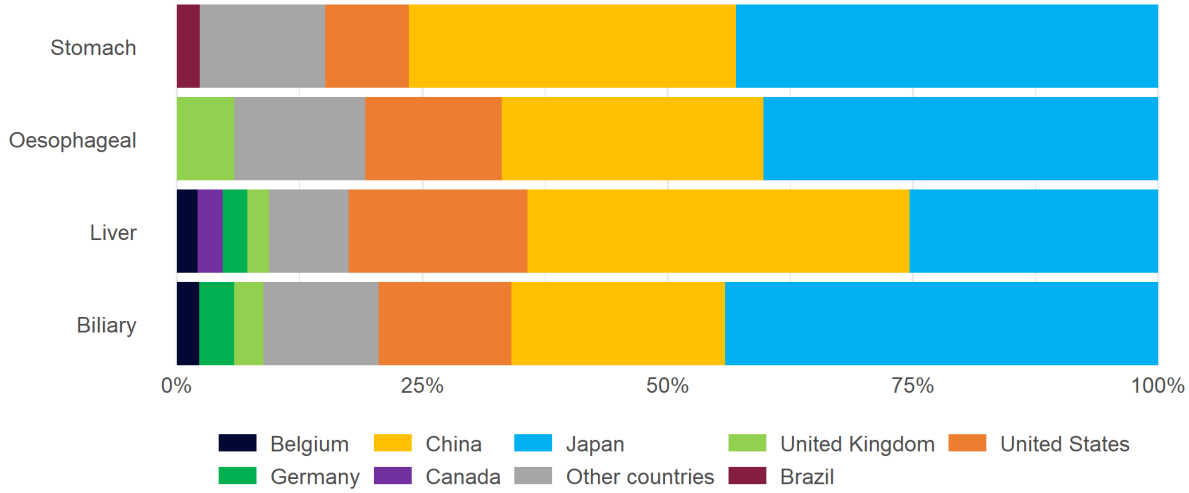
Reflective of the global distribution of incidence and intensity of cancer research, research in upper GI cancers is most commonly funded in the United States (US), China and Japan. This is consistent among both aggregate funding and number of grants as measures of research support; however, although US is identified as having the largest quantum of funding, China and Japan provide a relatively high number of grants.

Figure D.2: Proportion of global funding for upper GI cancer research, by funder country (2000-present)



Note: Aggregate funding statistics by funder. Search terms: oesophageal ("oesophageal cancer" OR "oesophageal adenocarcinoma" OR "oesophageal Squamous cell carcinoma" OR "esophageal cancer" OR "esophageal adenocarcinoma" OR "esophageal Squamous cell carcinoma"), liver ("Liver Cancer" OR "Hepatocellular carcinoma" OR "Hepatocellular carcinoma"), stomach ("stomach cancer" OR "gastric cancer") and biliary ("biliary cancer" OR "bile tract cancer" OR "cholangiocarcinoma" OR "gallbladder cancer" OR "gall bladder cancer"). Counties displayed if proportion of total funding in database equal to or in excess of 2 per cent. Source: Dimensions data sourced by Pancare Foundation.

Figure D.3: Proportion of global grants for upper GI cancer research, by funder country (2000-present)

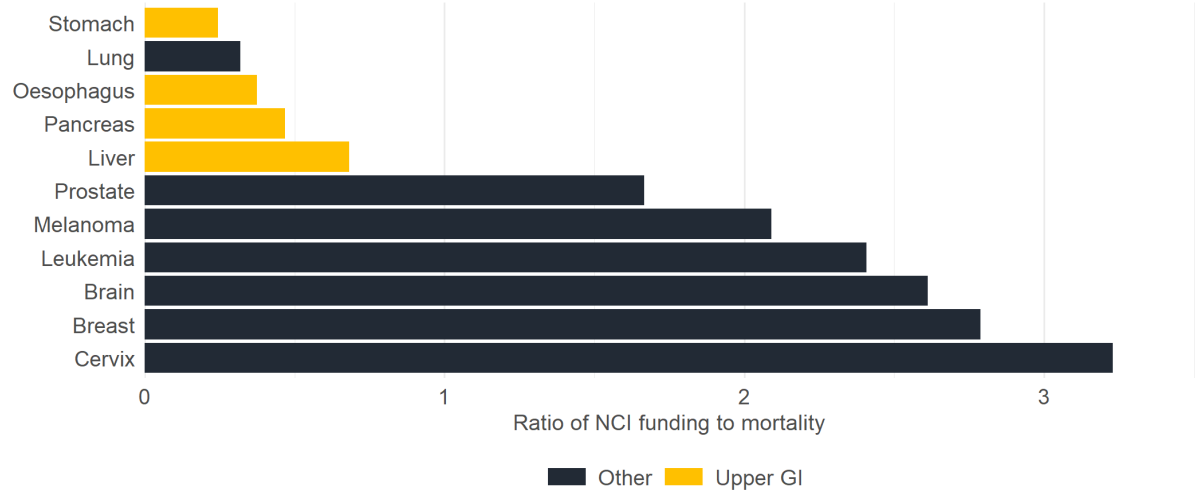


Note: Aggregate grant statistics. Search terms: oesophageal ("oesophageal cancer" OR "oesophageal adenocarcinoma" OR "oesophageal Squamous cell carcinoma" OR "esophageal cancer" OR "esophageal adenocarcinoma" OR "esophageal Squamous cell carcinoma"), liver ("Liver Cancer" OR "Hepatocellular carcinoma" OR "Hepatocellular carcinoma"), stomach ("stomach cancer" OR "gastric cancer") and biliary ("biliary cancer" OR "bile tract cancer" OR "cholangiocarcinoma" OR "gallbladder cancer" OR "gall bladder cancer"). Counties displayed if proportion of total funding in database equal to or in excess of 2 per cent. Source: Dimensions data sourced by Pancare Foundation.

Similarly, clinical trials are relatively common in US, China and Japan.

The leading funder for upper GI cancer research in Western countries is the National Cancer Institute (NCI). Analysis of NCI funding highlighted the challenges related to underfunding of some cancers given their poor survival outcomes.

Figure D.4: Historical underfunding of upper GI cancers



Source: Carter, AJ, and Nguyen, CN, 2012, A comparison of cancer burden and research spending reveals discrepancies in the distribution of research funding, BMC public health, 12, 526. doi: 10.1186/1471-2458-12-526.

Further review of NCI funding over the period spanning 1996 to 2018 indicates considerable discrepancy in funding for upper GI cancers research and funding for other selected cancers. For example, over the period spanning 1996 to 2018:

- Funding for breast cancer research was 3.1 times funding for **all** upper GI cancers
- Funding for prostate (colorectal) cancer research was over 1.4 (1.3) times funding for **all** upper GI cancers.

Table D.1: NCI, historical funding for selected cancers

Funding by cancer type	1996-2018	2000-2018	2010-2018
Start	1996	2000	2010
End	2018	2018	2018
Upper GI cancer			
Liver	$1,411	$1,266	$641
Stomach	$266	$233	$117
Oesophagus (a)	$340	$340	$266
Pancreas	$1,775	$1,726	$1,164
Total (b)	**$3,791**	**$3,564**	**$2,188**
Other / all cancers			
All cancers	$98,722	$88,648	$47,798
All other cancers (c)	$94,931	$85,084	$45,610
Colorectal	$5,059	$4,584	$2,139
Prostate	$5,477	$5,100	$2,269
Breast	$11,957	$10,571	$5,130

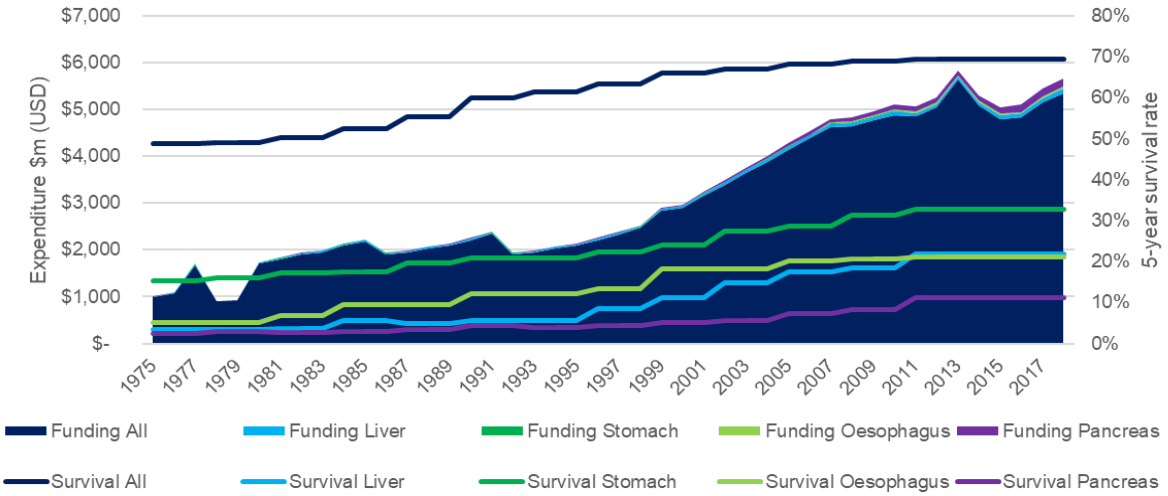
Note: (a) Oesophageal cancer data is not available before 2007 (via NCI budget fact book); (b) calculated as the summation of function for cancers of the liver, stomach, oesophagus and pancreas; (c) calculated as funding for all cancers less (b).

Given the significant volume of community giving alongside government funding, as well as commercial incentives to develop products for larger patient markets, it is likely this

substantially underestimates the difference in funding levels observed. Furthermore, community funding efforts may be limited in effect due to the relatively low incidence levels and low survival rates.

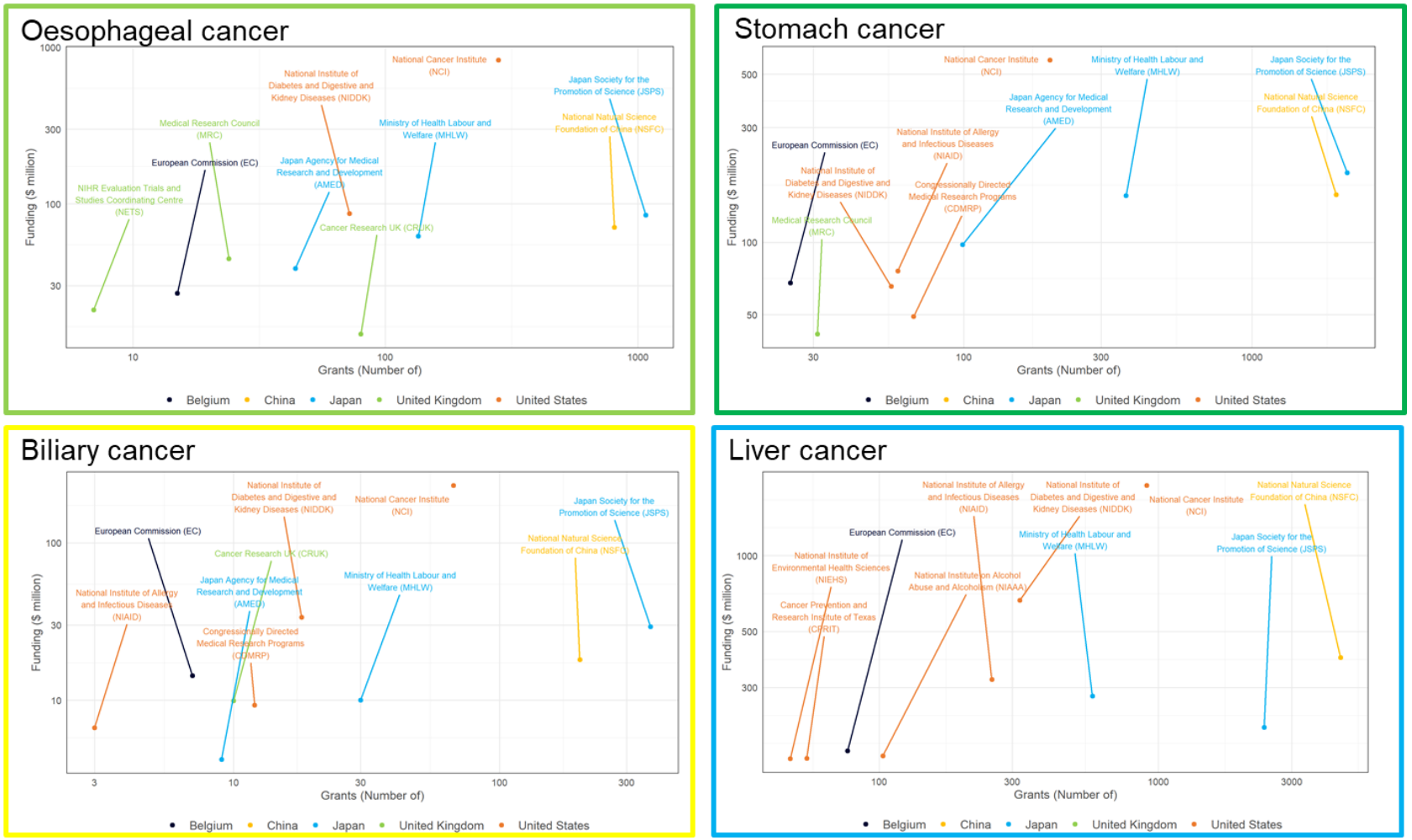
Historically low levels of funding for upper GI cancer research have contributed to the poor survival outlook for people diagnosed with upper GI cancers. While many cancers have seen survival rates substantially improve over the modern cancer research era, upper GI cancers have not.

Figure D.5: Limited funding for upper GI cancer in the modern cancer era has stifled breakthroughs ($US)



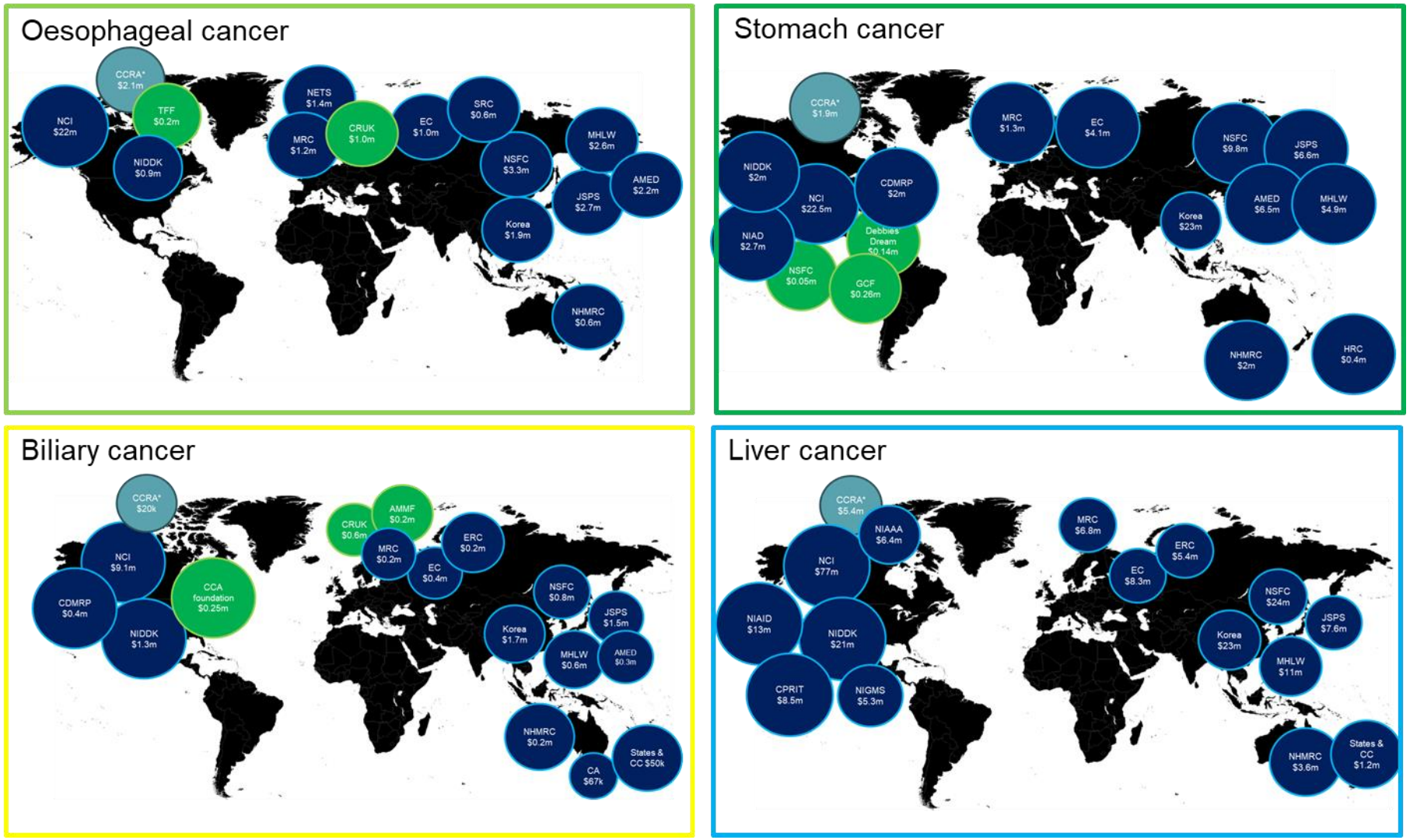
Note: Biliary cancer is excluded from this figure due to insufficient data. Source: NCI Budget Factbook Archives 1975-2017, accessed at www.cancer.gov.au/about-nci/budget/factbook/archive. NCI SEER, 2016, Age-Adjusted SEER Incidence and U.S. Death Rates and 5-Year Relative Survival (Percent); Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov).

Figure D.6: Top 10 funding sources, with corresponding aggregate funding and aggregate grant provision (2000-2022; AUD)



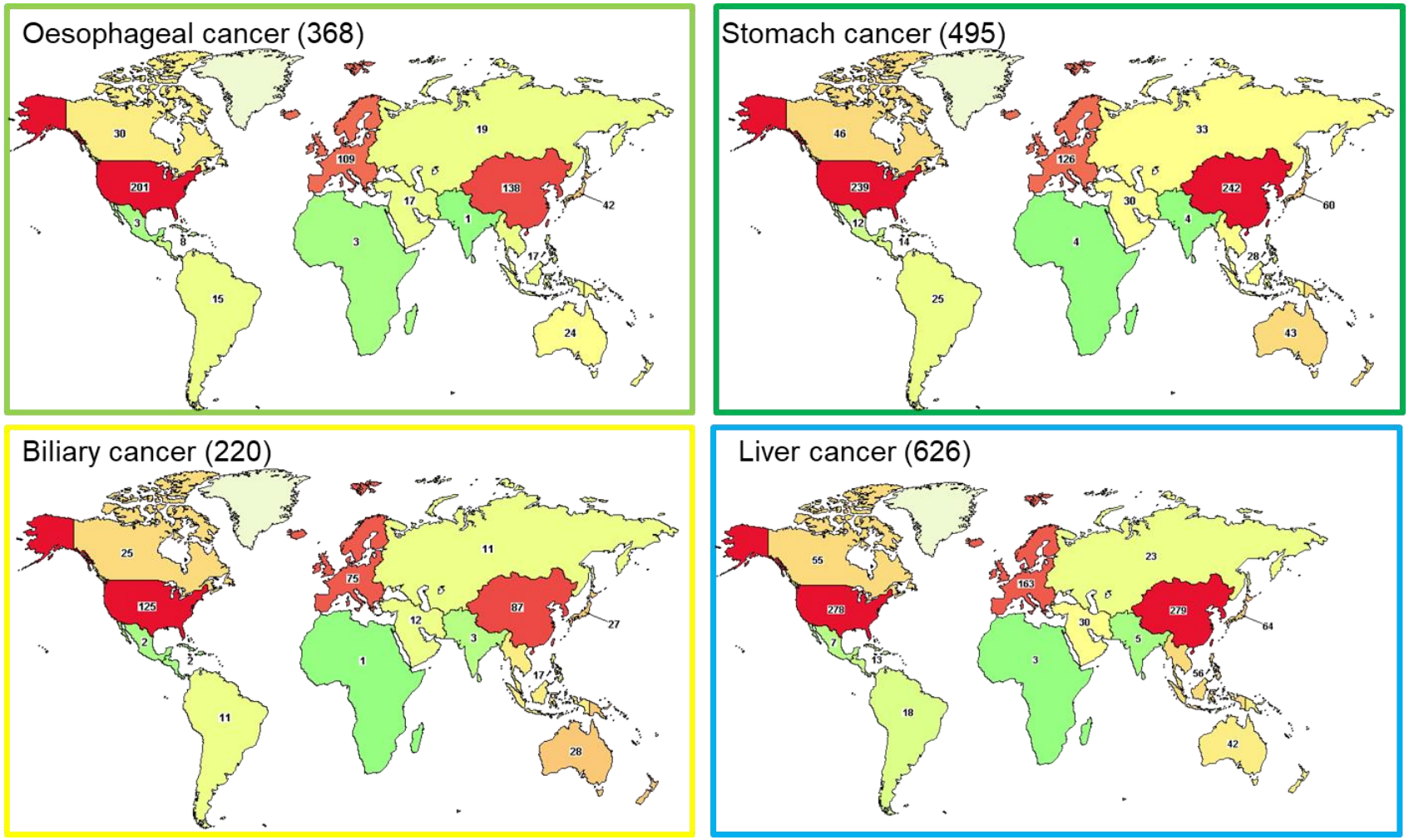
Note: Aggregate grants and funding statistics (log scale), 2000-April 2022. Log scales adopted for readability. Search terms: oesophageal ("oesophageal cancer" OR "oesophageal adenocarcinoma" OR "oesophageal Squamous cell carcinoma" OR "esophageal cancer" OR "esophageal adenocarcinoma" OR "esophageal Squamous cell carcinoma"), liver ("Liver Cancer" OR "Hepatocellular carcinoma" OR "Hepatocellular carcinoma"), stomach ("stomach cancer" OR "gastric cancer") and biliary ("biliary cancer" OR "bile tract cancer" OR "cholangiocarcinoma" OR "gallbladder cancer" OR "gall bladder cancer"). Source: Dimensions data sourced by Pancare Foundation.

Figure D.7: Visualisation of annual investment in upper GI cancer research (nominal, AUD)



Note: Average investment over period spanning 2009-2019. Data reflects desktop review of funder websites, e.g., NCI. Desktop review included Dimensions data and International Cancer Research Partnership data.

Figure D.8: Global clinical trials participation since 2010



Source: ClinicalTrials.gov. Note: Industry led clinical trials (Interventional Studies) with start date on or after 1 January 2010. Search terms: oesophageal ("oesophageal cancer" OR "oesophageal adenocarcinoma" OR "oesophageal Squamous cell carcinoma" OR "esophageal cancer" OR "esophageal adenocarcinoma" OR "esophageal Squamous cell carcinoma"), liver ("Liver Cancer" OR "Hepatocellular carcinoma" OR "Hepatocellular carcinoma"), stomach ("stomach cancer" OR "gastric cancer") and biliary ("biliary cancer" OR "bile tract cancer" OR "cholangiocarcinoma" OR "gallbladder cancer"). Extracted 9 December 2021.

Australia funding context

Adopting the above dataset, Australian funders have contributed to between 0.5 and 2.3 per cent of global funding across upper GI cancers (without explicit inclusion of clinical trials funding).

Table D.2: Australian funding and grants for research, relative to global levels (2000-present)

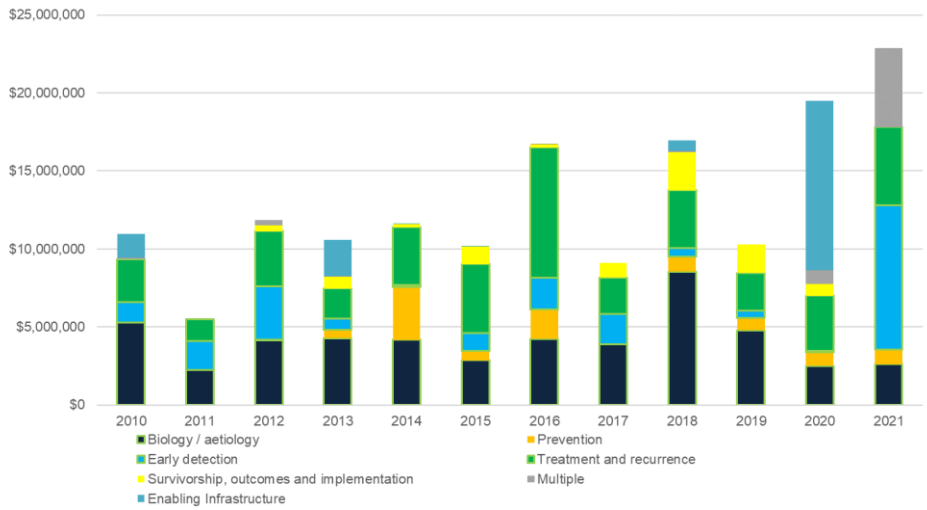
Funding by cancer type	Oesophagus	Stomach	Liver	Biliary
Grants (Number of)				
Australia	30	69	127	4
Total	3157	6161	12216	931
Australian proportion	0.95%	1.12%	1.04%	0.43%
Funding (AUD, $ million)				
Australia	15.54	41.87	86.2	1.99
Total	1468.63	1822.42	5878.87	411.51
Australian proportion	1.06%	2.30%	1.47%	0.48%

Note: Search terms: oesophageal ("oesophageal cancer" OR "oesophageal adenocarcinoma" OR "oesophageal Squamous cell carcinoma" OR "esophageal cancer" OR "esophageal adenocarcinoma" OR "esophageal Squamous cell carcinoma"), liver ("Liver Cancer" OR "Hepatocellular carcinoma" OR "Hepatocellular carcinoma"), stomach ("stomach cancer" OR "gastric cancer") and biliary ("biliary cancer" OR "bile tract cancer" OR "cholangiocarcinoma" OR "gallbladder cancer" OR "gall bladder cancer"). Counties displayed if proportion of total funding in database equal to or in excess of 2 per cent. Source: Dimensions data sourced by Pancare Foundation

To understand patterns in funding received by Australian upper GI cancer researchers, Pancare Foundation commissioned Insight Economics to undertake a Research Audit. Due to variable quality of data submitted in years prior to 2010, the Research Audit is limited to data from 2010-2021 (noting collection was in 2021, and therefore this year is incomplete). Furthermore, some discretion was used in determining whether to include funding for research regarding precursor diseases, e.g., hepatitis C for HCC. Inclusion was based on the amount of emphasis placed upon on the cancer within grant description and title.

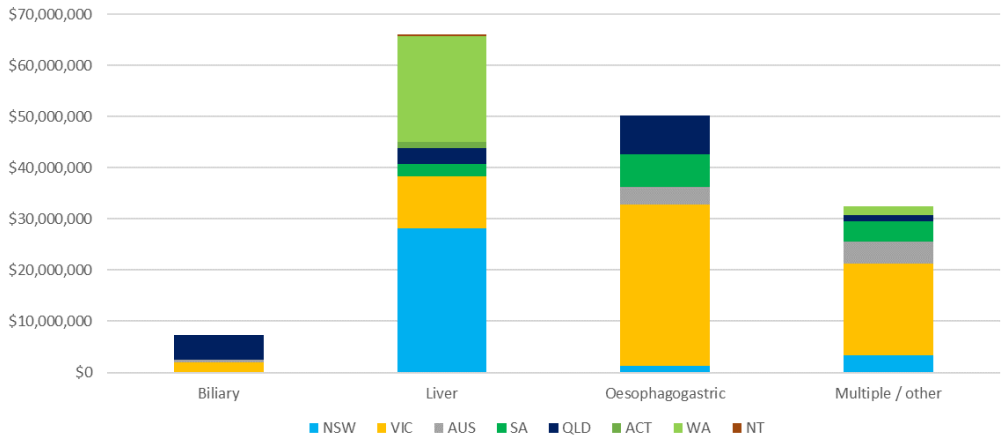
Across upper GI cancers, the total quantum of funding for Australian upper GI cancer research since 2010 is approximately $156 million (excluding industry funded clinical trials; when included, this amounts to approximately $234 million). By area of common scientific outline (CSO), this more frequently in biology/aetiology (approximately 33 per cent), followed by treatment (approximately 28 per cent) and early detection (15 per cent).

Figure D.9: Funding by common scientific outline (Research Audit)



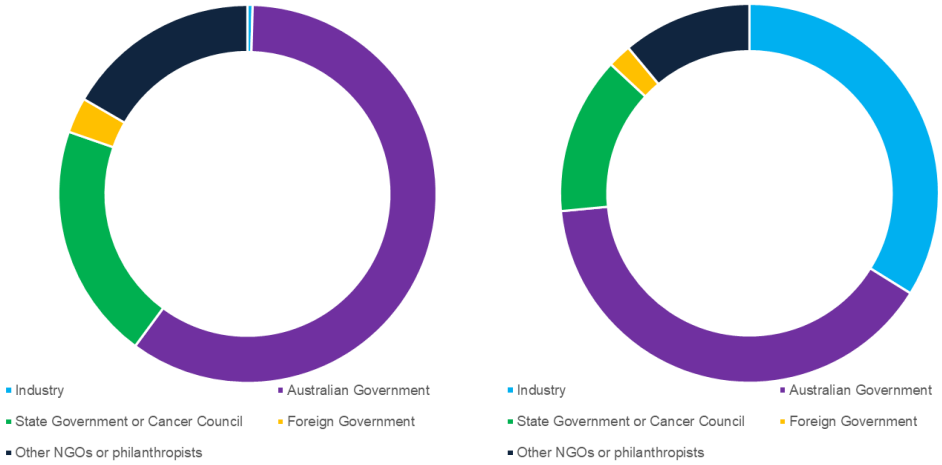
Funding for upper GI cancer research varied on a state by state basis, e.g., Western Australian and NSW based researchers have recently received funding for liver cancer research, while Victorian researchers have received relatively high amounts for funding for oesophagogastric cancer research. Simultaneously, there is a disparity in historical funding among these cancers; for example, liver cancer research has received the most funding in Australia, while biliary cancer has received the least.

Figure D.10: Funding by state (Research Audit)



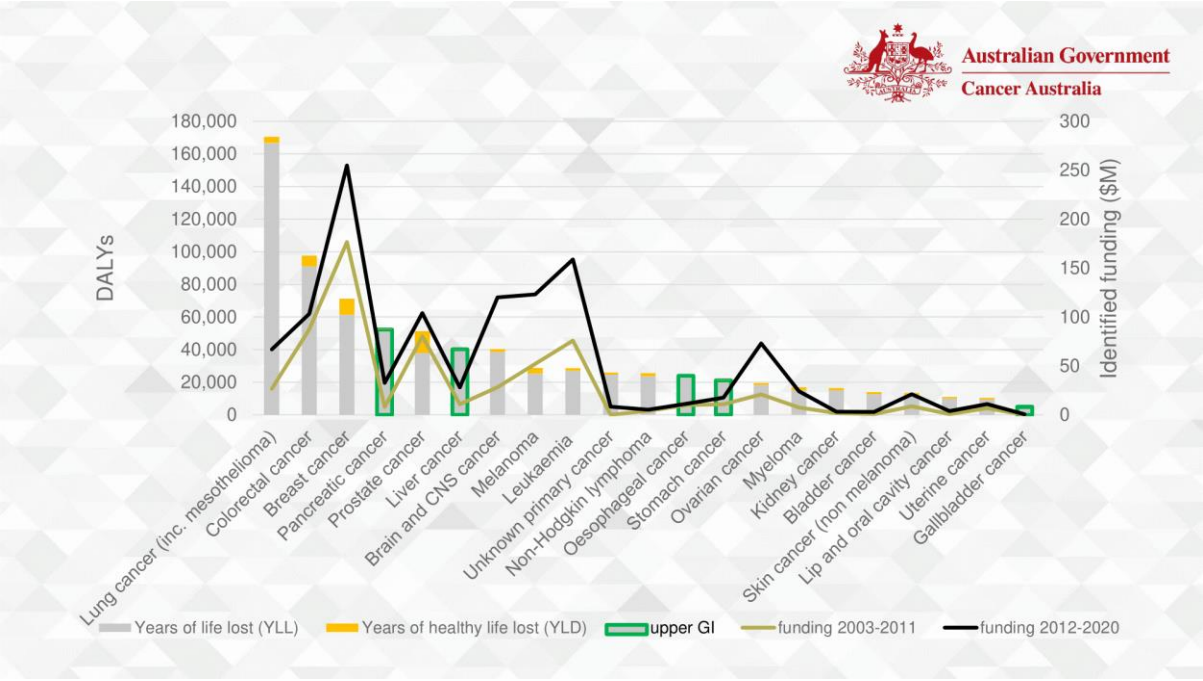
On a source by source basis, the Federal Government is the largest funder of research. Notwithstanding, over the last ten years there have been several industry funded clinical trials (e.g., INTEGRATE).

Figure D.11: Funding by source (Research Audit) [RHS includes industry funded trials]



Mirroring data from the United States, analysis by Cancer Australia within its Research Audit similarly indicates that funding to these cancers remained proportionally low compared with burden of disease (DALYs) on the Australian population.

Figure D.12: Funding against cancer impact



Source: Cancer Australia, Research Audit, 2022.

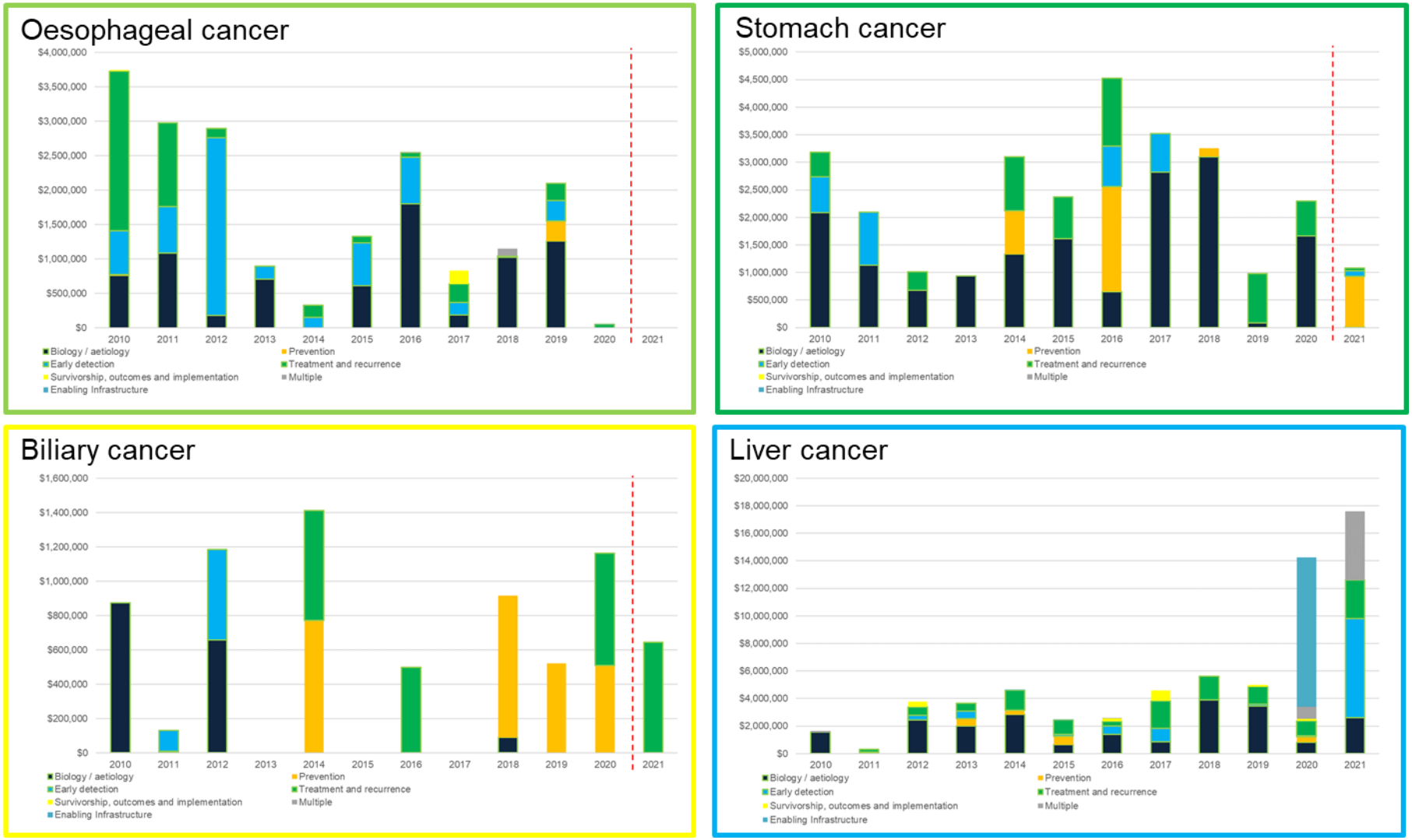
Observably, there has been a recent increase in focus on liver cancer research, with funding from both the non for profit sector and Federal and State governments.

- Western Australia Liver Cancer Collaborative [$10.8 million, funders include NGOs and state government]: Adopting multidisciplinary collaboration between clinicians, researchers and data experts, will develop a world-leading comprehensive liver cancer biobank that will drive the advancement of precision medicine for HCC
- APRICA program [$4 million, funders include CINSW]: Goals include 1. Optimising prevention strategies for primary liver cancer 2. Establishing an NSW liver cancer board with multidisciplinary representation to implement best practice clinical care 3. Developing a palliative care framework for primary liver cancer
- Microbiome Research Centre [$7 million, funders include Glen Family Foundation and MRFF]: Investigating the role of the micro biome in the immunopathogenesis of liver disease and liver cancer in obesity; development of microbial based biomarkers, powered by artificial intelligence, for the early detection of liver cancer.
- IC3 Trial [$3.2 million, funders include MRFF]: Identifying Cirrhosis and Liver Cancer in Primary Care.

Other funding highlights include:

- VCA - Improving Cancer Outcomes for Upper Gastrointestinal Cancers (2018)
- PROBE-NET: The Progression of Barrett's Esophagus to Cancer Network
- INTEGRATE trials

Figure D.13: Australia investment in research into upper GI cancers illustrates consistent focus on biology



Source: Insight Economics Research Audit.

D.2 Evidence of historical effectiveness of Australian research

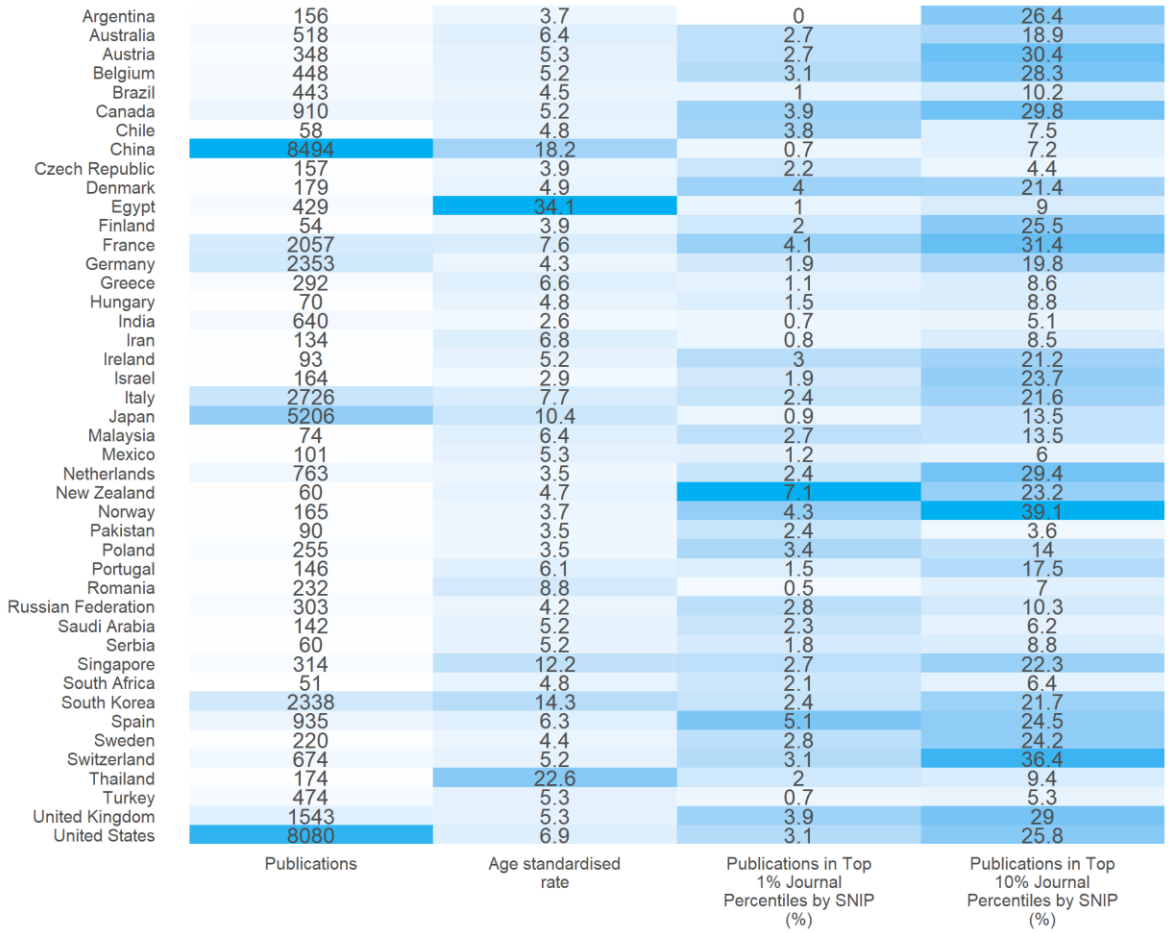
Figure D.14: Relative citations by country – biliary cancer

	Publications	Age standardised rate	Publications in Top 1% Journal Percentiles by SNIP (%)	Publications in Top 10% Journal Percentiles by SNIP (%)
Australia	61	0.62	4.9	31.1
Canada	69	0.66	7.4	33.8
China	628	1.2	1.7	10.6
France	134	0.39	9.3	41.1
Germany	196	0.52	4.8	20.7
Italy	273	0.55	5.2	28.3
Japan	407	1.8	1.2	16.2
Netherlands	63	0.53	6.5	22.6
Portugal	53	0.47	3.8	28.3
Romania	57	0.49	8.8	31.6
South Korea	159	2.9	3.2	21.9
Spain	71	0.49	10.4	38.8
Thailand	114	1.5	3.5	12.4
United Kingdom	149	0.71	13.2	35.4
United States	683	0.68	7.5	32.1

Figure D.15: Relative citations by country – oesophagogastric cancer

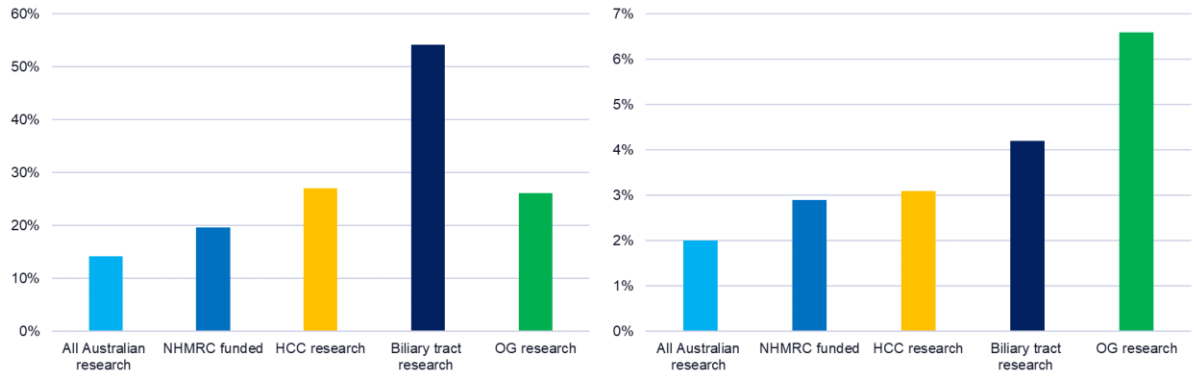
	Publications	Age standardised rate	Publications in Top 1% Journal Percentiles by SNIP (%)	Publications in Top 10% Journal Percentiles by SNIP (%)
Argentina	59	9.3	3.9	15.7
Australia	387	7.5	7.4	25.5
Austria	144	8.1	2.3	12.9
Belgium	204	10.4	8.3	40.4
Brazil	304	10.9	3.4	18
Canada	427	7.4	5.3	28.7
Chile	102	15.1	3.3	13
China	6170	34.4	0.8	9.2
Colombia	50	14.2	0	6.5
Czech Republic	100	8.8	2.3	11.4
Denmark	117	8.4	1.7	14.8
Egypt	98	6	1.1	8.9
Finland	82	6.2	0	16.7
France	730	8.3	4.6	30.8
Germany	1360	11	2.3	21
Greece	163	7.1	0	9
Hungary	70	11	4.8	21
India	607	9.2	1	8.2
Iran	697	21.6	0.8	3.1
Ireland	103	13	1	23.7
Israel	55	6.1	2	13.7
Italy	1181	9.3	2.4	20.5
Japan	5367	38.9	1	19
Mexico	85	7.1	1.2	3.8
Netherlands	853	12	4.2	36.8
Norway	77	7	2.6	14.3
Pakistan	68	10.7	1.6	3.2
Poland	210	10.2	2.5	8
Portugal	176	14	2.4	25.4
Romania	127	11.7	3.5	11.3
Russian Federation	204	16.6	7.3	14.7
Saudi Arabia	55	3.7	2	4.1
Singapore	111	9.4	7.9	35.6
South Africa	51	10.3	2.1	4.2
South Korea	2125	30.4	2.2	25.6
Spain	466	8.1	2.8	16.3
Sweden	251	5.7	5.4	29.3
Switzerland	240	8.6	6.5	32.3
Thailand	70	6.4	0	4.6
Turkey	544	13.9	0.6	3.5
United Kingdom	1148	10.4	5.7	32.5
United States	4262	7	3.2	27.7

Figure D.15: Relative citations by country – hepatocellular carcinoma



Evidence of historical effectiveness of Australian research

Figure D.16: Australian research share of publications within top 10 (LHS) and one (RHS) per cent of journals (2016-2020)



Source: NHRMC Measuring up report (2018); HCC, BTC and OG estimates based on Scival field weighted statistics - 2016 to 2020.

Ownership and access to the data

The data supplied by participants is held in confidence by Insight Economics. Access to identifiable information is limited to Insight Economics staff involved in the audit. Details of individual research projects and research programs, and individual levels of funding, will not be published or accessible unless agreement is obtained in advance from the organisation(s) supplying the data.

Appendix E
Stakeholder consultations

Fifty one stakeholders were consulted through the national stakeholder engagement process, bringing a diverse range of perspectives on the challenges and opportunities to improve outcomes for upper GI cancer patients and their family members:

Alison Keay	Cancer Nurse Consultant, Department of Health Western Australia
Amanda Quennell	Upper GI/HPB Cancer Nurse Consultant, Queensland Health
Amanda Silla	A/Principal Policy Officer - Cancer Network, Department of Health Western Australia
Barbara Smith	Indigenous Liaison Office, Northern Territory Government
Christine O'Donnell	Medical Lead, Servier
Claire Howlett	Dep Sec, Portfolio Manager, Cancer Policy and Services
Daniel Coase	Senior advisor, FECCA
Derek Bryan	Oncology Disease Area Lead, Roche
Dr Aaron Wong	Palliative Medicine Physician and Medical Oncologist, Chinese Cancer Society , Peter Mac
Dr Amanda Ruth	Head of Policy and Public Affairs, Rare Cancers Australia
Dr Anna Boltong	Head, National Cancer Control, Cancer Australia
Dr Dan Croagh	Surgeon - HPB/ interventional endoscopy, Monash MC; stem cell/translational
Dr David Cavallucci	President, Australian New Zealand Hepatic, Pancreatic and Biliary Association Inc (ANZHPBA)
Dr Eleonora Feletto	Lead, Gastrointestinal Cancers Group, Cancer Council NSW
Dr Iain Cameron	Head of HPB surgery at Nottingham University Hospitals
Dr Ian Thomson	President, Australian and New Zealand Gastric and Oesophageal Surgery Association (ANZGOSA)
Dr John L. Marshall, MD	Director of the Ruesch Center of the Cure of Gastrointestinal Cancers
Dr Kate Armstrong	Medical Advisor at NACCHO Australia, NACCHO
Dr Lorraine Chantrill	Chair, Australian Gastrointestinal Trials Group and GI Cancer Institute, Senior Staff Specialist Medical Oncologist and Head of Service for Medical Oncology
Dr Masha Somi	CEO of MRFF , Federal Government - Research
Dr Michael Caruana	Senior Research Fellow, Cancer Council NSW
Dr Michael He	Project/policy officer, FECCA
Dr Paul Jackson	Head, National Research and Data, Cancer Australia

Elizabeth de Somer	CEO, Medicines Australia
Grant Rutley	Patient / carer
Greg Cook	Director, Access, Policy and Advocacy, BMS
Gina Brown	Patient / carer
Guy Tancock	Medical Lead, Servier
Helen Santamaria	Oncology Patient Advocacy Manager, AstraZeneca
Irene Deftereos	Clinical Research Fellow, Nutrition and Dietetics , Melbourne Medical School
Julie Adams	Patient / carer
Katherine Whitfield	Manager, Cancer Reform, Department of Health Victoria
Mary Anne Geronimo	Director of Health Policy , Federation of Ethnic Communities' Councils Australia (FECCA)
Megan Bohensky	Director, Policy and Access Strategy, MSD
Mona Rujis	Patient / carer
Paul Grogan	Senior Strategic Adviser, Cancer Research Division at Cancer Council New South Wales
Prof Ben Deveraux	President, Gastroenterological Society of Australia (GESA)
Prof David Goldstein	Oncologist, Sydney; MOST translational study
Prof David Watson	Matthew Flinders Distinguished Professor of Surgery, Flinders University
Prof Dorothy Keefe	CEO, Cancer Australia
Prof Jacob George	Chair of Hepatic Medicine, Sydney Medical School,
Prof Jennifer Philip	Director, Storr Liver Centre, The Westmead Institute for Medical Research, Head, Department of Gastroenterology and Hepatology, Westmead Hospital and Sydney West Local Health District, Palliative Care Australia
Prof John Mariadason	Head, Gastrointestinal Cancers Program Head, Oncogenic Transcription Laboratory, Olivia Newton John Cancer Research Institute
Prof John Zalcberg	Head, Cancer Research Program. Monash University, Monash University, UGICR, AGITG
Prof Lara Lipton	Medical oncologist, WEHI, Cabrini
Prof Marion Saville	Non Executive Director, Cancer Council
Prof Mark Smithers	Surgeon - Oesophagogastric/Melanoma, PAH Dir Upper GI / Soft tissue unit; UQ Head of Acad and Chair of Surgery
Prof Morteza Aghmesheh	IHMRI Diagnostics and therapeutics lead, clinical professor at Woolongong, IHMRI; University of Woolongong
Prof Narcissus (Narci) Teoh	Professor, Gastroenterology and Hepatology, Medicine and Surgery Program, Australian National University
Prof Niall Tebbutt	Director of the Department of Medical Oncology, Olivia Newton-John Cancer Wellness and Research Centre, Olivia

	Newton John Cancer Research Institute, University of Melbourne
Prof Nic Waddell	Head of the Medical Genomics group at QIMR, QIMR Berghofer Medical Research Institute
Prof Paul Gow	Deputy Director of Gastroenterology and Liver Transplant Medicine at Austin Hospital, Austin Hospital
Prof Sean Grimmond	Director, University of Melbourne
Prof Trish Livingstone	Associate Dean – Research in the Faculty of Health at Deakin University, Deakin University
Prof Vicki White	Professor of Psycho-Oncology at the Faculty of Health at Deakin University, Deakin University
Prof Wayne Phillips	Co-head GI cancer program, Peter Mac
Richard Wylie	CEO, Liver Foundation
Sahisha Ketheeswaran	Medical Manager (Oncology), Roche
Sarah McKechnie	Head of Oncology Business, Roche
Stefan Gijssels	Co-Founder and Former CEO, Digestive Cancers Europe
Sue Sinclair	Service Line Director - Cancer Care, Ramsay Healthcare
Tanya Buchanan	CEO, Cancer Council Australia
Tim F. Greten, M.D.	Co-Director, NCI CCR Liver Cancer Program

The consultation brief provided to the stakeholders is presented in below.

State of the Nation in Upper Gastrointestinal cancers

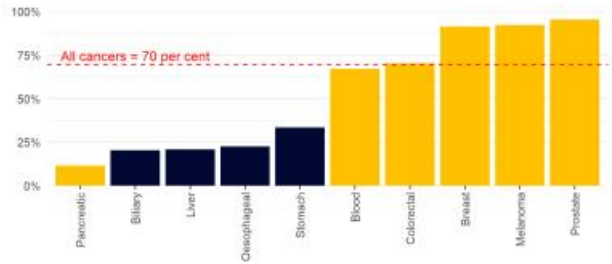
Consultation Brief

Project Background

Pancreatic and upper gastrointestinal (upper GI) cancers include cancers of the pancreas, liver, biliary, stomach and oesophagus. These cancers are individually relatively rare but combined account for 12,400 new cancer diagnoses every year (AIHW, 2021).

While survival for many cancers have improved substantially since the 1980s, survival rates for upper GI cancers have not seen a commensurate improvement and are among the lowest survival cancers in Australia today (Figure 1). As a result, these cancers accounted for nearly one in five (17%) cancer deaths in Australia in 2020.

Figure 1: 5-year relative survival rates for cancers



Note: Upper GI cancers are coloured blue. Source: Australian Institute of Health and Welfare, 2021, Cancer Data in Australia.

The urgent need to improve outcomes for low survival cancers has become a major focus for policy makers globally. For example, in the United States, the National Cancer Institute was directed to develop a research framework for cancers with a 5-year survival rate below 50 per cent. Similarly, in 2017, Australia's Senate Select Committee recommended the development of a national strategy to improve outcomes for low-survival cancers and set an explicit goal to increase 5-year survival rates for low survival cancers to above 50 per cent by 2027.

With survival rates at or below 30 per cent, upper GI cancers need urgent policy focus and investment in research to improve survival outcomes.

In addition to improving survival, patients and their families need policy action to improve quality and safety in treatment and access to supportive and palliative care services. Patients need to understand their diagnosis, make informed choices in their treatment, and receive effective supportive and palliative care services as needed to manage the physical, emotional, financial and social impacts of an upper GI cancer diagnosis.

The Pancare Foundation (Pancare) is championing the development of a State of the Nation in Upper GI cancers with the goal of addressing the needs of this underserved cohort and providing a framework for action. Importantly, this State of the Nation report will explicitly consider and seek to align with other policy work underway, including the development of Australia's first ever Australian Cancer Plan and the Pancreatic Cancer Roadmap.

About Pancare Foundation

Pancare has spent the last decade serving the Australian community by helping foster awareness of pancreatic and upper GI cancers, supporting those impacted by these devastating diseases, and funding research to improve outcomes for patients and their families. Pancare offers a range of support services to patients and carers, including specialist nurse consultations, financial assistance, support groups, education programs and informational resources. The aim of Pancare's services has been to provide a sense of connection, community and hope for patients and their families so that no family must navigate a pancreatic or upper GI cancer alone. It also works to fund high impact research with the goal of doubling the survival rates for all Australians diagnosed with pancreatic and upper GI cancers.

Your input and ideas will shape this report

To support the development of this State of the Nation in Upper GI cancers, Pancare have engaged Insight Economics to take stock of the current landscape for upper GI cancers, covering issues and opportunities across research, prevention, early detection, treatment, supportive and palliative care. It is intended that the State of the Nation in Upper GI cancers will make recommendations for how Australia can best improve outcomes for patients today and invest in research to improve survival outcomes.

To inform this work, we are seeking your perspectives on the major challenges and opportunities for Australian communities with respect to upper GI cancers today and into the future. We welcome your ideas for change and your support to develop a strategy that will make a significant improvement to the lives of the many Australians affected by upper GI cancers.

Questions for discussion

- ***Australia's role in upper GI cancer research.***
  - What are the **key research questions to be answered** for upper GI cancers in your view? How do they vary by cancer?
  - What do you see as **Australia's role** in contributing to research globally in terms of basic science, clinical translation and clinical trials by cancer area?
  - Is Australia sufficiently **integrated into global research efforts** for upper GI cancers across basic science, translational and/or clinical phases of research?
  - Are there **any barriers (infrastructure, skills, regulatory settings)** to Australia making major contributions to high impact research in upper GI cancers?
  - What do you see as the primary barriers or opportunities to Australian upper GI patients **participating in clinical trials** in Australia or internationally?
  - Are there **equity of access risks to clinical trials participation** by State and territory, or for rural and regional patients?

- ***Prevention.***
  - Are there emerging **opportunities in the prevention of upper GI cancers** on the horizon that should be prioritised? Are there **international approaches** to prevention that Australia could learn from?
    i. Prevention of bacterial infections (e.g., H. pylori) and/or key viruses (e.g., Hepatitis)
    ii. Reducing risks from lifestyle factors, such as obesity, poor diet, excess alcohol consumption and tobacco use
- ***Early detection and diagnosis.***
  - Are the **risks and symptoms** of upper GI cancers well understood in the community and by GPs? If not, why not? Does this contribute to poorer survival outcomes or excess costs of treatment and care?
  - Does Australia do enough to **screen for familial/genetic risks** for upper GI cancers and/or **medical conditions** (e.g., Barrett's, anaemia)?
  - Could more be done to **improve the diagnosis and/or referrals** of upper GI cancers?
  - What kind of **investment or policies** would be needed to improve detection and diagnosis (e.g., new technologies, training, systems)?
  - Are there **international approaches to detection** that Australia could learn from?
- ***Equitable access to treatment.***
  - Do patients have a good **understanding of their diagnosis and treatment options**? Does more need to be done to help patients navigate the health care system and care settings?
  - Are there major **barriers to accessing diagnostics or treatments** in upper GI cancers today?
    i. Imaging, endoscopy & biopsy
    ii. Surgery
    iii. Radiation
    iv. Medicines
    v. Organ donation & transplant
  - Are there any **major differences in treatment or care by State and/or territory** for particular upper GI cancers? Are there any barriers to treatment for **regional patients or carers** that need to be addressed?
  - Is there consistent use of **multidisciplinary teams** in the development of care plans?
  - Do patients have equitable access to **specialist nurse support**?
  - Are there **major technology disruptions on the horizon** for improving the diagnosis, treatment and care of upper GI cancers that should be prioritised in terms of research and patient access? Do you see any major impediments (infrastructure, skills, regulatory) to these new technologies becoming available in Australia?

Insight Economics
+Public Policy +Corporate Strategy

  - What **out of pocket costs** do patients and their support team face across the care pathway? Could more be done to support patients and carers through new payment models, insurance, welfare, regulatory systems or other funding mechanisms?
- ***Supportive and palliative care.***
  - Are there major **barriers to accessing supportive care** for patients and their families? Is supportive care consistently discussed? Is there good awareness of supportive care options? Are there any new models of care in development internationally which might deliver additional benefits if adopted in Australia?
    i. Informational support
    ii. Nutrition and diet
    iii. Oral hygiene
    iv. Exercise
    v. Financial support, including access to superannuation and insurance funds as well as disability and welfare support
    vi. Emotional support – professional-led support groups, peer support groups, counselling, psychotherapy, bereavement support
    vii. Carer support
    viii. Advanced care planning
  - Are there major **barriers to accessing palliative care**?
  - Is palliative care **offered early enough**?
  - Are there **equity risks in accessing palliative care** for key cohorts?

Appendix E
Key terms: Glossary & Acronyms

Acronym	Description
Australian Bureau of Statistics (ABS)	The independent statutory agency of the Australian Government responsible for statistical collection and analysis.
Oesophageal Adenocarcinoma (AC)	Cancer which beings in the cells of mucus-secreting glands in the oesophagus.
Adjuvant	Literally means helper or helping. Adjuvant therapy refers to additional cancer treatment given after primary treatment to reduce the risk that the cancer will return. Includes chemotherapy, radiation therapy, hormone therapy, targeted therapy, or biological therapy.
Alpha-fetoprotein (AFP)	A protein made in the liver of a developing baby. AFP levels are usually high when a baby is born but fall to very low levels by the age of 1.
Australian Institute of Health and Welfare (AIHW)	Australia's national agency for information and statistics on Australia's health and welfare.
Age standardised rate (ASR)	Summary measure of the rate that a population would have if it had a standard age structure.
Barcelona Clinic Liver Cancer (BCLC)	Staging system which accounts for the number and size of tumours, general wellbeing, and liver function,
Biobank	Biobanks are created to store biological samples for use in research. Tissue samples, such as blood or tumour tissue, are collected from the patient with their consent, annotated with clinical information, and preserved for later evaluation by scientific and medical researchers seeking to understand the causes, development, diagnosis and treatment of disease.
Biomarker	A biomarker, or tumour marker, is a biological molecule found in blood, other body fluids or tissues that is a sign of a normal or abnormal process, or of a condition or disease. For example, elevated levels of CA125, a protein, biomarker for ovarian cancer (although levels can be elevated as the result of other conditions as well). HE4, inhibin, β-hCG, Alpha-fetoprotein, LDH, CEA, and CA19-9 are other examples of biomarkers for ovarian cancer that have been evaluated in ovarian cancer research and/or may be used in current clinical practice.
Body mass indicator (BMI)	Defined as the body mass divided by the square of the body height.
Cancer antigen 19-9 (CA 19-9)	A protein that exists on the surface of certain cells.
Cholangiocarcinoma (CCA)	Cholangiocarcinoma is a type of cancer that forms in the slender tubes (bile ducts) that carry the digestive fluid bile.
Carcinoembryonic antigen (CEA) test	Measures the level of CEA in blood or other body fluid.
Common Scientific Outline	Common Scientific Outline, or CSO, is a classification system organised into six broad areas of scientific interest in cancer research: biology; aetiology; prevention; early detection, diagnosis, and prognosis; treatment; cancer control, survivorship, and outcomes research. The CSO is complemented by a standard cancer type coding scheme.

Acronym	Description
Chronic obstructive pulmonary disease (COPD)	Chronic inflammatory lung disease that causes obstructed airflow from the lungs.
CT scan	A CT scan, or computed tomography scan (formerly computerised axial tomography scan, or CAT scan) is a medical imaging procedure that uses computer-processed combinations of many X-ray measurements taken from different angles to produce cross-sectional (tomographic) images (virtual "slices") of specific areas of a scanned object, allowing the user to see inside the object without cutting.
Disease recurrence	Return of a disease after remission.
External Beam Radiation Therapy (EBRT)	Refers to the delivery of tightly targeted radiation beams from outside the body.
Epstein-Barr virus (EBV)	A member of the herpes virus family (human herpesvirus 4).
Enhanced Recovery After Surgery (ERAS)	Multimodal perioperative care pathway designed to achieve early recovery for patients undergoing major surgery
Endoscopic retrograde cholangiopancreatography (ERCP)	A procedure that combines upper gastrointestinal (GI) endoscopy and x-rays.
Endoscopic ultrasound (EUS)	Special endoscope uses high-frequency sound waves to produce detailed images of the lining and walls of the digestive tract and chest.
Exome	The part of the genome composed of exons, which are sequences that contribute to the final protein product encoded by that gene (after removing introns).
Fine needle aspiration (FNA)	Diagnostic procedure used to investigate lumps or masses whereby a thin, hollow needle is inserted into the mass for sampling of cells.
FOLFOX	Specific combination of chemotherapy drugs
Oesophagogastric junction (GEJ / OGJ)	Point where the stomach meats the oesophagus.
Gastrointestinal (GI)	Tract from the mouth to the anus.
Gastrointestinal stromal tumor (GIST)	Uncommon tumors that can grow anywhere in the digestive tract.
Gastro-oesophageal reflux disease (GORD)	Chronic disease that occurs when stomach acid or bile flows into the food pipe and irritates the lining.
General Practitioner (GP)	Treat all common medical conditions and refer patients to hospitals and other medical services for urgent and specialist treatment
Grey literature	Research produced by organisations outside of the traditional commercial or academic publishing and distribution channels.
Hepatitis B (HBV / CHB)	An infection caused by a virus (HBV) that attacks the liver and leads to inflammation. The condition can clear up on its own. However, chronic cases require medication and possibly a liver transplant.
Hepatocellular carcinoma (HCC)	Hepatocellular carcinoma, which is a subtype of liver cancer.
Healthcare practitioner (HCP)	Any person who in the course of his or her professional activities may prescribe, recommend, purchase, supply, sell or administer a pharmaceutical product.
Hepatitis C (hepatitis C / CHC)	An infection caused by a virus (hepatitis C) that attacks the liver and leads to inflammation. Acute infection can lead to chronic infection (CHC), which can be a lifelong infection if left untreated.
High dose-rate (HDR) brachytherapy	A type of internal radiotherapy.

Acronym	Description
Hepato Pancreato Biliary (HPB)	Common grouping of liver, pancreas and biliary structures.
Human papillomavirus (HPV)	Common sexually transmitted infection.
Health-related quality of life (HRQoL)	Perceived quality of an individual's daily life, including domains related to physical, mental, emotional, and social functioning.
ICD-10	ICD-10 stands for International Classification of Disease version 10. ICD-10 is the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD), a medical classification list by the World Health Organization (WHO). It contains codes for diseases, signs and symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or diseases. Work on ICD-10 began in 1983, became endorsed by the Forty-third World Health Assembly in 1990, and was first used by member states in 1994. It remains current until January 1, 2022, when it will be replaced by ICD-11. Ovarian cancer is coded as C56 in ICD-10, and fallopian cancer and cancers of unknown origin are coded under C57.
Immunotherapy	Immunotherapy is a type of cancer treatment that helps your immune system fight cancer. The immune system helps your body fight infections and other diseases. It is made up of white blood cells and organs and tissues of the lymph system. Immunotherapy is a type of biological therapy. Biological therapy is a type of treatment that uses substances made from living organisms to treat cancer.
Incidence	The number of newly diagnosed cases of cancer each year.
John Cunningham virus (JCV)	Also referred to as Human polyomavirus 2, JCV is a type of human polyomavirus.
Key performance indicator (KPI)	A type of performance measurement which evaluates the success of an organisation or of a particular activity in which it engages.
Lesion	A region in a tissue or organ which has suffered damage through injury or disease.
Liver Imaging Reporting and Data System (LI-RADS)	A classification system for liver lesions which is used in patients with liver cirrhosis and chronic HBV without cirrhosis, because these patients have an increased risk of hepatocellular carcinoma (HCC
Lymphoedema	Swelling of part of the body, usually a limb. Is a possible side effect of cancer treatment, when lymph nodes have been removed or damaged causing lymph fluid to build up.
Lymphovascular invasion	The invasion of a cancer to the blood vessels and/or lymphatics (organ system responsible for draining fluid and returning it to the bloodstream).
Multidisciplinary team (MDT)	A multidisciplinary team involves a range of health professionals, from one or more organisations, working together to deliver comprehensive patient care. Teams meet at multidisciplinary meetings (MDM).
Metastatic cancer	Occurs when cancer cells break off from the original tumor, spread through the bloodstream or lymph vessels to another part of the body.
Mortality	A measure of the number of people deceased from ovarian cancer, typically expressed on a per annum basis.
MRI scan	Magnetic resonance imaging, or MRI, scan is a procedure in which radio waves and a powerful magnet linked to a computer are used to create detailed pictures of areas inside the body. These pictures can show the difference between normal tissue and cancer.
NAFLD	Non-Alcoholic Fatty Liver Disease, which is an umbrella term for a range of liver conditions affecting people who drink little to no alcohol. As the name implies, the main characteristic of NAFLD is too much fat stored in liver cells. NAFLD is a precursor medical condition to liver cancer.

Acronym	Description
Non-alcoholic steatohepatitis (NASH)	Nonalcoholic steatohepatitis is an aggressive form of fatty liver disease, which is marked by liver inflammation and may progress to advanced scarring (cirrhosis), liver failure and possibly liver cancer. This damage is similar to the damage caused by heavy alcohol use.
National Comprehensive Cancer Network (NCCN)	A not-for-profit alliance of 32 leading cancer centers devoted to patient care, research, and education.
National Cancer Institute (NCI)	The federal government's principal agency for cancer research and training. The NCI drives the cancer research enterprise by supporting and convening researchers, paying for facilities and systems, and coordinating the National Cancer Plan.
Non-dysplastic Barret's Oesophagus (NDBE)	A condition in which tissue that is similar to the tissue lining in the intestines changes or replaces the lining of the oesophagus. In NDBE, the risk of progression to cancer is low.
Neoadjuvant	Treatment given as a first step to shrink a tumor prior to the main treatment. Neoadjuvant therapy includes chemotherapy, radiation therapy, and hormone therapy.
Net present value	Net present value is the value of a future stream of cash flows in today's dollar terms, hence the 'present value' of a sum of money. Generally speaking, money is worth more today than it is tomorrow, because it is possible to invest and grow money over time. Present value calculations allow for a like-for-like comparison between two alternative investments that may have payoffs or benefits realisation at different time horizons.
Non government organisations (NGO)	Non-profit organisations that are set up and operated independently from governments.
National Health and Medical Research Council (NHMRC)	The main statutory authority of the Australian Government responsible for medical research.
National Mutual Acceptance (NMA) scheme	National Mutual Acceptance (NMA) is a national system for mutual acceptance of scientific and ethical review of multi-centre human research projects.
Non-governmental organisation	A non-governmental organisation, or NGO, refers to organisations that are operated independently of any government, typically on a not-for-profit basis and one whose purpose is to address a social or political issue.
Neurotrophic tyrosine receptor kinase (NTRK)	NTRK gene fusions are an actionable biomarker for cancer therapy.
Optimal care pathway (OCP)	Documents which set out key principles for optimal care at each step of the patient journey
Off label	Off-label use is the use of pharmaceutical drugs for an unapproved indication or in an unapproved age group, dosage, or route of administration.
Opportunistic screening	Occurs when a health professional offers an additional examination or test as part of a routine medical check-up.
Pan-cancer	Across all cancers.
Poly-ADP ribose polymerase (PARP)	PARP is a protein (enzyme) found in cells and helps damaged cells to repair themselves.
PET scan	Positron Emission Tomography (PET) is a nuclear medicine technology that uses short-lived radioisotopes to enable the non-invasive imaging of metabolic functions within the body. A small amount of radioactive glucose (sugar) is injected into the patient's vein, and a scanner is used to make detailed, computerised pictures of areas inside the body where the glucose is taken up. Because cancer cells often take up more glucose than normal cells, the pictures can be used to find cancer cells in the body. While computed tomography (CT) and magnetic resonance imaging (MRI) primarily provide information about anatomical structure, PET can image and quantify biochemical and/or physiological function. This is important

Acronym	Description
	because functional changes caused by disease, such as cancer, are often detectable before any structural abnormalities become evident.
Phenotypic	The set of observable characteristics or traits of an organism.
Plasticity	The quality of being easily shaped or moulded.
Prevalence	The number of people diagnosed and living with cancer; includes newly diagnosed cases plus other survivors.
Patient Reported Outcomes (PROs)	Assessments based on a report that comes directly from a patient about the status of their health without amendment or interpretation of their response by a clinician or anyone else.
Performance status (PS)	Assessment of level of function and capability of self-care
Quality adjusted life year (QALY)	A generic measure of disease burden used to assess the value of medical interventions. One QALY equates to one year in perfect health, it is adjusted downwards from there.
Randomised controlled trial	A trial (experiment) in which subjects are randomly assigned to one of two groups: the experimental group, which receives the intervention, and the control group, which receives an alternative treatment. The process is considered to provide reliable evidence as it controls for confounding factors through randomness.
Real world data	Real world data or real world evidence is information related to the health status and health care delivered to patients routinely collected through a variety of sources such as clinical registries, electronic medical records (EMRs), patient reported outcome (PRO) platforms, pharmaceutical Benefits Scheme (PBS) and Medical Benefits Scheme (MBS) data.
Resectable	Able to be removed by surgery.
Return on investment (ROI)	A performance measure used to evaluate the efficiency or profitability of an investment or compare the efficiency of a number of different investments
Stereotactic Body Radiation Therapy (SBRT)	Cancer treatment that delivers precise doses of radiation to cancer cells.
Squamous cell carcinoma (SCC)	The squamous cells are flat, thin cells that line the surface of the esophagus.
Socioeconomic status (SES)	Social standing or class of an individual or group, generally used to measure variation in financial wellbeing.
Selective internal radiation therapy (SIRT)	A way of giving radiotherapy treatment for cancer in the liver, which relies on particles that are loaded with a radioactive beta emitter.
Survivorship	Consistent with the NCI dictionary, survivorship refers to the health and well-being of a person with cancer from the time of diagnosis until the end of life.
Systemic therapies	Any type of cancer treatment that targets the entire body.
Transarterial chemoembolization (TACE)	A minimally invasive procedure performed to restrict a tumor's blood supply. Small embolic particles coated with chemotherapeutic drugs are injected through a catheter into an artery directly supplying the tumour.
Targeted therapy	Targeted therapy is the foundation of precision medicine. It is a type of cancer treatment that targets proteins that control how cancer cells grow, divide, and spread.
TNM	The TNM system is the most widely used cancer staging system. T refers to the size and extent of the primary / main tumor. N refers to the number of nearby lymph nodes that have cancer. M refers to whether the cancer has metastasised.
Tumourigenesis	The process of tumour development.
Upper gastrointestinal (Upper GI)	Upper part of the gastrointestinal tract, including the oesophagus, stomach, liver, and biliary. The definition varies by source.

Appendix F
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