Acknowledgments

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In this section, eight cancer types are outlined briefly as a way of contextualising the analysis and highlighting cancer types that are important in Australia – either because of their public health programs or because of large incidence or mortality percentage changes – to illustrate how policy, programs or other changes may have affected these measures. These have been selected based on a combined list of the top five cancer sites for males and females in incidence and mortality according to IARC GLOBOCAN 2008 working estimates, and cancer types of national importance in Australia.5

Firstly, trends in incidence and mortality for the cancer type are described – including data from the IARC GLOBOCAN project to illustrate global incidence and mortality working estimates for 2008 in individuals aged 74 years and under. Additionally, the most current survival data available for Australia from the AIHW are also provided.3 The AIHW survival data are presented to provide context rather than to facilitate a comparison between survival trends and our findings. However, the AIHW data were only available for all ages combined. The relative survival and five-year conditional relative survival data reported by the AIHW show the probability of surviving a given number of years, provided that an individual has already survived a specific amount of time after diagnosis.3

A brief overview of current prevention strategies, screening programs and treatment methods in use globally and in Australia are also provided. The results of our analysis for the specific cancer type are then presented and discussed.
7.3  
Colorectal 
cancer 
(C18-C20)

7.3.1  Background
Colorectal cancer, also referred to as bowel cancer, is the third most common cancer in males and the second most common in females worldwide. IARC GLOBOCAN 2008 working estimates state that the incidence for colorectal cancer was 11.4/100,000 in females and 15.9/100,000 in males under the age of 75. Incidence is higher in developed countries and as such it is often considered a Western lifestyle disease. In the United States of America (USA), incidence trends have shown a reduction in colorectal cancer. However, incidence has increased in Americans under 50 years of age, who are not eligible for the screening program. Approximately 8% of cancer-related deaths worldwide are from colorectal cancer, with higher rates in males (6.8/100,000) than females (4.9/100,000) under 75.

Colorectal cancer includes cancers of the colon, rectosigmoid junction and rectum. It is more often found in the elderly; however, it can present in people under 40 years of age but commonly in the more advanced stages. Early-stage colorectal cancer typically has no symptoms, therefore screening is currently the only method through which early diagnosis can be made.

In Australia, colorectal cancer is the second most commonly diagnosed cancer and the second most common cause of death. In 2006, a National Bowel Cancer Screening Program was implemented to improve early detection rates. The prognosis improves over time, beginning with a 66% probability of survival for at least 5 years at the time of diagnosis. The conditional relative survival for 5 years was 76% at 1 year after diagnosis and almost 100% for 5 years after diagnosis. Survival rates are higher in major cities in comparison to inner regional and outer regional areas. Survival is also influenced by SES, with lower SES associated with lower survival rates.
7.3.1.1 Causes and risk factors

The most prominent risk factor for colorectal cancer is age, with over 90% of cases being diagnosed in people over 50 years of age. In addition to this, there are a number of genetic or personal history factors that increase risk. A personal or family history of colorectal cancer, polyps and specific inherited genetic conditions (e.g., familial adenomatous polyposis and hereditary nonpolyposis colorectal cancer) or a personal history of inflammatory bowel disease significantly increases the likelihood of colorectal cancer.

A distinction has been identified in the increased risk by dietary patterns between colon and rectal cancers. An evaluation of existing evidence, led by the World Cancer Research Fund, has found:

- **Convincing evidence for:**
  - Physical activity protecting against colon cancer
  - Consumption of red meat and processed meat increasing risk of colorectal cancer
  - Consuming alcoholic drinks increasing risk of colorectal cancer in men (probably in women)
  - Body fatness and abdominal fatness, and factors leading to greater adult-attained height increasing risk of colorectal cancer

- **Probably evidence for:**
  - Consumption of garlic, milk and calcium decreasing risk of colorectal cancer

Other food products do not have a conclusive association with decreased risk. A high-fibre diet consisting predominantly of fruits and vegetables, whole grains, fish, poultry, legumes and soy products is considered optimal, as it minimises the risk of other chronic conditions. Later studies have found that high consumption of milk and other dairy products is statistically associated with a reduction in colorectal cancer compared to low consumption, as a result of their calcium content and its protective effect. However, high dairy consumption may have an adverse effect on other diseases. Use for one year or more of oral bisphosphonate, often prescribed in the treatment of osteoporosis, has been associated with a reduced risk of colorectal cancer. This relationship still requires confirmation in larger randomised trials with longer term follow-up.

A recent Norwegian cohort study showed that females who consumed more than 60 grams of processed meats per day were at higher risk of colorectal cancer, especially distal cases, compared to those who consume 15 grams or less a day. Additionally, higher risk of recurrence is suggested in patients who continued with a diet of processed meats, more prominently in Western cultures. An Australian study found that obesity, specifically higher central adiposity, prior to cancer diagnosis was associated with poorer survival of colorectal cancer. The Mediterranean diet, as measured by the Italian Mediterranean Index, has been associated with lower risk for all types of colorectal cancer except proximal cancer, when introduced a priori. A link between particular gene variations and dietary patterns has been shown, but requires further investigation.

Alcohol consumption causes colorectal cancer, according to the most recent IARC evaluation. A pooled analysis found that consumption of over 30 grams of alcohol per day was significantly associated with increased risk in males and females, for all types of alcoholic beverages and in all subtypes of colorectal cancer. The association appeared to be stronger in subjects with a lower BMI. Coffee consumption has been linked to a lower risk of colon cancer but not rectal cancer for individuals with higher levels of consumption. The antioxidant properties of coffee are thought to be the reason for this effect. Despite large international variations in colorectal cancer, a search for definitive lifestyle and dietary causes has been elusive, and it is thought that a still unidentified dietary or lifestyle factor is more likely the cause.

An additional modifiable risk factor of colorectal cancer is smoking. This was previously considered a possible risk factor, but more recent analyses showed a significant increased risk of colorectal cancer with smoking. A pooled analysis looking at the risk after quitting smoking showed that the risk can continue for up to 25 years after quitting. However, risk begins to decline as soon as smoking is ceased for proximal colon and rectal cancer, but for distal colon cancer, a point of decline is only reached after 25 years of cessation. Further, higher risk of colorectal cancer was found in individuals who smoked for more than 30 years and smokers of more than 20 cigarettes a day compared to never smokers, as well as in male smokers over female smokers. Perhaps controversially, Tsoi et al’s analysis...
of cohort studies found that there was no statistically significant increase in risk for current female smokers, for males or females who smoked less than 20 cigarettes per day and smoked for less than 20 years, and for females who had smoked less than 20 packs per year. A proposition that antioxidant micronutrients could mediate the effect of smoking and reduce the risk of colorectal cancer has been refuted in a Danish study.173

The relationship between physical activity and risk of colorectal cancer varies by sites. There is convincing evidence indicating reduced risk for colon cancer, but no conclusion has been drawn for rectal cancer.24 An Australian study found poorer survival in colorectal cancer patients who did not undertake regular physical activity prior to their diagnosis.174 The lack of conclusive evidence relating to physical activity and colorectal cancer risk is largely due to the study measurements used and design limitations.175 A recent analysis of a cohort of females in the USA found a reduction in mortality risk for females who had a score of 18 or more metabolic equivalent hours of recreational physical activity pre- and post-diagnosis of colorectal cancer.176 However, increased physical activity is promoted as being of overall benefit and providing a protective effect.7, 20

Additional lifestyle factors also alter the risk of colorectal cancer. There is evidence suggesting reduced incidence of colorectal cancer in females using oestrogen-only menopause therapy, but there is no evidence of elevated risk when combined therapies are used.21 Evidence also suggests an inverse relationship between oral contraceptive use and risk of colorectal cancer.21 Additionally, a cohort study suggests that short (five hours or less) or long (nine hours or more) sleep duration increases the risk of colorectal cancer in females.176 This is the first prospective study of its kind. Sleep duration may become an emerging issue in the area of cancer causation. Occupational exposure to asbestos is also associated with higher risk of colorectal cancer.177 Evidence suggests that the association may be greater for colon cancer than rectal cancer.177 X- and y-radiation have been positively associated with rectal cancer; for colon cancer there is convincing evidence making X- and y-radiation a cause of this subtype.93

7.2.1.2 International prevention/screening/treatment programs

Prevention of colorectal cancer is largely based on addressing the modifiable risk factors which can also decrease the likelihood of diagnosis of other chronic illnesses.178 The major focus – which has had the greatest impact – is colorectal cancer screening. Screening programs are in place worldwide and are recommended for people over 50 years of age.7 Screening can detect precancerous polyps and cancer at its early stage. If caught early, treatment is more successful and less invasive.20 Precancerous polyps can be removed via a polypectomy.7 Specifically, for people who have previously undergone polypectomy, calcium and anti-inflammatory medications such as aspirin and celecoxib play a chemoprevention role.179

A number of screening methods can be used, and suggestions have been made encouraging patient autonomy in choosing preferred screening methods.180 However, FOBT followed by a colonoscopy is the most common process. Two types of FOBT are available. Guaiac FOBT has restrictions on dietary consumption and medications taken for the three days prior to testing. Many countries, such as Australia, have shifted to use immunochemical FOBT, as it is not as restrictive. Colonoscopy and sigmoidoscopy have recently increased in use as first-line screening techniques.181 The latter options are more invasive than the FOBT and more labour intensive to administer. Newer screening tests are available, but have not yet been proven to be cost effective and are not used extensively.182

As previously mentioned, Australia has a screening program, with a one-time immunochemical FOBT at ages 50, 55, 60 and 65, despite the National Health and Medical Research Council (NHMRC) recommendation for biennial screening.183 Those turning 60 in 2013 were recruited, beginning on 1 July 2013, and 70-year-olds will be incorporated into the program from 1 July 2015.67 The Australian program has previously been critiqued for the lack of resources available to perform follow-up colonoscopies when required.184 A comparison of patients participating and not participating in the national program in South Australia showed that diagnoses occurred at earlier stages for individuals participating in the screening program, illustrating positive program outcomes.185 Attaining sufficient coverage of colorectal screening is, however, an ongoing challenge in countries that have tried to implement such programs. A recent evaluation of the national program reported reduced participation rates in the past year, dropping from 38.4% in 2008–2011 to 35% in 2011–2012.186

Surgery is the most common treatment for colorectal cancer. Chemotherapy, with or without radiation therapy, is used before or after surgery if the cancer has spread into the bowel wall or the lymph nodes.20 There are also chemoprevention drugs available that have been shown to benefit some patients.187 Anti-inflammatory medications such as aspirin as prophylaxis can be used against further adenoma development in those with a previous removal of an adenoma.188
7.2.2 Incidence and mortality rates in Australia 1987–2007

Colorectal cancer had a small, non-statistically significant overall change in incidence (2%), (see Table 7–5 and Table 7–6). A substantial, statistically significant difference is seen in mortality. Overall, there has been a 47% decline in mortality, only slightly higher for females (50% decline) (see Table 7–5). Reduced mortality is probably due to improved treatment technology and adherence to national management and treatment guidelines. Early detection may also have had an impact, although there was no organised screening during the time period analysed, apart from the dissemination of FOBT kits to a limited age group from late 2006. Both incidence and mortality age standardised rates have shown downwards trends over the last 20 years (Figure 7–5 and Figure 7–6). Therefore, it is assumed that these figures will improve in the future. The drop in cervical cancer incidence and mortality rates from 1987 to 2007 can be seen in Figure 7–5 and Figure 7–6.

Table 7–5
Colorectal cancer deaths and incident cases in Australia 1987–2007

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Persons</th>
<th>Male</th>
<th>Female</th>
<th>Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deaths†</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observed in 2007 (O)</td>
<td>1,197</td>
<td>791</td>
<td>1,988</td>
<td>5,121</td>
<td>3,653</td>
<td>8,774</td>
</tr>
<tr>
<td>Expected in 2007 (E)</td>
<td>2,205</td>
<td>1,580</td>
<td>3,785</td>
<td>4,921</td>
<td>3,680</td>
<td>8,600</td>
</tr>
<tr>
<td>Difference (O–E)</td>
<td>-1,008</td>
<td>-789</td>
<td>-1,797</td>
<td>200</td>
<td>-27</td>
<td>174</td>
</tr>
<tr>
<td>Change in (O–E)/E (%)</td>
<td>-46</td>
<td>-50</td>
<td>-47</td>
<td>4</td>
<td>-1</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 7–6
Colorectal cancer: average annual percentage change (AAPC)

<table>
<thead>
<tr>
<th></th>
<th>Mortality</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AAPC</td>
<td>Confidence Interval (95%)</td>
</tr>
<tr>
<td>Male</td>
<td>-2.9</td>
<td>-3.3, -2.5</td>
</tr>
<tr>
<td>Female</td>
<td>-3.3</td>
<td>-4.4, -2.2</td>
</tr>
<tr>
<td>Persons</td>
<td>-3.0</td>
<td>-3.4, -2.7</td>
</tr>
</tbody>
</table>

Figure 7–5
Colorectal cancer: age-standardised cancer mortality rates in Australia 1987–2007, 0–74 years

Figure 7–6
Colorectal cancer: age-standardised cancer incidence rates in Australia 1987–2007, 0–74 years

*An average of the observed rates for 2006 to 2008 was applied to the 2007 population to calculate the observed number of deaths and incident cases for 2007.

*An average of the observed rates for 1986 to 1988 was applied to the 2007 population to calculate the expected number of deaths and incident cases for 2007.

*All figures have been rounded to the nearest whole number.
The issue of quality of life in colorectal cancer survivors is becoming more important as mortality decreases and incidence increases or remains stable. Survival has improved over time. As expected, long-term survivors (five years after diagnosis) of colorectal cancer have higher health-related and global quality-of-life in comparison to patients at baseline (five months after diagnosis). A UK study showed that survivors up to five years post-diagnosis had comparable health behaviour outcomes to the general population. Survivors of colorectal cancer have shown very high quality-of-life when they were at least 15 years after diagnosis and had no disease recurrence. Differences are apparent in survivors of different subtypes, with rectal cancer survivors reporting lower quality-of-life compared to the colon cancer survivors when compared to controls. Physical activity has not been found to have a positive effect on quality of life, perhaps a result of low levels of physical activity in patient groups. However, a Taiwanese study found that supervised exercise programs resulted in improved health outcomes and quality-of-life indicators in colorectal cancer patients compared to usual care, although the scores for usual care were also high.

Caring for colorectal cancer patients has high associated costs, especially in later phases of the disease. To this end, an analysis of first-degree relatives of colorectal patients and their adherence to screening guidelines showed that there are low levels of screening for this high-risk group; and interventions should be developed to improve this. Screening and early diagnosis are becoming more important from a budgetary point of view, and the greatest future reductions in mortality across the whole population are expected to be gained from population-wide screening. Later data have shown earlier-stage diagnosis due to participation in the national screening program, potentially leading to reductions in mortality in the future. Individual behaviour modifications, such as increased physical activity, can also reduce colorectal cancer risk.

The recommended biennial program of FOBT, not currently in place in Australia, would be cost effective for people aged 50–74. Given the rising cost of treating colorectal cancer patients, it would seem that improving and expanding the screening program would result in the best, most cost-effective long-term outcome. However, the program in its current form cannot be upgraded to support biennial screening, due to the limited capacity of health care facilities to perform follow-up colonoscopies. In light of this, the Australian Government has committed resources to the program until 2034, to ensure biennial screening is eventually available to all individuals aged 50–74. To facilitate the program’s expansion, the 2013/14 federal budget incorporated AUS$16.1 million to potentiate the program register by incorporating electronic reporting by health professionals. Independent public health and medical authorities continue to call on the Australian Government for an expedited expansion of the screening program.
7.3 Colorectal Cancer (C18-C20)

References


