

The Price of Cancer

The public price of registered cancer
in New Zealand

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MANATŪ HAORA

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Disclaimer

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Abbreviations

DAP	District Annual Plans
DHB	District Health Board
NZCR	New Zealand Cancer Registry

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Executive Summary

This report calculates the annual public price of all cancers registered with the New Zealand Cancer Registry (NZCR) in 2008 and then estimates the drivers and likely magnitude of price change 10 years into the future, based on previous cancer incidence projections (Ministry of Health 2010).

The price of cancer in New Zealand has been estimated before, but not for all registered cancers and without the same level of granularity – this report presents mean price by date of diagnosis, site and service.

For a more complete view of the projected burden of cancer, previous reports should be consulted, together with reports on the projected mortality from cancer (Ministry of Health 2002, 2007, 2008, 2010).

We calculated the price of registered cancers for a single year as \$511 million (2008/09 prices – excluding screening programmes and supported care). This relates predominantly to public hospital discharges (42%), outpatient attendance (22%), and community and hospital pharmacy dispensing (10%). Individually, female breast cancer (15%), cancer of the colorectum and anus (14%), and haematological and lymphoid cancers (13%) consume the largest shares.

The mean price for a single cancer for six years (one year prior to and five years following diagnosis) is calculated as \$20,372.50 (2008/09 prices – excluding screening programmes and supported care). The most expensive cancers on average are haematological and lymphoid cancers (\$38,834).

By 2021 the cost of cancer is predicted to be \$117 million more than it is currently. This figure takes into account overall decreases in rates of incidence (–\$23 million), increases in population size (+\$45 million) and the impact of an ageing population (+\$95 million). Prostate cancer is predicted to have the largest increase in price in 10 years (+\$51 million), followed by lymphoid and haematological cancers (+\$26 million).

Introduction

It is widely acknowledged that cancer treatment and palliative care services could easily absorb enormous amounts of new funding. In a constrained economic environment the reality is that limited new funding is available.

Previous work published by the New Zealand Treasury (2010) and the Cancer Control Council of New Zealand (2009) indicates that:

- cancer care will continue to see pressures from volume growth due to population growth, an ageing population and increasing prevalence of cancer
- there will be an increased number of cancer drugs and therapies being targeted to individual patients
- new treatments are becoming available that will straddle traditional definitions of drugs and devices.

These developments are likely to challenge current models of service delivery and strain health care resources. There is evidence to suggest that the cost of cancer care is already increasing rapidly; however the understanding of the drivers behind those increasing costs is limited. This led the Cancer Control Steering Group for the Ministry of Health to prioritise work on understanding the increasing costs of providing cancer services and to commission this report.

This report provides a baseline of what the Ministry is paying for cancer care and explores the likely drivers (based on current treatments and models of care) of the price of cancer between 2011 and 2021.

In scope

Where possible this report covers prices that are wholly attributable to cancer treatment and care – that is, when the primary reason for engagement with the health service in question is cancer, whether testing, treatment, travel to care or otherwise.

It was not possible to take this approach with all services, in particular laboratory testing and primary care consults. We have had to assume that the vast majority of testing and primary care consultations with people with a registered cancer relate to the cancer and not to other causes. In the case of these two services this assumption is unlikely to be true and will result in an overestimation of costs. We believe this overestimation will be relatively small, both in terms of its contribution to the cost of the respective service and to the price of cancer overall.

Out of scope

This report does not explore the costs associated with the prevention or early diagnosis of cancer. The price calculated therefore does not include the price of organised screening programmes, tobacco control or the Human Papilloma Virus (HPV) Immunisation Programme.

In addition, the report does not include costs associated with rehabilitation and disability support, non-government organisations, private insurance, out-of-pocket expenditure, or expenditure on research.

Methods

Registered cancers

All cancers (malignant and in situ) registered for the years 2003 to 2008 inclusive were extracted from the New Zealand Cancer Registry (NZCR). These cohorts were used to estimate selected public wholly attributable cancer costs. Where possible the prices were adjusted or rebased to the prices for the 2008/09 financial year.

Cancer registrations were retained for the estimation of mean price when either of the following applied.

1. It was the first registration for the person in the period.
2. It followed a previous registration for the same person by more than five years.

This was done to reduce double counting of costs for cancers. However, all incident cases for a year were included in the total cost calculations (the product of mean price by incident cases).

The *International Statistical Classification of Diseases and Related Health Problems*, 10th Revision, Australian Modification (ICD-10-AM) is used to classify the site for the registration data used in this report.

Table 1 shows the breakdown of the cancer sites and the ICD-10-AM codes used in this report.

Table 1: New Zealand cancer registrations – site group and ICD coding

Group	ICD10AM – Description
1	C18–C21 – Colorectal
2	C33, C34 – Respiratory
3	C43 – Melanoma
4	C50 – Breast
5	C51, C52, C54–C58 – Gynaecological
6	C53 – Cervix
7	C61 – Prostate
8	C81–C96 – Lymphoid and haematological
9	C01–C17, C22–C32, C35–C42, C44–C49, C59, C60, C62–C80, C97–C99, D45–D47 – Other malignant
10	D00–D09 – In situ
Malignant	C01–C99, D45–D47 – All registered malignant cancers
All	C01–C99, D00–D09 or D45–D47 – All registered cancers

Sources of volume and price data

The volume and price data from selected data sources were used for the period 1 July 2006 to 30 June 2009 when available. These data sources and the related services are detailed below.

National travel assistance

Any national travel assistance (NTA) claims paid by District Health Boards for the period 1 July 2008 to 30 June 2009 were included and the claim value paid was applied to the date of payment interface (likely four weeks after the date of service).

Outpatient attendances

Oncology, chemotherapy, haematology or radiotherapy outpatient visits reported to the National Non-Admitted Patient Collection (NNAPC) for the period 1 July 2008 to 30 June 2009 were included. DHB contracted prices were applied to the date of visit. A summary of these prices can be found in Appendix 1.

Other work undertaken by the Cancer Team has identified deficiencies in the data for outpatient events. This includes inconsistencies in reporting by DHBs. This is likely to result in an underestimate.

Outpatient events priced in this report include only those specifically identified as wholly attributable to cancer. Cancer patients also have outpatient attendances for purchase units that are not specific to the care or treatment of a cancer in an outpatient setting. We observed that cancer patients have these non-cancer specific attendances at a much higher rate than the remainder of the New Zealand population. Consequently we believe that this report will underestimate the overall price of outpatient services provided for the care and treatment of people solely because of their cancer. For example, given that a number of the District Health Board planned revenues for general surgical purchase units are in the order of \$10 million each, it is conceivable that the underestimate may be in that order as well.

Community laboratory tests

Laboratory testing claims related to cancer reported to the Laboratory Claims Warehouse (Labs) for the period 1 July 2007 to 30 June 2009 were included. The estimated test cost was applied to the date the patient visited the general practitioner and in many cases the actual test date would have been a few days later.

The estimated laboratory test cost extracted from Labs is either the actual price of the claim made for the test, and in some cases (bulk contracted tests) it is the contracted price divided by the contracted volume. The average estimated price for each type of test in 2008/09 can be found in Appendix 2.

It was not possible to determine the reason for most types of tests, barring those few specifically for screening or testing for cancer. We are therefore unable to determine the price of laboratory tests that can be wholly attributed to the presence of cancer. We proceeded on the basis that any and all tests claimed for during the presence of cancer represent the laboratory test price wholly attributable to cancer. This will overestimate the price of laboratory testing attributable to cancer. However, as laboratory testing is a small contributor to the total price of cancer we felt comfortable with the approach taken.

It should be noted that some hospitals have their own in-house laboratory and in those cases the laboratory test events will not be included in the community laboratory testing data used.

Community and hospital pharmacy dispensing

Community and hospital dispensing costs related to a cancer reported to the Pharmacy Claims Warehouse (Pharmhouse) for the period 1 July 2008 to 30 June 2009 were included. The drug costs were applied to the date of dispensing.

The chemical identification numbers presented in Appendix 3 were provided by the Cancer Team in the Sector Capability and Implementation Directorate. The list deliberately excludes palliative care-related and pain medications on the basis that they are not used only in cancer treatment (morphine, ketamine or benzodiazepines).

Public hospital discharges

Discharges collected in the National Minimum Dataset (NMDS) have a cost-weighted discharge value calculated when the data is submitted by DHBs. Cost weights are then applied to the national inter-district flow (IDF) price for secondary services, which is decided by the National Pricing Programme. The methodology for calculating cost weights can be found online at:

[http://www.moh.govt.nz/moh.nsf/Files/ncamp2011/\\$file/wiesnz11-version%208.pdf](http://www.moh.govt.nz/moh.nsf/Files/ncamp2011/$file/wiesnz11-version%208.pdf)

Public hospital discharge costs related to a cancer diagnosis (excluding palliative care public hospital discharges) reported to the NMDS for the period 1 July 2006 to 30 June 2009 were included. The extract was based on events with a primary or secondary diagnosis of cancer (identified by ICD-10-AM codes C01–C99, D00–D09 or D45–D47). Procedure codes were not used specifically in the identification of cancer-related discharge events; however, cost weights for discharges take into account procedures with high resource costs.

Palliative care events were excluded and reported separately (see below).

The cost weights were applied to the 2008/09 national IDF price and apportioned to days in hospital on a uniform basis. The costs reflect the inpatient and day-patient medical and surgical events funded by the Ministry of Health.

Public hospital palliative care discharges

Public hospital palliative care discharge costs reported to the NMDS for the period 1 July 2006 to 30 June 2009 were included. The cost weights were applied to the 2008/09 national IDF price and apportioned to days in hospital on a uniform basis.

This extract was based on events with a primary or secondary diagnosis of cancer (identified by ICD-10-AM codes C01–C99, D00–D09 or D45–D47) and with either a health specialty of palliative care or any supplementary care code of palliative care (stored as a Z code in the diagnosis fields on the NMDS).

Primary care consultations

Primary care consults based on a proxy indicator for the period 1 July 2006 to 30 June 2009 were included. A cost weight was applied based on the 2009 Quarter 2 Primary Healthcare Organisation enrolment register capitation payments for first contact care, health promotion and services to improve access (annual funding of \$566 million divided by four). This was divided by the number of consults to derive an average public price of \$31.15.

Private hospital discharges

Private hospital discharge costs reported and related to a cancer diagnosis to the NMDS for the period 1 July 2006 to 31 December 2007 were included. Cost weights were applied to 2008/09 national IDF price and apportioned to days in hospital on a uniform basis. More recent data was not available.

Community hospice cancer-related palliative care

The reported operating budget for hospices in New Zealand in 2008/09 was used. There was no available unit record data, with unique identifiers for linkage for hospice services provided to patients dying in New Zealand. Therefore the public price of hospice cost of cancer has been estimated, as detailed in Appendix 4.

Estimation of daily mean price

We selected all first cancers:

- registered between 1 January 2003 and 31 December 2008 (using ICD-10-AM codes in Table 1) on the New Zealand Cancer Registry (NZCR), and
- if the patient was alive, at any time, during the period 1 July 2006 to 30 June 2009.

Additional cancer registrations were excluded from the mean cost calculation to avoid double counting costs from overlapping cancer care and cost experiences (this may slightly underestimate total costs).

All utilisation events and prices relating to the individuals identified above during the period 1 July 2006 to 30 June 2009 (with some exceptions noted below) were identified and linked to the cancer registrations using the National Health Index Health Care User Identifier (NHI).

A common chronological reference was defined as numbers of days before and after registration of the cancer on the NZCR with a window of one year before (–365 days) and five years after (5 x 365 +1 days).

The resulting data structure allows the calculation of mean cost by days from, or before, diagnosis by cancer site (see Table 1) and the services described above.

In nearly all cases the daily mean costs are highly variable. However, when the data is aggregated by year this variability is not apparent.

Interpretation of price period

The analysis presented in this report has two valid interpretations. The mean price for the year preceding and five years following the date of diagnosis represents either:

1. six cohorts of patients passing through six separate stages (years) of the cancer diagnosis and treatment pathway, thus the majority of the public price of cancer in one year, or
2. a single cohort of patients passing through their cancer diagnosis and treatment experience, thus the mean cost for six years.

Interpretation of mean price

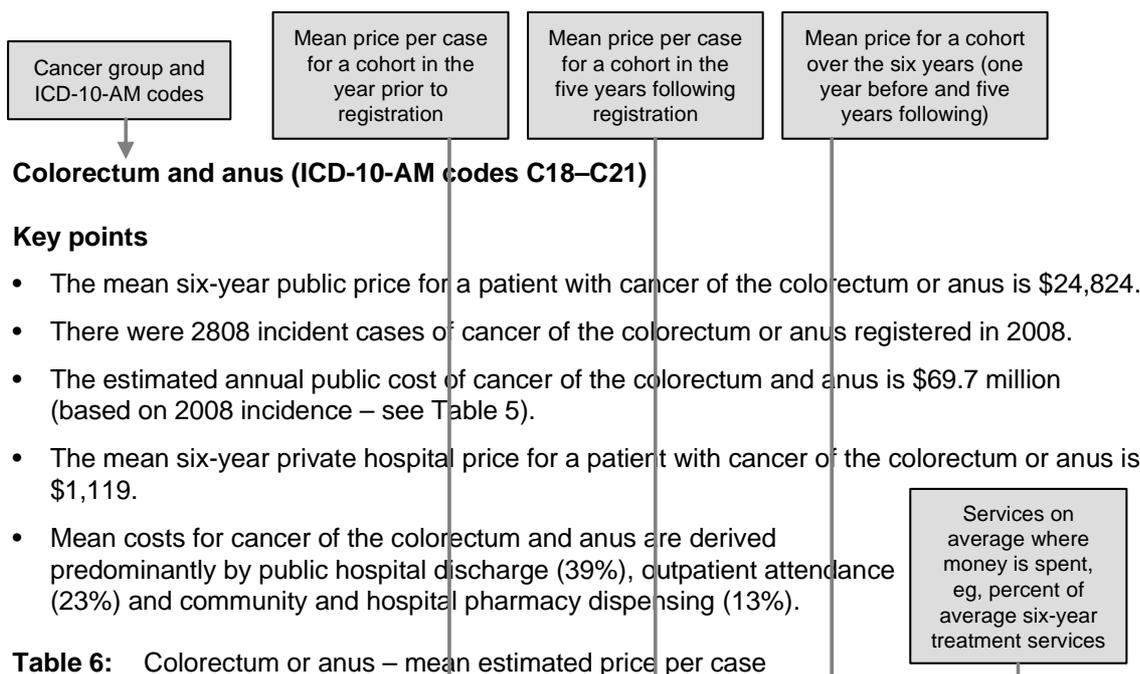
In this report we have presented the total price and mean price per patient for services and cancer site.

The *total price* is simply the calculated value of all wholly cancer-attributable services (barring certain caveats) in one of the two ways described above.

The *mean price* represents the ‘average’ cost arising from a particular cancer event. It does not imply that all cancer events of that type will cost this amount. Some people registered with the cancer may not access certain (or any) services, while others access higher than average services.

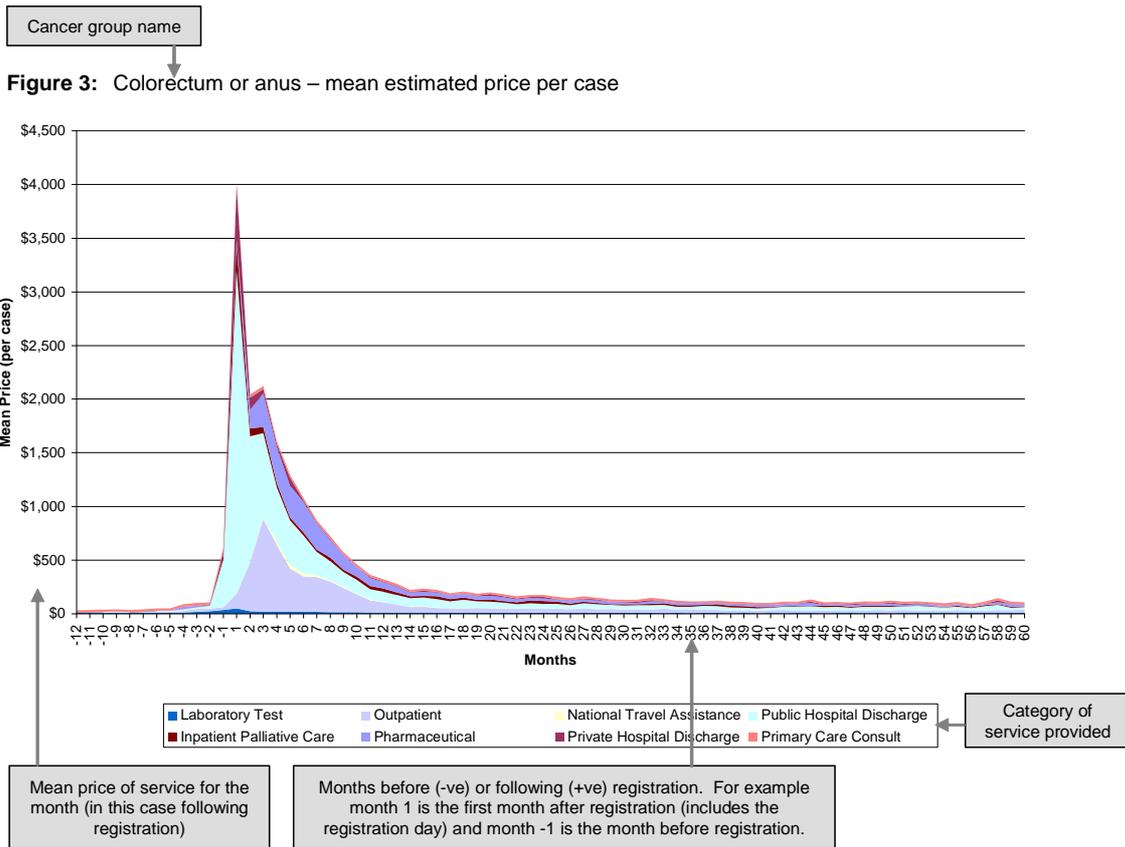
The mean price allows a comparison on the average experience of the group, and a comparison of the relativities in average price experience.

How to interpret contents (bullets, tables and charts)



Category of service provided	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$8	\$283	\$292	1%
Public hospital discharge (excluding palliative care)	\$548	\$9,030	\$9,578	39%
Public inpatient palliative care discharge	\$47	\$1,243	\$1,290	5%
Outpatient attendance	\$114	\$5,545	\$5,658	23%
Community and hospital pharmacy dispensing	\$58	\$3,218	\$3,277	13%
Laboratory testing	\$163	\$641	\$804	3%
Primary care consult	\$257	\$1,199	\$1,456	6%
Subtotal	\$1,196	\$21,158	\$22,355	90%
Community hospice (Ministry funded)	–	–	\$2,469	10%
Total	–	–	\$24,824	100%
Private hospital discharge	\$36	\$1,082	\$1,119	–

Mean price for private hospital discharge (not used in main analysis)



Projected growth and drivers of price in 10 years

Cancer incidence projections

In the second set of results, we estimate the total price growth for each cancer site group from 2011 to 2021. Projections of incidence and incidence growth for a range of cancer sites over a 10-year period (2006–2016) were published in *Cancer Projections: Incidence 2004–08 to 2014–18* (Ministry of Health 2010a).

We calculated an absolute incident change from 2011 to 2021 using the projected incidences (counts). The price change in 10 years was then the absolute incident change (count) multiplied by the mean cost in 2008/09 of a case of cancer (incident change x mean price). The magnitude of growth attributable to changes in risk, population size and population ageing (the key drivers examined in this report) were also calculated.

A commentary on the growth in incidence (rate) and burden (count), by site group, over the period of interest can be found in Appendix 5.

Results

Table 2 presents the overall estimates of the annual public price of registered cancer in 2008 by site group. We calculated the price of registered cancer for a single year as \$511 million (2008/09 prices – excluding costs that were out of scope).

Relative to the total estimated price of cancer, female breast cancer (15%), cancer of the colorectum and anus (14%), and haematological and lymphoid cancers (13%) consume the largest shares, with in situ cancers (11%) and other malignant cancers (20%) consuming significant amounts.

Cancer of the cervix consumes, in relative terms, the least of any site group (1%) but it should be noted that this price does not account for possible in situ cancer of the cervix (not examined in this report).

In situ cancers (\$11,740) have the lowest average price of those cancer groups reported on, followed closely by melanomas (\$11,804). The most expensive cancers on average per registration are lymphoid and haematological (\$38,834), breast (\$28,074) and colorectal (\$24,824).

Table 2: Summary of key results – estimated public price of cancer 2008 (2008/09 prices)

Group	ICD-10-AM description	Incidence	Mean price per case of cancer (six years of treatment)	Total spend (one year)	Percent of registrations	Percent of price
1	Colorectum and anus	2808	\$24,824	\$69,705,604	11%	14%
2	Respiratory	1871	\$20,856	\$39,021,150	8%	8%
3	Melanoma	2255	\$10,804	\$24,362,643	9%	5%
4	Breast	2735	\$28,074	\$76,783,163	11%	15%
5	Gynaecological	811	\$22,405	\$18,170,858	3%	4%
6	Cervix	175	\$23,116	\$4,045,348	1%	1%
7	Prostate	2940	\$17,677	\$51,969,609	12%	10%
8	Lymphoid and haematological	1766	\$38,834	\$68,581,245	7%	13%
9	Other malignant	4983	\$20,655	\$102,924,376	20%	20%
10	In situ cancers	4762	\$11,740	\$55,907,797	19%	11%
	All registered malignant cancers*	20,344	\$22,393	\$455,563,995	81%	89%
	All registered cancers	25,106	\$20,372	\$511,471,792	100%	100%

* This category is the summary for all registered malignant cancer (excludes in situ registered cancers).

All registered cancers (ICD-10-AM codes C01–C99, D00–D09, D45–D47)

Table 3 presents the mean estimated price per case and Table 4 the estimated total price (over six years) by each service. Table 5 presents the estimated total price by cancer site group.

Key points

- There were 25,106 incident cases of cancer registered in 2008.
- The mean six-year public price for a patient with a registered cancer is \$20,373; the estimated annual public cost of registered cancers is \$511.4 million (based on 2008 incidence).
- The mean six-year private hospital price for a patient with a registered cancer is \$910; the estimated annual price is \$22.7 million (based on 2008 incidence).
- Mean costs for all registered cancers are driven predominantly by public hospital discharges (42%) and outpatient attendance (22%).
- Total price for registered cancers is driven predominantly by public hospital discharges (42%) and outpatient attendance (22%), followed by community and hospital pharmacy dispensing (10%), and community hospice (cancer-attributable Ministry funded) (9%).

Table 3: All registered cancers – mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$9	\$321	\$330	2%
Public hospital discharge (excluding palliative care)	\$467	\$8,180	\$8,647	42%
Public inpatient palliative care discharge)	\$36	\$923	\$959	5%
Outpatient attendance	\$71	\$4,384	\$4,455	22%
Community and hospital pharmacy dispensing	\$14	\$2,105	\$2,120	10%
Laboratory testing	\$142	\$595	\$737	4%
Primary care consult	\$233	\$1,056	\$1,289	6%
Subtotal	\$974	\$17,563	\$18,537	91%
Community hospice (Ministry funded)*	–	–	\$1,835	9%
Total	–	–	\$20,373	100%
Private hospital discharge	\$27	\$883	\$909	–

* Assumes distribution of hospice price by site group is same as inpatient palliative care by site group.

Table 4: All registered cancers – estimated total public price

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$236,960	\$8,047,259	\$8,284,306	2%
Public hospital discharge (excluding palliative care)	\$11,727,057	\$205,365,532	\$217,092,561	42%
Public inpatient palliative care discharge	\$906,268	\$23,168,527	\$24,074,767	5%
Outpatient attendance	\$1,794,605	\$110,055,560	\$111,850,077	22%
Community and hospital pharmacy dispensing	\$362,565	\$52,858,946	\$53,221,511	10%
Laboratory testing	\$3,567,639	\$14,927,614	\$18,495,238	4%
Primary care consult	\$5,852,650	\$26,520,260	\$32,372,909	6%
Sub-total	\$24,447,743	\$440,943,698	\$465,391,368	91%
Community hospice (Ministry funded)*	–	–	\$46,080,424	9%
Total	–	–	\$511,471,792	100%
Private hospital discharge	\$671,857	\$22,052,061	\$22,723,918	–

* Assumes distribution of hospice price by site group is same as inpatient palliative care by site group.

Table 5: All registered cancers – estimated public price

Group	ICD-10-AM description	Hospice*	Other public	Total spend	Percent of price	Percent of registrations
1	Colorectum and anus	\$6,933,964	\$62,771,640	\$69,705,604	14%	11%
2	Respiratory	\$8,158,718	\$30,862,432	\$39,021,150	8%	8%
3	Melanoma	\$1,456,759	\$22,905,884	\$24,362,643	5%	9%
4	Breast	\$2,781,795	\$74,001,368	\$76,783,163	15%	11%
5	Gynaecological	\$1,953,614	\$16,217,244	\$18,170,858	4%	3%
6	Cervix	\$587,191	\$3,458,157	\$4,045,348	1%	1%
7	Prostate	\$2,658,403	\$49,311,206	\$51,969,609	10%	12%
8	Lymphoid and haematological	\$4,525,879	\$64,055,366	\$68,581,245	13%	7%
9	Other malignant	\$16,454,978	\$86,469,399	\$102,924,376	20%	20%
10	In situ cancers	\$569,124	\$55,338,673	\$55,907,797	11%	19%
	All registered cancers	\$46,080,424	\$465,391,368	\$511,471,792	100%	100%

* Assumes distribution of hospice price by site group is same as inpatient palliative care by site group.

Figure 1 shows the estimated public prices by site group for one year.

Other malignant cancers consume the largest share of the \$511 million spend, followed by breast (\$77 million), colorectal (\$70 million), lymphoid and haematological (\$69 million) and in situ cancers (\$56 million).

Cancer of the cervix (\$4 million) consumes the least of the site groups.

Note that other malignant cancers (group 9) is a very large and heterogeneous group and this means it masks the effects on price of different cancer sites.

Figure 1: All registered cancers – estimated public price by site group (price in \$ millions)

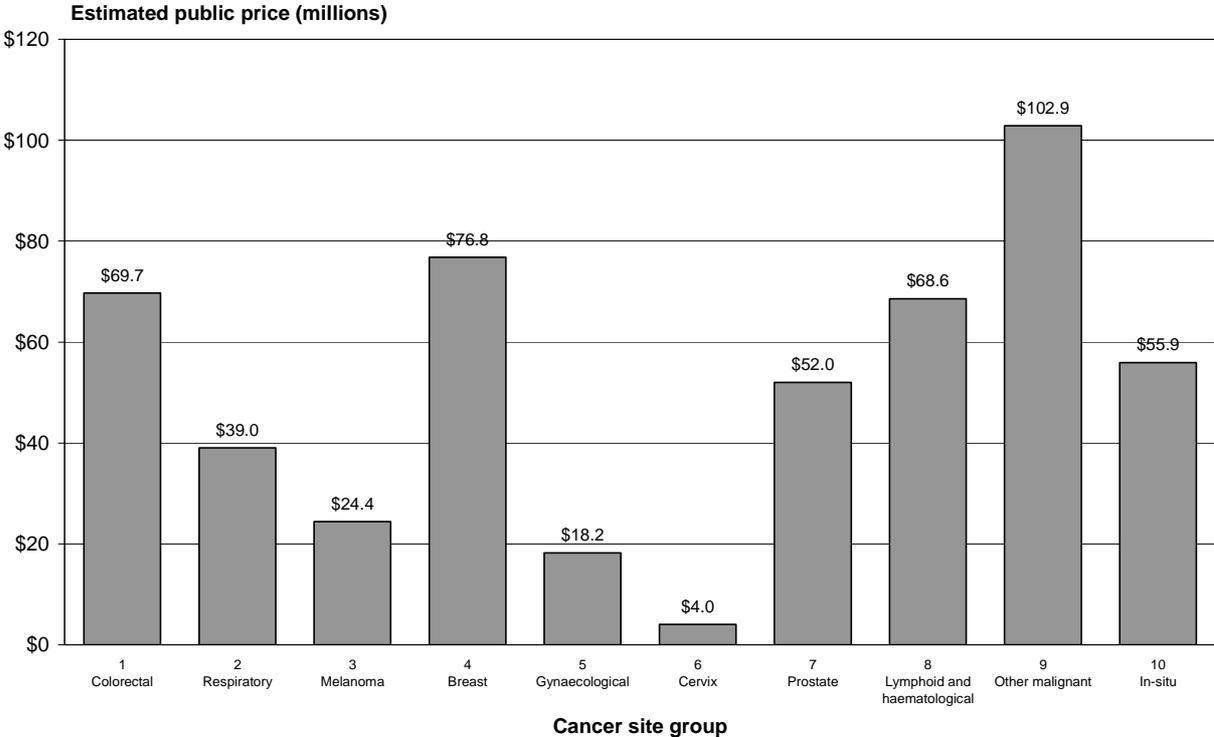
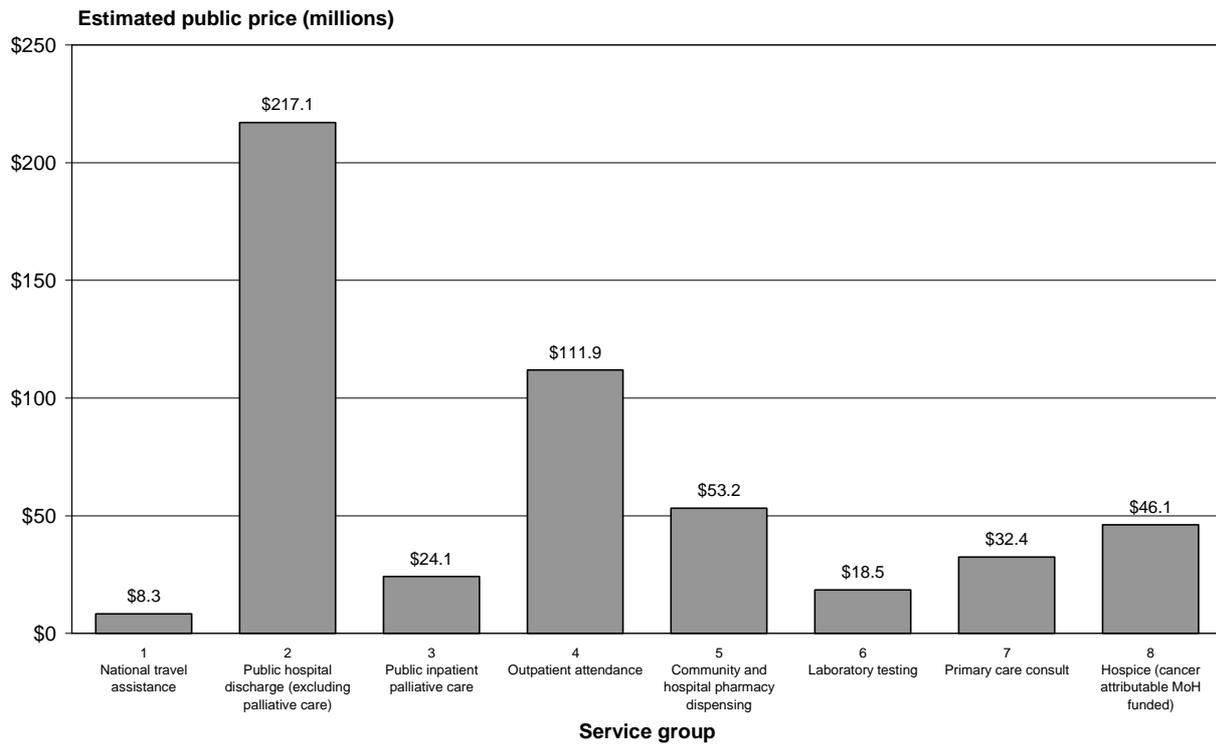


Figure 2 shows the estimated public prices by service group for one year.

Public hospital discharges (\$217 million) (excluding inpatient palliative care) consumes the largest share, followed by outpatient attendance (\$111 million), pharmaceutical dispensing (\$53 million) and cancer-attributable Ministry of Health funded community hospice operating costs (\$46 million).

National travel assistance (\$8 million) consumes the least, but this is still a significant proportion of the total NTA budget in 2008/09 (\$27 million).

Figure 2: All registered cancers – estimated public price by service group (price in \$ millions)



Colorectum and anus (ICD-10-AM codes C18-C21)

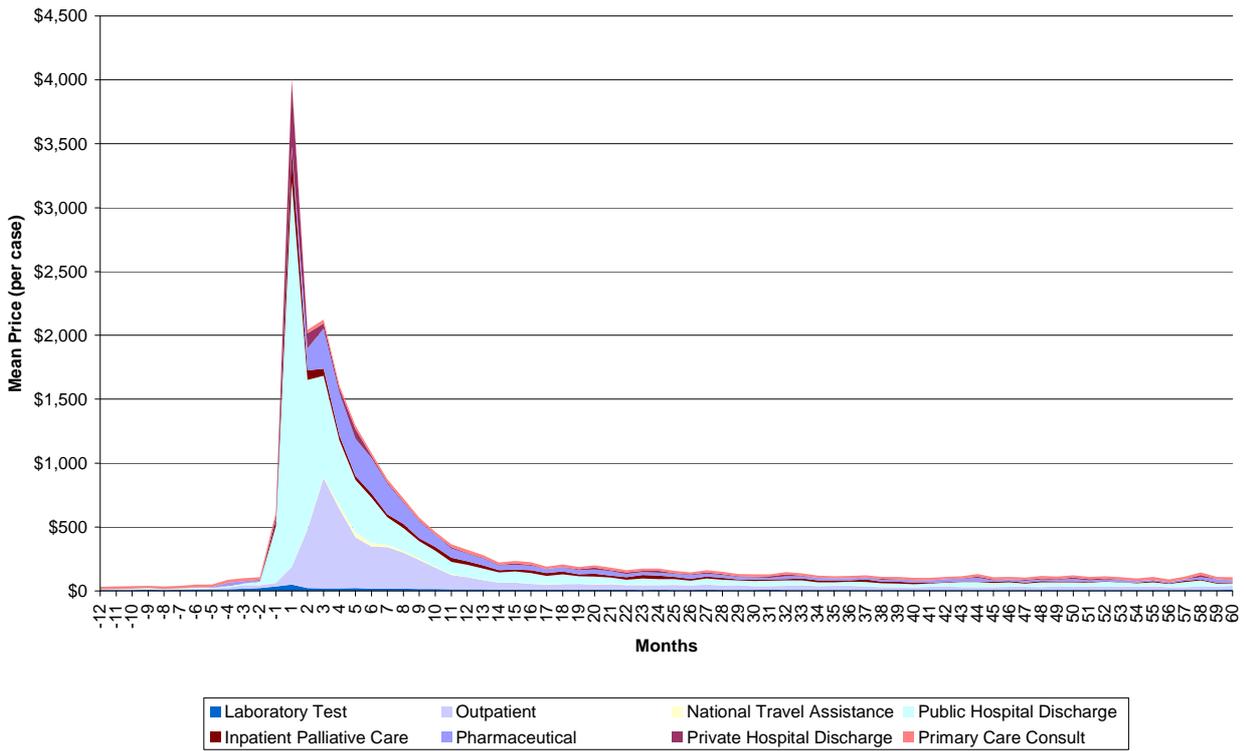
Key points

- The mean six-year public price for a patient with cancer of the colorectum or anus is \$24,824.
- There were 2808 incident cases of cancer of the colorectum or anus registered in 2008.
- The estimated annual public cost of cancer of the colorectum and anus is \$69.7 million (based on 2008 incidence – see Table 5).
- The mean six-year private hospital price for a patient with cancer of the colorectum or anus is \$1,119.
- Mean costs for cancer of the colorectum and anus are driven predominantly by public hospital discharge (39%), outpatient attendance (23%), and community and hospital pharmacy dispensing (13%).

Table 6: Colorectum or anus – mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$8	\$283	\$292	1%
Public hospital discharge (excluding palliative care)	\$548	\$9,030	\$9,578	39%
Public inpatient palliative care discharge	\$47	\$1,243	\$1,290	5%
Outpatient attendance	\$114	\$5,545	\$5,658	23%
Community and hospital pharmacy dispensing	\$58	\$3,218	\$3,277	13%
Laboratory testing	\$163	\$641	\$804	3%
Primary care consult	\$257	\$1,199	\$1,456	6%
Subtotal	\$1,196	\$21,158	\$22,355	90%
Community hospice (Ministry funded)	–	–	\$2,469	10%
Total	–	–	\$24,824	100%
Private hospital discharge	\$36	\$1,082	\$1,119	–

Figure 3: Colorectum and anus – mean estimated price per case



Trachea, bronchus or lung (ICD-10-AM codes C33 and C34)

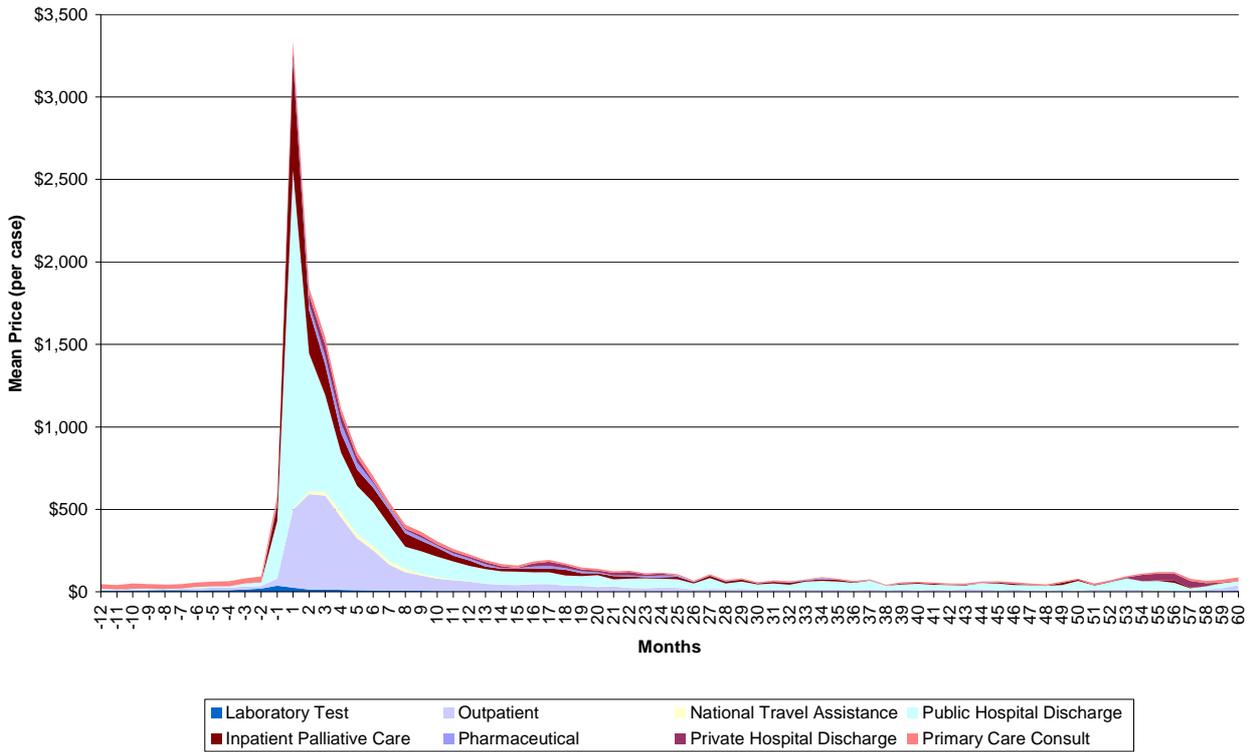
Key points

- The mean six-year public price for a patient with cancer of the trachea, bronchus or lung is \$20,856.
- There were 1871 incident cases of cancer of the trachea, bronchus or lung registered in 2008.
- The estimated annual public cost of cancer of the trachea, bronchus or lung is \$30.9 million (based on 2008 incidence – see Table 5).
- The mean six-year private hospital price for a patient with cancer of the trachea, bronchus or lung is \$714.
- Mean costs for cancer of the trachea, bronchus or lung are driven predominantly by public hospital discharge (37%), community hospice (21%) and outpatient attendance (20%).

Table 7: Trachea, bronchus or lung – mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$17	\$259	\$276	1%
Public hospital discharge (excluding palliative care)	\$436	\$7,339	\$7,775	37%
Public inpatient palliative care discharge	\$100	\$2,179	\$2,278	11%
Outpatient attendance	\$140	\$4,031	\$4,171	20%
Community and hospital pharmacy dispensing	\$7	\$480	\$487	2%
Laboratory testing	\$155	\$234	\$389	2%
Primary care consult	\$353	\$765	\$1,118	5%
Subtotal	\$1,209	\$15,286	\$16,495	79%
Community hospice (Ministry funded)	–	–	\$4,361	21%
Total	–	–	\$20,856	100%
Private hospital discharge	\$16	\$699	\$714	–

Figure 4: Trachea, bronchus or lung – mean estimated price per case



Melanoma (ICD-10-AM code C43)

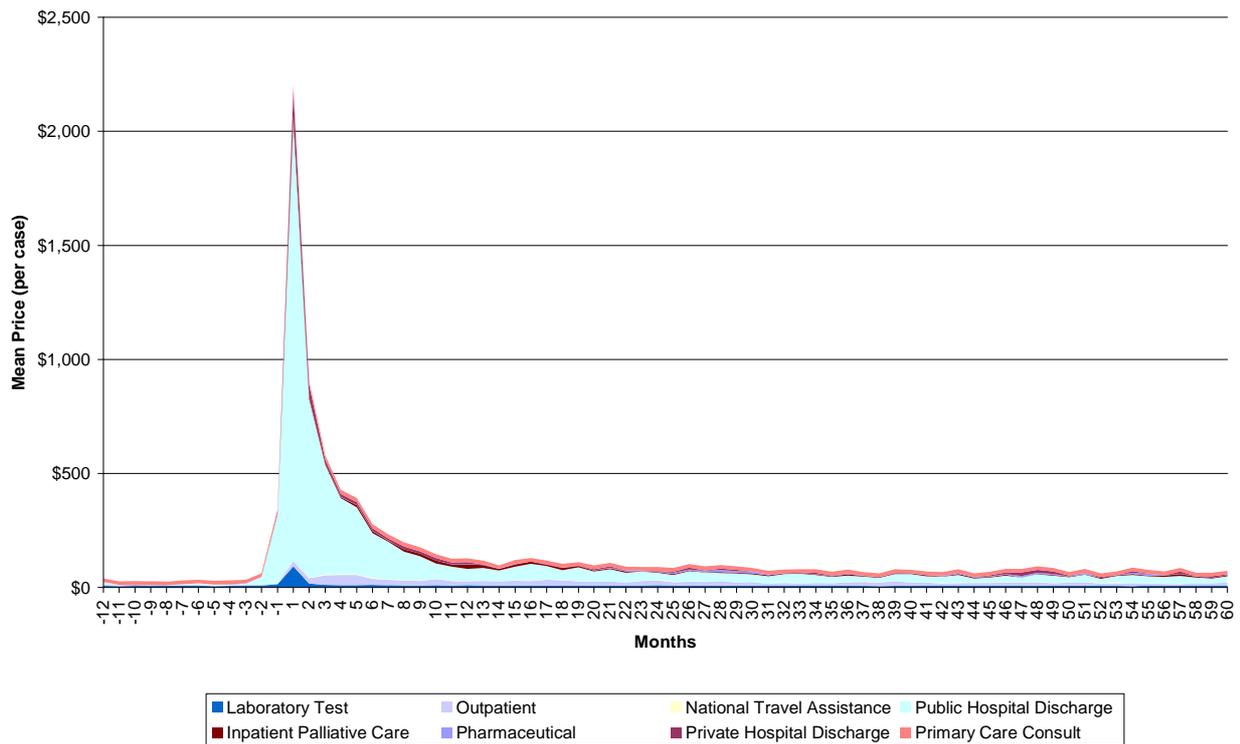
Key points

- The mean six-year public price for a patient with melanoma is \$10,804.
- There were 2255 incident cases of melanoma registered in 2008.
- The estimated annual public cost of melanoma is \$24.4 million (based on 2008 incidence – see Table 5).
- The mean six-year private hospital price for a patient with melanoma is \$421.
- Mean costs for melanoma are driven predominantly by public hospital discharge (62%) primary care consults (11%) and outpatient attendance (10%).

Table 8: Melanoma – mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$6	\$83	\$88	1%
Public hospital discharge (excluding palliative care)	\$380	\$6,300	\$6,680	62%
Public inpatient palliative care discharge	\$2	\$335	\$338	3%
Outpatient attendance	\$27	\$1,024	\$1,052	10%
Community and hospital pharmacy dispensing	\$3	\$135	\$138	1%
Laboratory testing	\$96	\$595	\$691	6%
Primary care consult	\$191	\$980	\$1,171	11%
Subtotal	\$705	\$9,453	\$10,158	94%
Community hospice (Ministry funded)	–	–	\$646	6%
Total	–	–	\$10,804	100%
Private hospital discharge	\$10	\$412	\$421	–

Figure 5: Melanoma – mean estimated price per case



Female breast (ICD-10-AM code C50)

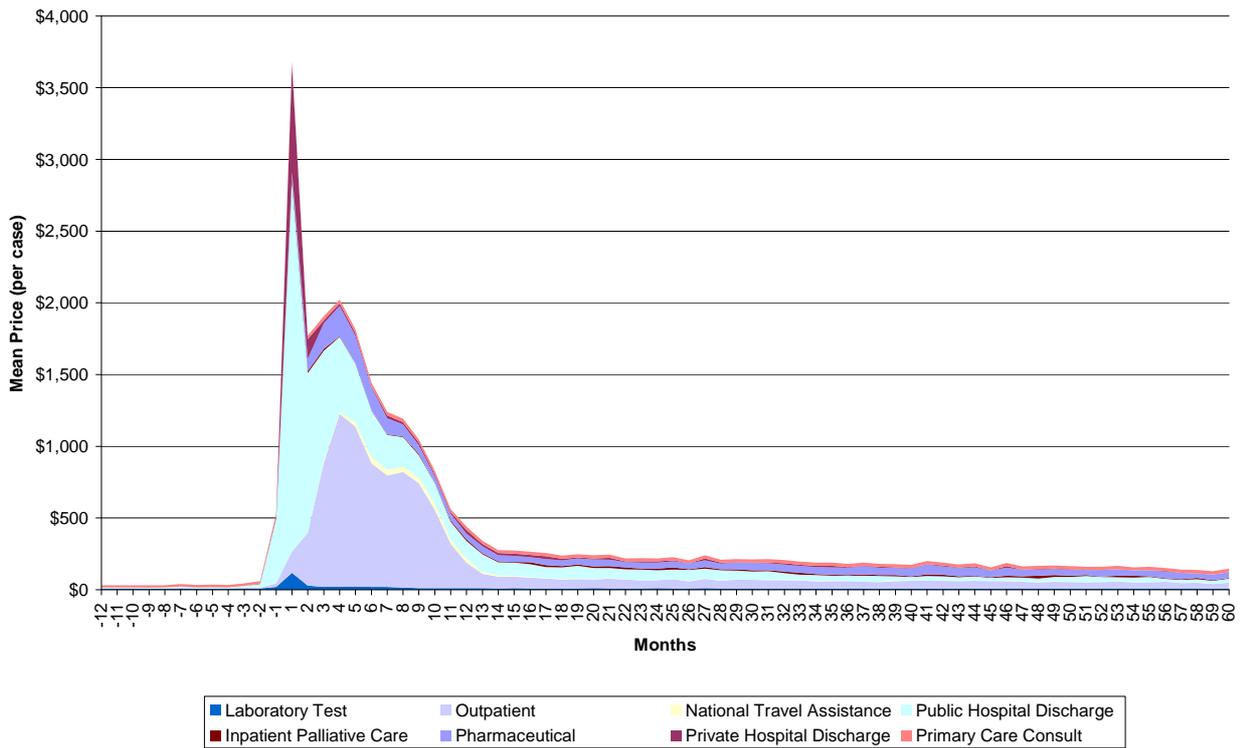
Key points

- The mean six-year public price for a patient with breast cancer is \$28,074.
- There were 2735 incident cases of breast cancer registered in 2008.
- The estimated annual public cost of breast cancer is \$76.8 million (based on 2008 incidence – see Table 5).
- The mean six-year private hospital price for a patient with breast cancer is \$1,345.
- Mean costs for breast cancer are driven predominantly by outpatient attendance (38%) and public hospital discharge (34%).

Table 9: Female breast – mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$6	\$425	\$431	2%
Public hospital discharge (excluding palliative care)	\$545	\$9,076	\$9,621	34%
Public inpatient palliative care discharge	\$4	\$527	\$531	2%
Outpatient attendance	\$56	\$10,551	\$10,607	38%
Community and hospital pharmacy dispensing	\$5	\$3,479	\$3,484	12%
Laboratory testing	\$98	\$721	\$818	3%
Primary care consult	\$203	\$1,362	\$1,565	6%
Subtotal	\$917	\$26,140	\$27,057	96%
Community hospice (Ministry funded)	–	–	\$1,017	4%
Total	–	–	\$28,074	100%
Private hospital discharge	\$20	\$1,325	\$1,345	–

Figure 6: Female breast – mean estimated price per case



Gynaecological (ICD-10-AM codes C51, C52, C54–C58)

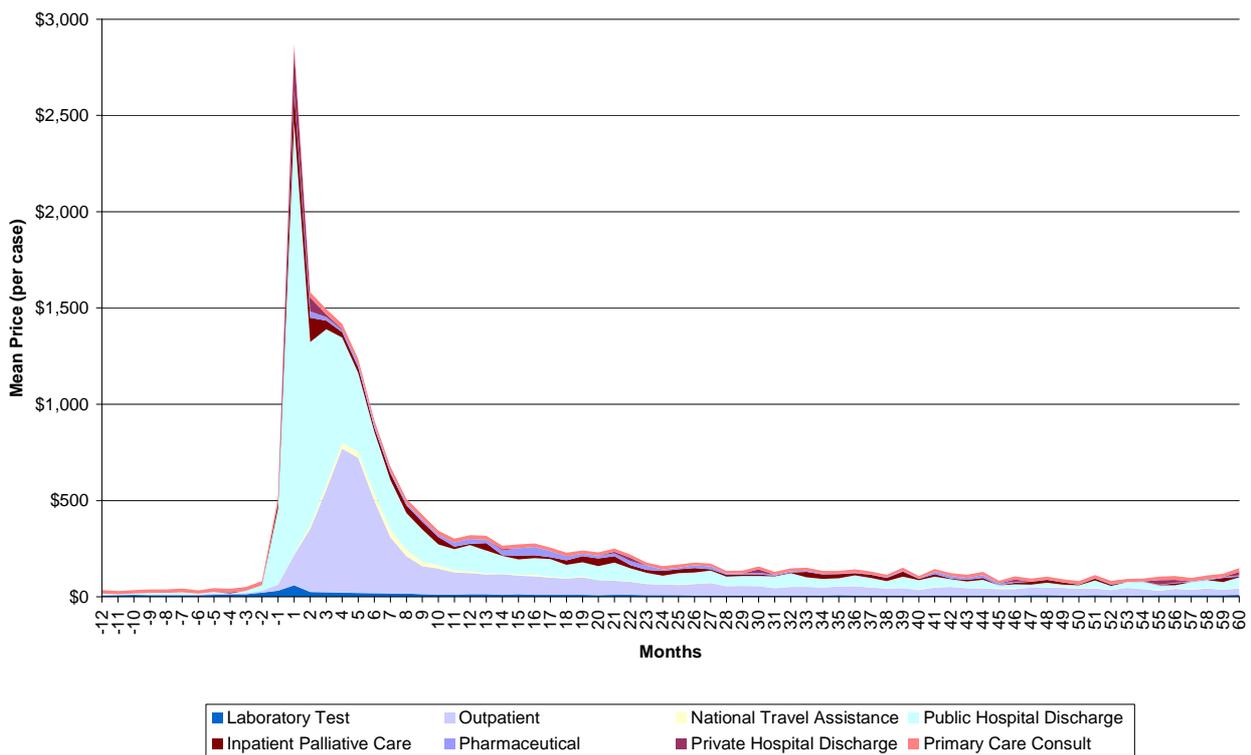
Key points

- The mean six-year public price for a patient with gynaecological cancer is \$22,406.
- There were 811 incident cases of gynaecological cancer registered in 2008.
- The estimated annual public cost of gynaecological cancer is \$18.2 million (based on 2008 incidence – see Table 5).
- The mean six-year private hospital price for a patient with gynaecological cancer is \$439.
- Mean costs for gynaecological cancers are driven predominantly by public hospital discharge (41%) and outpatient attendance (29%).

Table 10: Gynaecological – mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$2	\$417	\$419	2%
Public hospital discharge (excluding palliative care)	\$488	\$8,606	\$9,094	41%
Public inpatient palliative care discharge	\$26	\$1,232	\$1,259	6%
Outpatient attendance	\$75	\$6,369	\$6,445	29%
Community and hospital pharmacy dispensing	\$0	\$666	\$666	3%
Laboratory testing	\$153	\$653	\$806	4%
Primary care consult	\$236	\$1,073	\$1,309	6%
Subtotal	\$981	\$19,016	\$19,997	89%
Community hospice (Ministry funded)	–	–	\$2,409	11%
Total	–	–	\$22,406	100%
Private hospital discharge	\$14	\$425	\$439	–

Figure 7: Gynaecological – mean estimated price per case



Cervix (ICD-10-AM code C53)

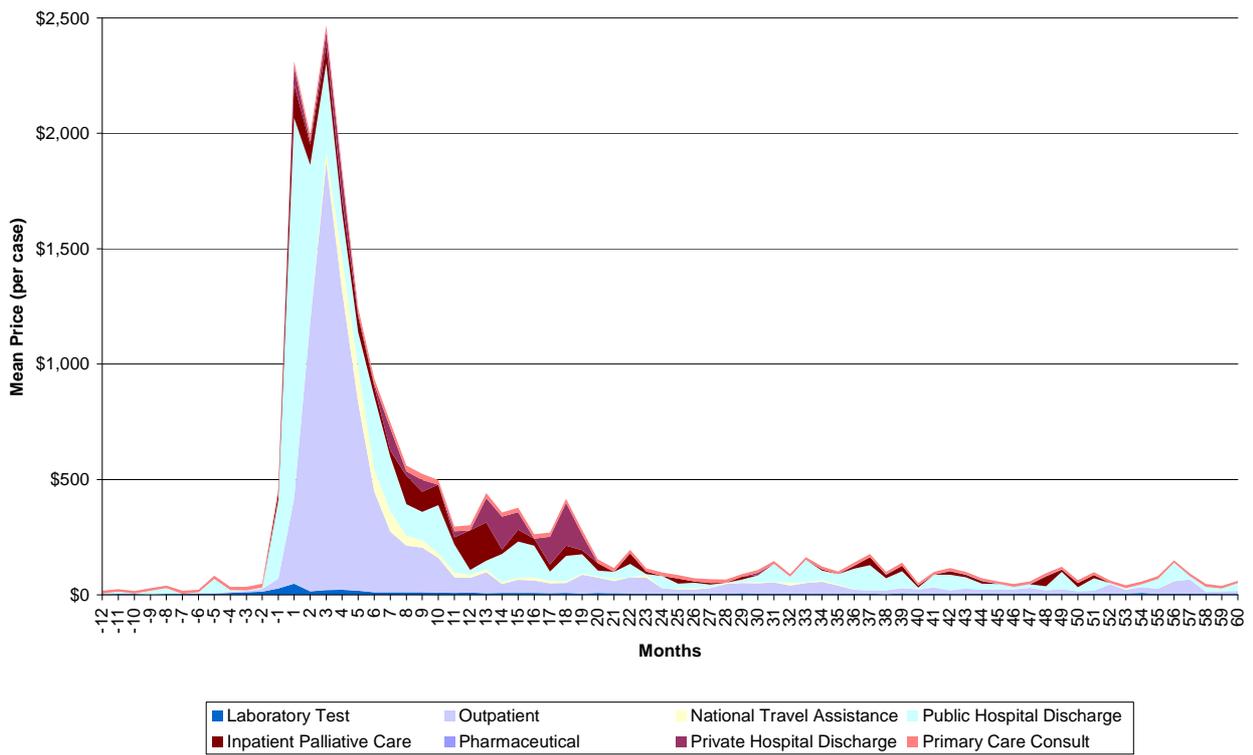
Key points

- The mean six-year public price for a patient with cancer of the cervix is \$23,116.
- There were 175 incident cases of cancer of the cervix registered in 2008.
- The estimated annual public cost of cancer of the cervix is \$4.0 million (based on 2008 incidence – see Table 5).
- The mean six-year private hospital price for a patient with cancer of the cervix is \$1,181.
- Mean costs for cancer of the cervix are driven predominantly by outpatient attendance (37%), public hospital discharge (30%) and community hospice (15%).

Table 11: Cervix – Mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$2	\$818	\$820	4%
Public hospital discharge (excluding palliative care)	\$477	\$6,436	\$6,914	30%
Public inpatient palliative care discharge	\$29	\$1,724	\$1,753	8%
Outpatient attendance	\$69	\$8,517	\$8,586	37%
Community and hospital pharmacy dispensing	–	\$18	\$18	0%
Laboratory testing	\$95	\$477	\$572	2%
Primary care consult	\$158	\$939	\$1,098	5%
Subtotal	\$831	\$18,930	\$19,761	85%
Community hospice (Ministry funded)	–	–	\$3,355	15%
Total	–	–	\$23,116	100%
Private hospital discharge	\$3	\$1,178	\$1,181	–

Figure 8: Cervix – mean estimated price per case



Prostate (ICD-10-AM code C61)

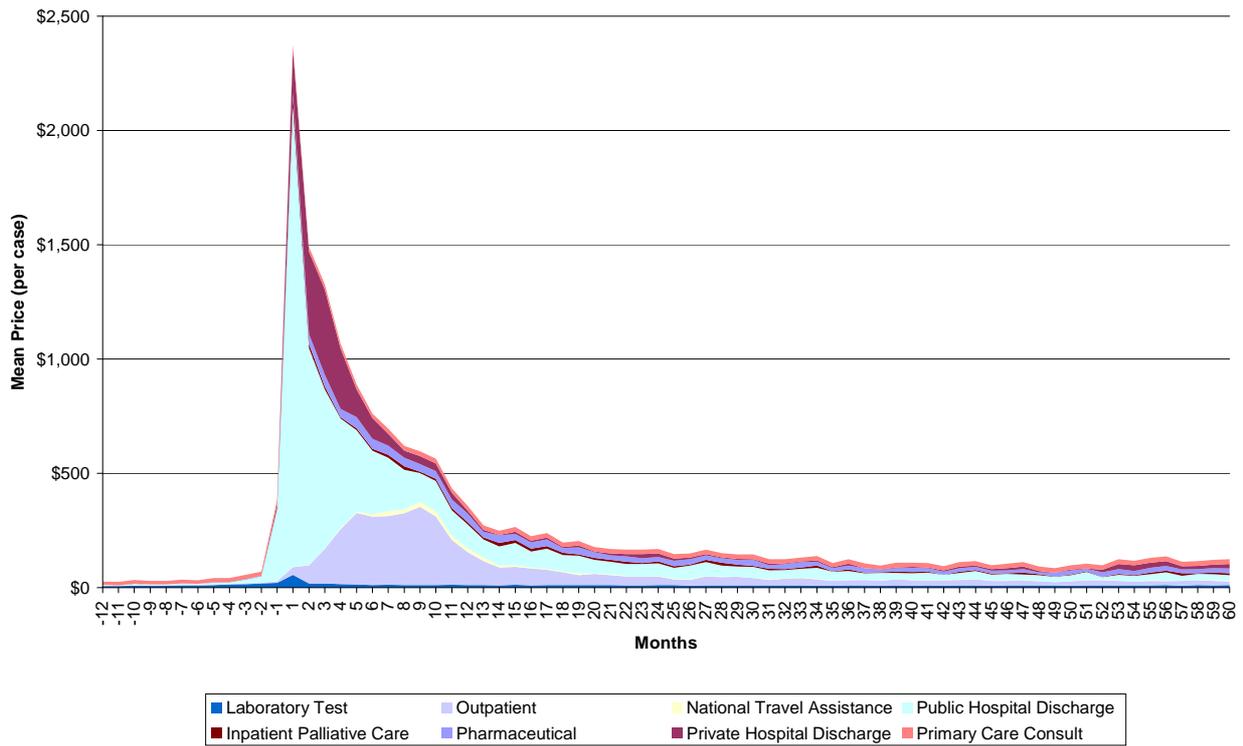
Key points

- The mean six-year public price for a patient with prostate cancer is \$17,677.
- There were 2940 incident cases of prostate cancer registered in 2008.
- The estimated annual public cost of prostate cancer is \$52.0 million (based on 2008 incidence – see Table 5).
- The mean six-year private hospital price for a patient with prostate cancer is \$2,006.
- Mean costs for prostate cancer are driven predominantly by public hospital discharge (46%) and outpatient attendance (24%).

Table 12: Prostate – mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$7	\$269	\$276	2%
Public hospital discharge (excluding palliative care)	\$405	\$7,687	\$8,091	46%
Public inpatient palliative care discharge	\$4	\$469	\$472	3%
Outpatient attendance	\$27	\$4,273	\$4,301	24%
Community and hospital pharmacy dispensing	\$8	\$1,404	\$1,412	8%
Laboratory testing	\$139	\$691	\$829	5%
Primary care consult	\$202	\$1,189	\$1,391	8%
Subtotal	\$791	\$15,981	\$16,772	95%
Community hospice (Ministry funded)	–	–	\$904	5%
Total	–	–	\$17,677	100%
Private hospital discharge	\$19	\$1,987	\$2,006	–

Figure 9: Prostate – mean estimated price per case



Lymphoid and haematological (ICD-10-AM codes C81–C96)

Key points

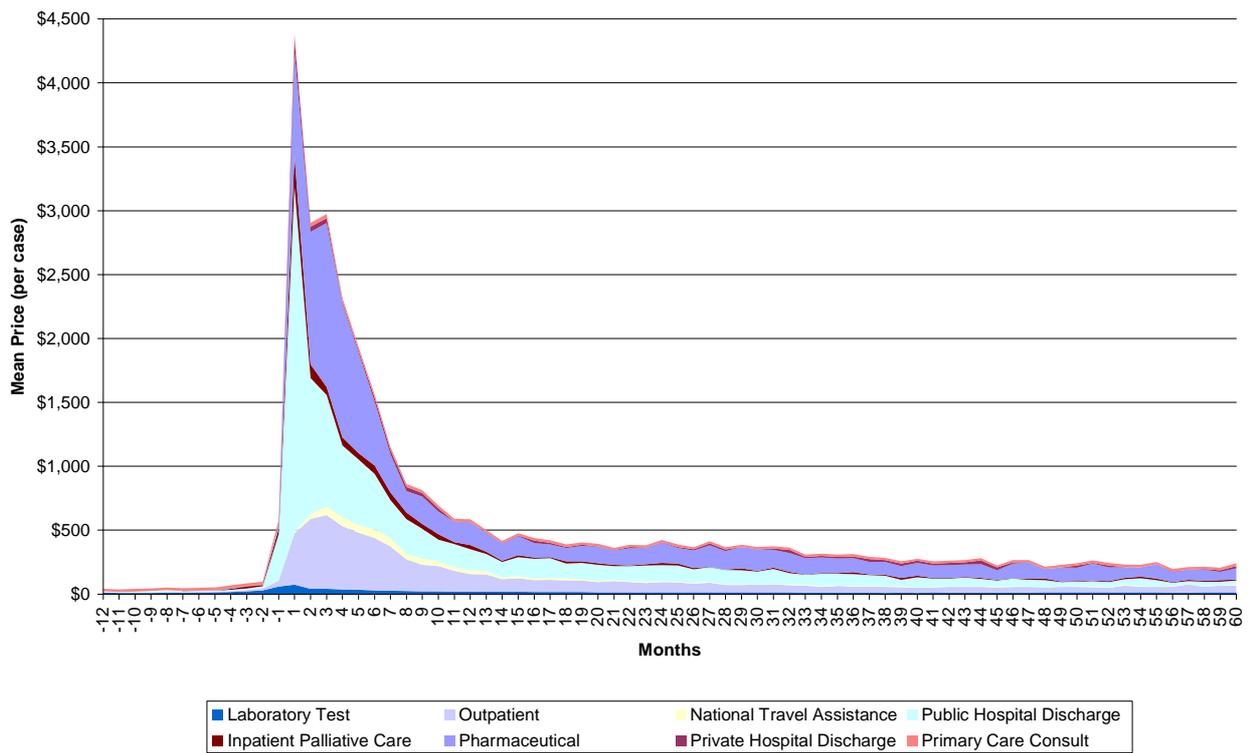
- The mean six-year public price for a patient with lymphoid or haematological cancer is \$38,834.
- There were 1766 incident cases of lymphoid or haematological cancers registered in 2008.
- The estimated annual public cost of lymphoid or haematological cancers is \$68.6 million (based on 2008 incidence – see Table 5).
- The mean six-year private hospital price for a patient with lymphoid or haematological cancer is \$855.
- Mean costs for lymphoid and haematological cancers are driven predominantly by community and hospital pharmacy dispensing (31%), public hospital discharge (31%) and outpatient attendance (18%).

Table 13: Lymphoid and haematological – mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$11	\$893	\$904	2%
Public hospital discharge (excl. palliative care)	\$475	\$11,479	\$11,955	31%
Public inpatient palliative care discharge	\$77	\$1,262	\$1,339	3%
Outpatient attendance	\$101	\$7,068	\$7,169	18%
Community and hospital pharmacy dispensing	\$38	\$12,169	\$12,207	31%
Laboratory testing	\$214	\$1,038	\$1,252	3%
Primary care consult	\$256	\$1,190	\$1,446	4%
Subtotal	\$1,172	\$35,099	\$36,272	93%
Community hospice (Ministry funded)*	–	–	\$2,563*	7%
Total	–	–	\$38,834	100%
Private hospital discharge	\$18	\$837	\$855	–

* The hospice costs associated with haematological and lymphoid cancers are likely to be an overestimate. This is because patients with haematological and lymphoid cancer are generally not seen in hospice settings due to the level of palliative care and complications with these cancers.

Figure 10: Lymphoid and haematological – mean estimated price per case



Other malignant (ICD-10-AM codes C01–C17, C22–C32, C35–C42, C44–C49, C59, C60, C62–C80, C97–C99, D45–D47)

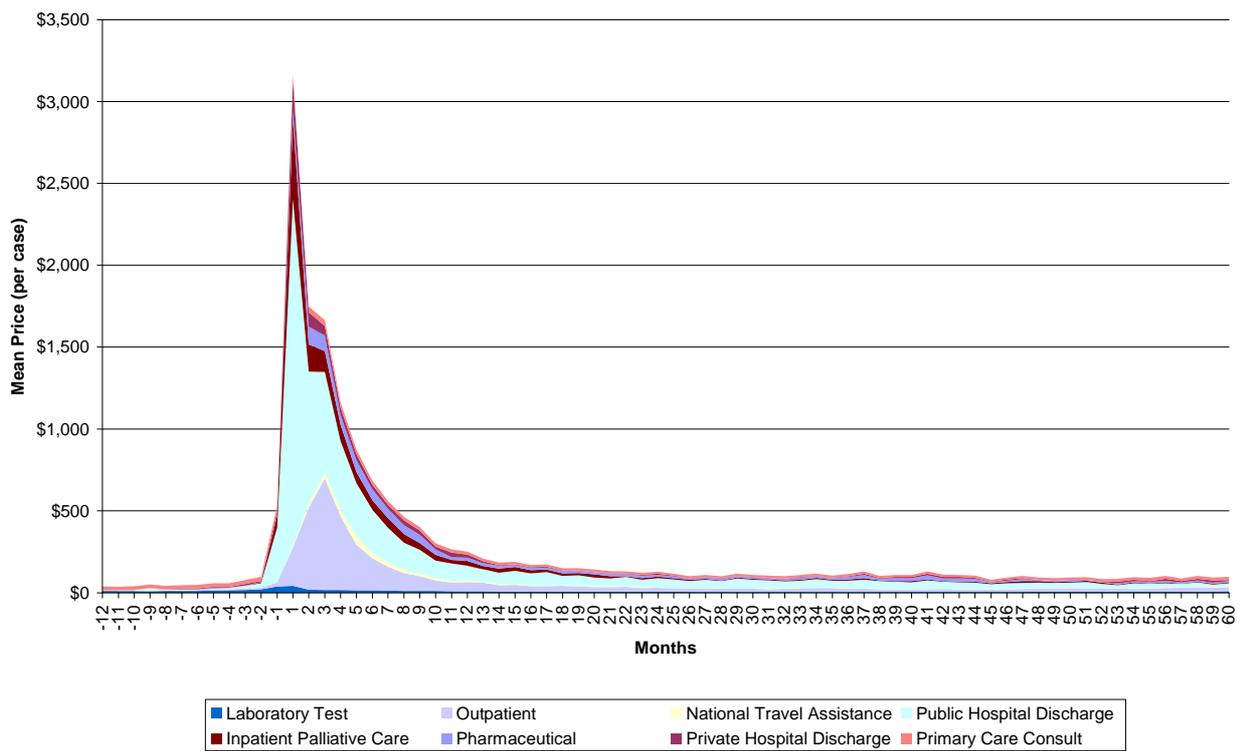
Key points

- The mean six-year public price for a patient with other malignant cancer is \$20,655.
- There were 4983 incident cases of other malignant cancers registered in 2008.
- The estimated annual public cost of other malignant cancers is \$102.9 million (based on 2008 incidence – see Table 5).
- The mean six-year private hospital price for a patient with other malignant cancer is \$865.
- Mean costs for other malignant cancer are driven predominantly by public hospital discharge (38%), outpatient attendance (20%) and community hospice (16%).

Table 14: Other malignant – mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$15	\$442	\$457	2%
Public hospital discharge (excluding palliative care)	\$422	\$7,511	\$7,933	38%
Public inpatient palliative care discharge	\$80	\$1,645	\$1,725	8%
Outpatient attendance	\$78	\$3,958	\$4,036	20%
Community and hospital pharmacy dispensing	\$13	\$1,264	\$1,277	6%
Laboratory testing	\$174	\$475	\$650	3%
Primary care consult	\$282	\$993	\$1,275	6%
Subtotal	\$1,064	\$16,289	\$17,353	84%
Community hospice (Ministry funded)	–	–	\$3,302	16%
Total	–	–	\$20,655	100%
Private hospital discharge	\$59	\$806	\$865	–

Figure 11: Other malignant – mean estimated price per case



In situ (ICD-10-AM code D00–D09)

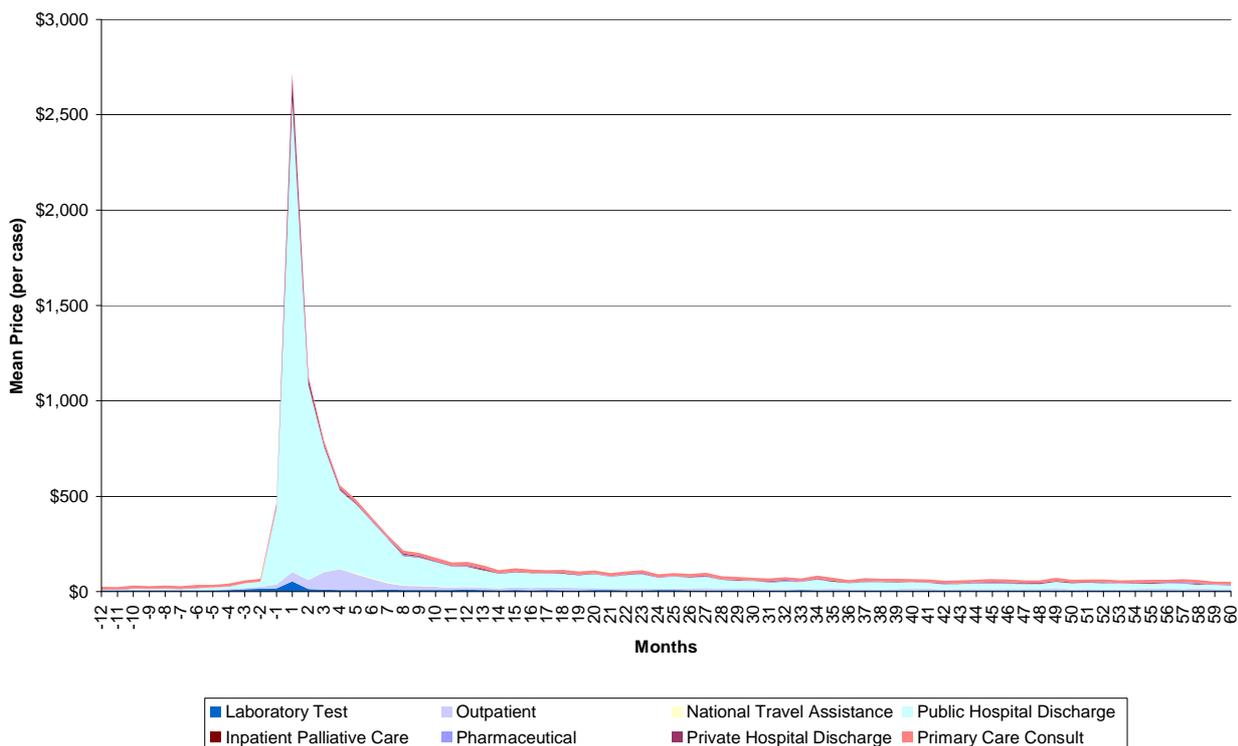
Key points

- The mean six-year public price for a patient with an in situ cancer is \$11,740.
- There were 4672 incident cases of in situ cancer registered in 2008.
- The estimated annual public cost of in situ cancers is \$55.9 million (based on 2008 incidence – see Table 5).
- The mean six-year private hospital price for a patient with an in situ cancer is \$303.
- Mean costs for in situ cancers are driven predominantly by public hospital discharge (74%) primary care consults (9%) and outpatient attendance (8%).

Table 15: In situ – mean estimated price per case

	One year to registration	Five years following registration	Total (six years)	Distribution (six years)
Public price	Mean cost	Mean cost	Mean cost	
National travel assistance	\$8	\$77	\$84	1%
Public hospital discharge (excluding palliative care)	\$507	\$8,157	\$8,664	74%
Public inpatient palliative care discharge	\$0	\$62	\$62	1%
Outpatient attendance	\$58	\$915	\$973	8%
Community and hospital pharmacy dispensing	\$2	\$136	\$137	1%
Laboratory testing	\$113	\$532	\$645	5%
Primary care consult	\$171	\$884	\$1,055	9%
Subtotal	\$859	\$10,762	\$11,621	99%
Community hospice (Ministry funded)	–	–	\$120	1%
Total	–	–	\$11,740	100%
Private hospital discharge	\$16	\$287	\$303	–

Figure 12: In situ – mean estimated price per case



Projected Growth and Drivers of Price in 10 Years

Interpreting drivers of change

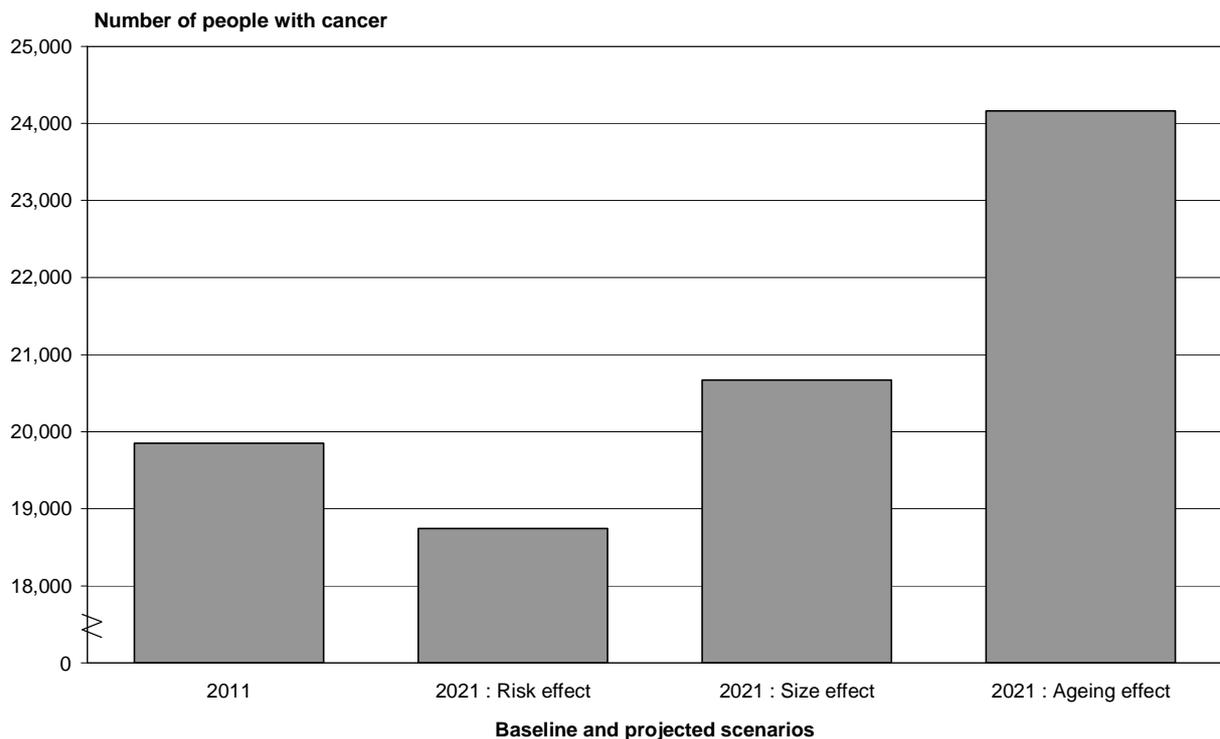
Population growth and structural ageing are the dominant forces driving change in cancer registration counts, sometimes overwhelming the effect of changes in cancer risk (Ministry of Health 2002).

To illustrate the relative impacts of cancer risk, population growth and structural ageing, we have broken down the change in projected count of cancer registrations over 10 years (2011 to 2021) into:

- risk effect
- population size effect
- population ageing effect.

Figure 13 presents the projected counts for all malignant cancers (C01–C99, D45–D47) for 2011 and 2021.

Figure 13: Projected counts of all malignant cancers 2011–2021



The first bar shows the projected number of cancer registrations (incidence) for 2011.

The second bar (2021: Risk effect) illustrates the effect of changes in incidence risk on the absolute burden of cancer. This projects what the incidence count would be if the population size remained the same and the overall structure was not ageing. For some cancers the number of registrations falls because the risk decreases over time, while for other sites counts remain stable (constant risk) or increase (indicating increasing risk). This demonstrates that the overall risk of developing cancer is decreasing.

The third bar (2021: Size effect) represents the effect on the absolute cancer burden resulting from the increases in population size while accounting for the changes in cancer risk over this time. This demonstrates that even with the decrease in overall risk, the projected increases in population size will increase the incidence of cancer and therefore the overall number of registrations.

The fourth bar (2021: Ageing effect) approximates the effect on the cancer burden of population ageing; this accounts for both the changing risk and increasing population size over the study period.

Results of the 'driver analysis' should be regarded as approximations only, because the analysis is sensitive to the order in which the variables are incorporated into the model.

The convention used here is:

1. risk only
2. risk + population size
3. risk + population size + population ageing.

The price driver analysis is based on the mean price per incident case, multiplied by the change in the number of cases, as follows.

1. 2021 risk only projected cases minus the 2011 projected cases.
2. 2021 size effect projected cases minus the 2021 risk only projected cases.
3. 2021 ageing effect projected cases minus the 2021 size effect projected cases.
4. The net cases are the 2021 projected cases minus the 2011 projected cases.

Table 16 presents the projected price change and incidence change (cases) by cancer site group. The estimated price growth and the drivers of this growth by site group are presented in Figures 14 to 23.

In 2011 the projected cancer incidence is 19,848; by 2021 the number of cases is projected to increase by 5215 cases to 25,063. This is driven by a decrease of 1041 cases due to decreases in overall risk for developing cancer, an increase of 2002 cases due to increases in population size and an increase of 4254 cases due to the ageing population structure.

Based on estimated mean costs of registered cancers in 2008 (2008/09 prices) and incidence projections from 2011 to 2021, this report estimates that the price of cancer will increase by \$116.8 million (23% of \$511.5 million) in 10 years.

Table 16: Projected growth and drivers of price and incidence in 10 years (2011 to 2021)

Group	Cancer site	Projected incidence 2011	Price change (\$000)				Incidence change (cases)			
			Risk	Size	Ageing	Net	Risk	Size	Ageing	Net
1	Colorectal	3072	-\$9,547	\$8,244	\$14,590	\$13,288	-385	332	588	535
2	Respiratory	1850	-\$4,885	\$4,146	\$6,617	\$5,879	-234	199	317	282
3	Melanoma	2253	-\$410	\$2,661	\$4,687	\$6,939	-38	246	434	642
4	Breast	2828	-\$962	\$11,090	\$7,673	\$17,801	-34	395	273	634
5	Gynaecological	743	-\$132	\$2,139	\$2,388	\$4,396	-6	95	107	196
6	Cervix	138	-\$653	\$232	-\$57	-\$477	-28	10	-2	-21
7	Prostate	2474	\$14,902	\$10,859	\$25,265	\$51,026	843	614	1429	2887
8	Lymphoid and haematological	1872	\$922	\$8,788	\$16,819	\$26,530	24	226	433	683
9	Other malignant	4850	-\$5,736	\$11,698	\$16,945	\$22,908	-278	566	820	1109
10	In situ	4762*	-	-	-	-	-	-	-	-
±	All registered malignant cancers	20,080	-\$23,320	\$44,836	\$95,253	\$116,770	-1041	2002	4254	5215
	All registered cancers	24,842**	-	-	-	-	-	-	-	-

* Based on actual 2008 incidence figures as no projection is available for in situ cancers.

± No in situ cancer incidence projections were available so the total is for registered malignant cancers.

Projected growth and drivers of price in 10 years (2011 to 2021)

Figures 14 to 23 display the total estimated price growth from 2011 to 2021 and the drivers of this growth by site group.

Key points

- Cervical cancer is the only cancer in this report projected to have a negative price growth (−\$0.5 million) owing primarily to the risk driver (a projected decrease in the rate of cervical cancer). Given the time period, this is likely to be due to the impact of screening and not the HPV vaccine.
- Prostate cancer is projected to have the highest cost growth (\$51 million), driven by risk (increases in the rate) and size, but predominantly by ageing (the increasing proportion of older New Zealanders).
- Significant growth in prices relating to colorectal (\$13 million), breast (\$18 million), lymphoid and haematological (\$27 million), and other malignant cancers (\$23 million) are predicted, driven predominantly by size and ageing and offset by decreases in risk (decreases in the rates of these cancers).
- The remaining site groups showed relatively modest total price growth, again driven by size and ageing and offset somewhat by reductions in risk.

Figures 14 to 23: Total estimated price growth from 2011 to 2021 and the drivers of this growth by site group

Figure 14: Colorectal
(ICD-10-AM codes C18–C21)

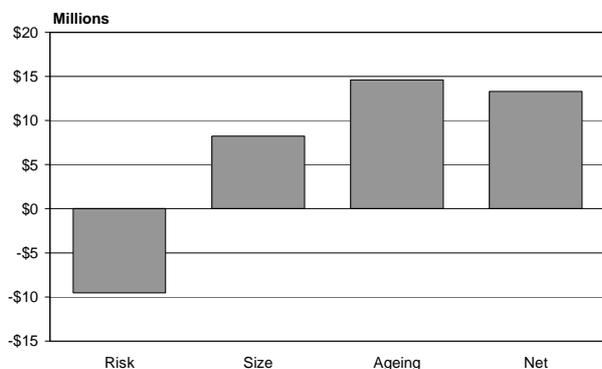


Figure 15: Respiratory
(ICD-10-AM codes C33 and C34)

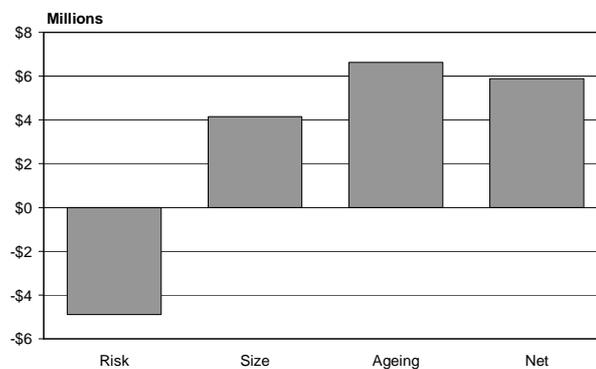


Figure 16: Melanoma
(ICD-10-AM code C43)

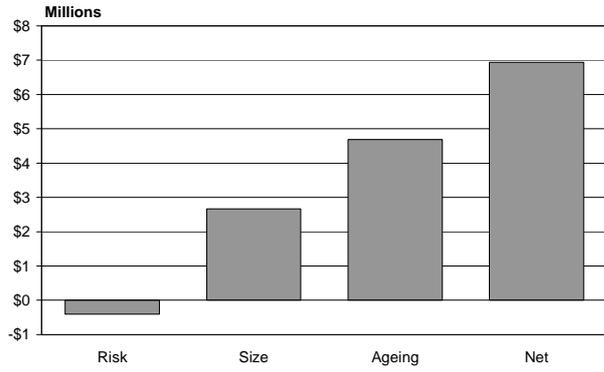


Figure 17: Breast
(ICD-10-AM code C50)

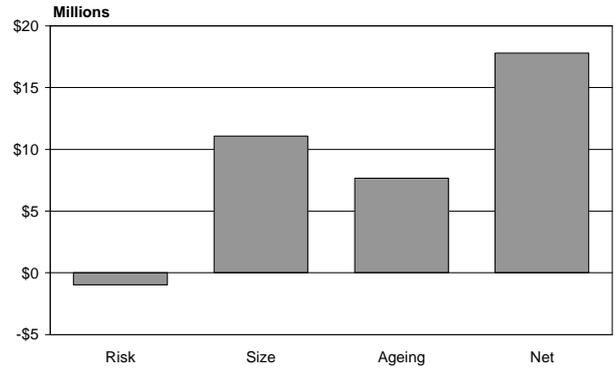


Figure 18: Gynaecological (ICD-10-AM codes C51, C52, C54–C58)

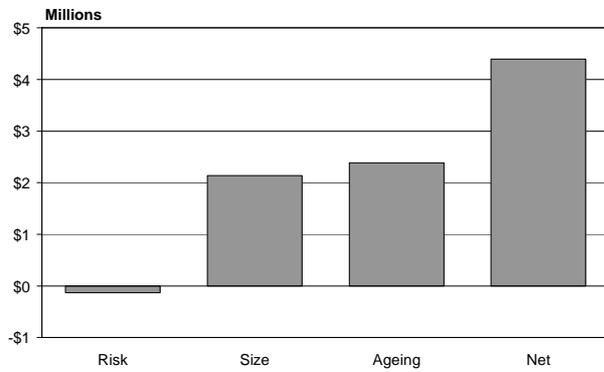


Figure 19: Cervix
(ICD-10-AM code C53)

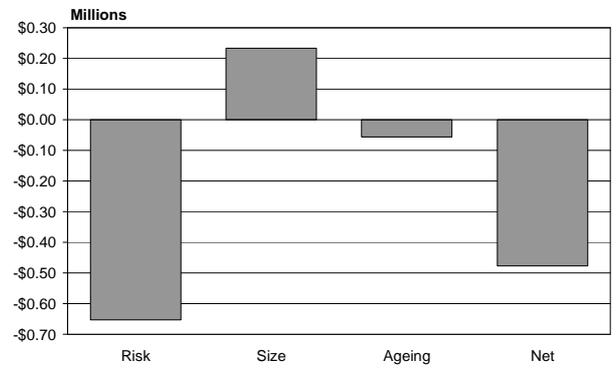


Figure 20: Prostate
(ICD-10-AM code C61)

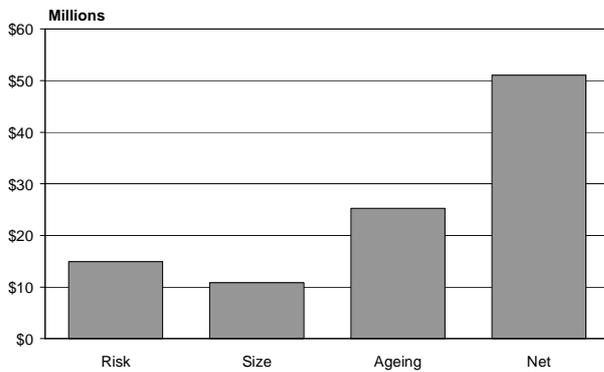


Figure 21: Lymphoid and haematological
(ICD-10-AM codes C81–C96)

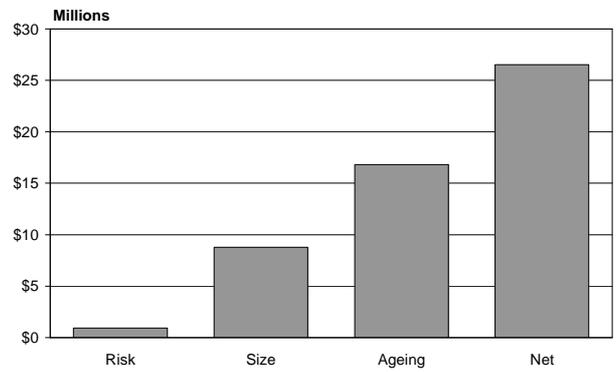


Figure 22: All other registered malignant cancers (ICD-10-AM C01–C17, C22–C32, C35–C42, C44–C49, C59, C60, C62–C80, C97–C99, D45–D47)

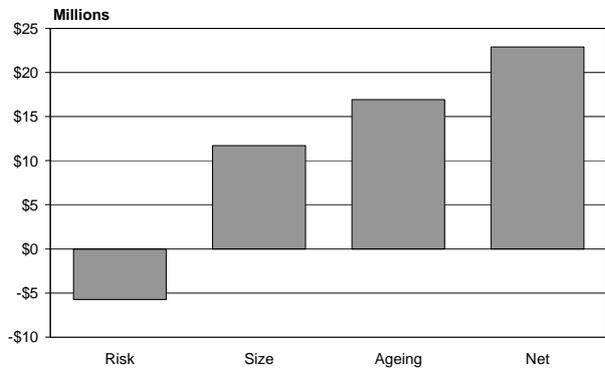
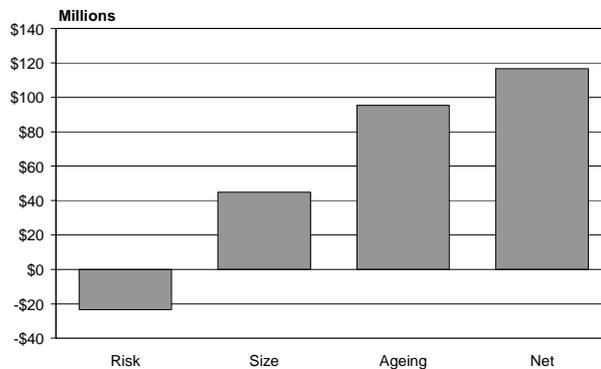


Figure 23: All registered malignant cancers (ICD-10-AM codes C00–C99, D45–D47)



Discussion

Results

The results of the analysis have estimated the price of all registered cancers for a single year (2008) to be \$511 million based on 2008/2009 prices. Based on current models of care and projected incidence growth expenditure, this is estimated to increase by \$117 million (23 percent) by 2021.

Colorectal, breast, prostate, lymphoid and haematological, and in situ cancers account for over 60 percent of both costs and registrations.

Colorectal, breast, prostate, and lymphoid and haematological cancers are expected to account for 93 percent of the projected cost growth. Prostate cancer may account for over 40 percent of that growth.

Breast cancer is the most expensive cancer to treat at \$76.8 million a year. These costs do not include the costs of running BreastScreen Aotearoa, which are approximately \$42 million a year. Also excluded are the treatment costs of ductal carcinoma in situ, which are likely to make up a large proportion of the costs associated with the in situ registrations analysed in this report.

Cervical cancer is the least expensive cancer to treat at \$4 million a year. These costs do not include the costs of running the National Cervical Screening Programme, which costs around \$36 million a year.

The areas of cancer care with the largest spend are inpatient discharges (47 percent, including inpatient palliative care), and outpatient attendances (22 percent). Community and hospital pharmaceutical dispensing accounts for 10 percent of the spend. The majority of those costs occur in the first 12 months following registration.

Limitations

As noted in the report there are limitations in the data available. Outpatient prices are likely to be an underestimate due to inconsistencies in reporting by DHBs. In addition, there are attendances to outpatient clinics that could be for treatment or diagnosis of cancer; however the attendance could also be due to other diseases. Because outpatient data is reported without a diagnosis code for cancer we are unable to determine which of these events are wholly attributed to cancer. For this reason we have only included outpatient attendances that can be attributed to cancer such as chemotherapy and radiation oncology.

There is likely to be an overestimate of the laboratory testing components as we are unable to identify those laboratory tests that would be wholly attributable to cancer.

GP consults and community hospice prices were estimated and we currently have no way of assessing the accuracy of these estimations.

Conclusion

The majority of the price paid for cancer care is in hospital settings and the main drivers of the projected increases in cost are from the increasing size and ageing of the population. Improving productivity is therefore likely to be the most effective way of containing costs. Productivity improvements could be achieved through adopting new service models, including new service delivery settings and a different workforce configuration. This finding also indicates that the introduction of any new technologies or drugs should also consider their impact on service delivery. For example, the introduction of a new drug may require an increase in attendances at outpatient clinics when compared to a current drug used. This means the impact of introducing the drug is not just the cost of the drug itself, but also the administration of it.

This report does not provide:

- information on trends in spending growth that are not related to risk, population size and population ageing (for example, workforce, capital, other operational costs)
- any indication of the likely influence of new technologies
- any indication of likely impacts from improved survival, reduced mortality and earlier detection of some cancers.

Pharmaceutical cancer treatments are already assessed under PHARMAC for clinical and cost effectiveness. Work on improvements to budget setting is ongoing, including developing a budget for exceptional circumstances.

The Ministry is also involved in the process for prioritisation and decision-making on the funding of innovations that sit outside the remit of PHARMAC. A committee will be formed to advise on the clinical and cost effectiveness of innovations, and the circumstances in which public funding should be supported.

Work is already under way on developing new models of care for medical oncology, radiation oncology and palliative care. This work is likely to provide scenarios for service reconfiguration. Additional analysis looking at the impact of the proposed service reconfigurations could be undertaken once that work has been completed.

Appendices

Appendix 1: Outpatient purchase unit contracted price 2006/07–2008/09

Purchase unit	Purchase unit description	Frequency 2006–2009	DAP DHB price (low)	DAP DHB price (high)	National price 2008–2009	Study price (per unit)
BSA-55	Breast screening treatment – general surgery – first specialist assessment (outpatient first attendance)	133	\$240.94	\$818.00	Mean of high and low DHB prices	\$529.47
BSA-60	Breast screening treatment – general surgery – follow up (outpatient subsequent attendances)	1090	\$205.61	\$220.57	Mean of high and low DHB prices	\$213.09
BSA-75	Breast screening treatment – oncology – first specialist assessment	210	\$297.70	\$578.92	Mean of high and low DHB prices	\$438.31
BSA-80	Breast screening treatment – oncology – follow up	2122	\$252.41	\$346.38	Mean of high and low DHB prices	\$299.39
M50002	Oncology – first attendance	45,361			\$578.92	\$578.92
M50003	Oncology – subsequent attendance	261,595			\$338.32	\$338.32
M50007	Oncology – stereotactic radiosurgery	109			\$12,925.95	\$12,925.95
M50009	Oncology – blood transfusions	820			\$1,108.75	\$1,108.75
M50010	Paediatric oncology project management	451	Total price only	Total price only	Average price based on contracted total price and volume for two years	\$745.67
M50012	High-cost cancer drugs	51	Total price only	Total price only	Assumed to be in PCT drug costs	\$–
M50PRE	Oncology preadmission visit	1	No price in PVS	No price in PVS	No price in PVS	\$–
M54002	Specialist paediatric oncology – outpatient first attendance	572			\$390.90	\$390.90
M54003	Specialist paediatric oncology – outpatient subsequent attendance	20,277			\$351.01	\$351.01
M80004	Palliative care – outpatient services	3445			\$167.99	\$167.99
M80005	Palliative care – community services	10,453			\$1,169.76	\$1,169.76
NCSP-10	Gynaecology – colposcopy	48,688	\$225.04	\$326.59	Mean of high and low DHB prices	\$275.81
NCSP-20	Gynaecology – (high cost) colposcopy directed treatment	3294	\$404.34	\$504.34	Mean of high and low DHB prices	\$454.34
S00009	Breast op proc – first attendance	6729			\$461.72	\$461.72
S00010	Breast op proc – subsequent attendance	11,854			\$347.99	\$347.99
BSA-65	Breast screening treatment – oncology – radiotherapy	4912	\$360.25	\$396.46	Mean of high and low DHB prices	\$378.35
M50005	Oncology – radiotherapy	379,637			\$396.46	\$396.46
M50008	Oncology – stereotactic radiotherapy	430			\$12,925.33	\$12,925.33
BSA-70	Breast screening treatment – oncology – chemotherapy	416	\$816.19	\$816.19	Mean of high and low DHB prices	\$816.19
M30004	Haematology – chemotherapy	7421	\$627.37	\$1,135.90	Mean of high and low DHB prices	\$881.63
M30015	Oral chemotherapy – haematology	506	No price in PVS	No price in PVS	2007/08 PVS national price	\$844.24
M30020	IV chemotherapy – cancer – haematology (non-paediatric)	No events			\$627.37	\$627.37
M30021	Oral chemotherapy oversight – cancer – haematology (non-paediatric)	No events			\$170.86	\$170.86

Purchase unit	Purchase unit description	Frequency 2006–2009	DAP DHB price (low)	DAP DHB price (high)	National price 2008–2009	Study price (per unit)
M50004	Oncology – chemotherapy	67,481	\$511.02	\$816.19	Mean of high and low DHB prices	\$663.60
M50013	Oral chemotherapy – oncology	No events	\$282.24	\$282.24	Mean of high and low DHB prices	\$282.24
M54004	IV chemotherapy – cancer – specialist paediatric oncology	No events			\$511.02	\$511.02
MS02008	IV chemotherapy – non-cancer – any health specialty	No events	\$817.75	\$817.75	Mean of high and low DHB prices	\$817.75
MS02009	IV chemotherapy – cancer – any health specialty	No events			\$511.02	\$511.02
MS02012	Oral chemotherapy oversight – cancer – any health specialty	No events			\$170.86	\$170.86
S70004	Urology – chemotherapy	1972	\$277.25	\$511.02	Mean of high and low DHB prices	\$394.14

Appendix 2: Mean estimated community laboratory test prices 2008/09

Type	Type description	Code	Description	Number of tests	Total estimated value	Mean estimated price
BA	Biochemistry, adrenal tests	BA1	Cortisol, serum	14,862	\$201,545	\$13.56
BA	Biochemistry, adrenal tests	BA2	Cortisol (stimulation or suppression tests)	753	\$19,226	\$25.53
BA	Biochemistry, adrenal tests	BA3	Catecholamines, 24-hour urine	2809	\$111,598	\$39.73
BA	Biochemistry, adrenal tests	BA4	Vanilylmandelic acid, 24-hour urine	180	\$7,130	\$39.61
BA	Biochemistry, adrenal tests	BA5	Urine free cortisol	1369	\$18,912	\$13.81
BE	Biochemistry, electrolyte tests	BE1	Sodium, serum	45,955	\$155,891	\$3.39
BE	Biochemistry, electrolyte tests	BE2	Potassium, serum	57,515	\$195,177	\$3.39
BE	Biochemistry, electrolyte tests	BE3	Sodium and potassium, serum	1,504,049	\$9,148,261	\$6.08
BE	Biochemistry, electrolyte tests	BE4	Chloride, serum	61,837	\$186,004	\$3.01
BE	Biochemistry, electrolyte tests	BE5	Sodium, 24-hour urine	479	\$2,876	\$6.00
BE	Biochemistry, electrolyte tests	BE6	Potassium, 24-hour urine	49	\$284	\$5.79
BE	Biochemistry, electrolyte tests	BE7	Sodium and potassium 24-hour urine	844	\$4,711	\$5.58
BE	Biochemistry, electrolyte tests	BE8	Calcium, serum	279,610	\$849,726	\$3.04
BE	Biochemistry, electrolyte tests	BE9	Calcium 24-hour urine	1243	\$7,002	\$5.63
BE	Biochemistry, electrolyte tests	BEA	Phosphate, serum	238,611	\$708,979	\$2.97
BE	Biochemistry, electrolyte tests	BEB	Magnesium, serum	46,913	\$168,034	\$3.58
BE	Biochemistry, electrolyte tests	BEC	Magnesium, urine	123	\$658	\$5.35
BS	Biochemistry, blood gas assays	BED	Bicarbonate or total CO ₂ , serum	1	\$16	\$16.33
BF	Biochemistry, faeces tests	BF1	Faecal occult blood, human haemoglobin specific	108,310	\$646,545	\$5.97
BF	Biochemistry, faeces tests	BF2	Faecal fat (quantitative)	16	\$671	\$41.95
BF	Biochemistry, faeces tests	BF5	Faecal reducing substances	1490	\$9,579	\$6.43
BG	Biochemistry, glucose tests	BG1	Fructosamine	213	\$1,066	\$5.00
BG	Biochemistry, glucose tests	BG2	Glycosylated haemoglobin	512,873	\$5,124,597	\$9.99
BG	Biochemistry, glucose tests	BG3	Glucose tolerance test standard	63,565	\$1,058,134	\$16.65
BG	Biochemistry, glucose tests	BG4	Glucose tolerance test post-polydose	42,401	\$220,633	\$5.20
BG	Biochemistry, glucose tests	BG5	Serum glucose	1,201,266	\$3,207,368	\$2.67
BH	Biochemistry, haemopoietic tests	BH1	Ferritin, serum	885,805	\$5,247,459	\$5.92
BH	Biochemistry, haemopoietic tests	BH2	Transferrin, serum	126,527	\$385,440	\$3.05
BH	Biochemistry, haemopoietic tests	BH3	Iron binding capacity, serum	293,173	\$979,136	\$3.34
BH	Biochemistry, haemopoietic tests	BH4	Iron, serum	425,238	\$1,382,520	\$3.25
BH	Biochemistry, haemopoietic tests	BH7	Folate, red cell	11,505	\$56,335	\$4.90
BH	Biochemistry, haemopoietic tests	BH8	Folate plus Vitamin B12, serum	454,259	\$3,510,812	\$7.73
BL	Biochemistry, lipid tests	BL1	Cholesterol total, serum	28,792	\$94,966	\$3.30
BL	Biochemistry, lipid tests	BL3	Triglycerides, fasting only	21,982	\$76,272	\$3.47
BL	Biochemistry, lipid tests	BL4	Fasting lipid group test	1,154,787	\$8,631,607	\$7.47
BL	Biochemistry, lipid tests	BL5	Lipoproteins, electrophoresis, serum	5548	\$34,406	\$6.20

Type	Type description	Code	Description	Number of tests	Total estimated value	Mean estimated price
BM	Biochemistry, monitoring tests for drugs	BM1	Digoxin	17,562	\$119,708	\$6.82
BM	Biochemistry, monitoring tests for drugs	BM2	Lithium	15,747	\$121,270	\$7.70
BM	Biochemistry, monitoring tests for drugs	BM3	Antiepileptics	32,515	\$322,272	\$9.91
BM	Biochemistry, monitoring tests for drugs	BM4	Theophylline	248	\$1,941	\$7.83
BP	Biochemistry, protein tests	BP1	Proteins total, serum	90,645	\$282,455	\$3.12
BP	Biochemistry, protein tests	BP2	Albumin, serum	158,512	\$481,353	\$3.04
BP	Biochemistry, protein tests	BP3	Protein electrophoretic pattern, serum	56,702	\$332,770	\$5.87
BP	Biochemistry, protein tests	BP4	Electrophoresis concentrated urine	3861	\$86,280	\$22.35
BP	Biochemistry, protein tests	BP5	Immunoglobulins (IgA, IgE, IgG, or IgM)	154,204	\$962,522	\$6.24
BP	Biochemistry, protein tests	BP6	Paraprotein identification	4463	\$207,419	\$46.48
BP	Biochemistry, protein tests	BP7	Proteins, 24-hour urine	11,135	\$79,982	\$7.18
BP	Biochemistry, protein tests	BP8	Microalbumin, early morning urine	241,220	\$3,245,892	\$13.46
BR	Biochemistry, renal tests	BR1	Creatinine, serum	1,788,970	\$5,408,068	\$3.02
BR	Biochemistry, renal tests	BR2	Urea, serum	481,587	\$1,396,919	\$2.90
BR	Biochemistry, renal tests	BR3	Urate or uric acid, serum	398,871	\$1,276,507	\$3.20
BR	Biochemistry, renal tests	BR5	Urinary calculus analysis	396	\$3,574	\$9.03
BR	Biochemistry, renal tests	BR8	Creatinine, 24-hour urine	27,421	\$158,079	\$5.76
BR	Biochemistry, renal tests	BR9	Creatinine clearance test	3296	\$24,313	\$7.38
BS	Biochemistry, blood gas assays	BS1	Bicarbonate or total CO ₂ (serum)	10,112	\$36,394	\$3.60
BS	Biochemistry, blood gas assays	BS2	pH, pO ₂ , and pCO ₂	13,035	\$244,835	\$18.78
BT	Biochemistry, thyroid tests	BT1	Thyroid stimulating hormone, serum (TSH)	951,252	\$5,153,849	\$5.42
BT	Biochemistry, thyroid tests	BT2	Free thyroxine index or free T4	345,666	\$1,645,013	\$4.76
BT	Biochemistry, thyroid tests	BT3	Serum free T3	132,039	\$763,165	\$5.78
BU	Biochemistry, uncategorised tests	BU1	Hydroxy-indoleacetic acid (serotonin)	768	\$10,662	\$13.88
BU	Biochemistry, uncategorised tests	BU2	Troponin T and troponin I	64,562	\$764,148	\$11.84
BV	Biochemistry, liver tests	BV1	Bilirubin total, serum	51,028	\$297,848	\$5.84
BV	Biochemistry, liver tests	BV2	Bilirubin total, conjugated and unconjugated serum	5800	\$49,193	\$8.48
BV	Biochemistry, liver tests	BV4	Alcohol, diagnostic purposes only	977	\$7,325	\$7.50
BV	Biochemistry, liver tests	BV9	Liver function group	1,376,353	\$25,487,705	\$18.52
BX	Biochemistry, reproductive system tests	BX1	Progesterone, serum	59,182	\$494,813	\$8.36
BX	Biochemistry, reproductive system tests	BX2	Chorionic gonadotrophin qualitative plus quantitative (HCG)	101,465	\$1,259,650	\$12.41
BX	Biochemistry, reproductive system tests	BX3	Follicle stimulating hormone (FSH)	93,094	\$812,961	\$8.73
BX	Biochemistry, reproductive system tests	BX4	Luteinising hormone (LH)	94,617	\$673,783	\$7.12
BX	Biochemistry, reproductive system tests	BX5	Oestradiol, serum	83,873	\$1,007,523	\$12.01
BX	Biochemistry, reproductive system tests	BX7	Prolactin, serum	36,480	\$430,546	\$11.80

Type	Type description	Code	Description	Number of tests	Total estimated value	Mean estimated price
BX	Biochemistry, reproductive system tests	BX8	Serum testosterone	28,723	\$297,455	\$10.36
BZ	Biochemistry, enzyme tests	BZ1	Amylase	60,434	\$192,010	\$3.18
BZ	Biochemistry, enzyme tests	BZ2	Asparate amino transferase, serum – AST	49,864	\$154,543	\$3.10
BZ	Biochemistry, enzyme tests	BZ3	Creatine kinase, serum (CK)	105,375	\$344,831	\$3.27
BZ	Biochemistry, enzyme tests	BZ4	Acid phosphatase, serum	2495	\$16,114	\$6.46
BZ	Biochemistry, enzyme tests	BZ5	Alkaline phosphatase, serum	70,159	\$223,809	\$3.19
BZ	Biochemistry, enzyme tests	BZ6	Gamma glutamyl transferase, serum (GGT)	67,801	\$216,525	\$3.19
BZ	Biochemistry, enzyme tests	BZ7	Myocardial screen	383	\$2,091	\$5.46
BZ	Biochemistry, enzyme tests	BZ8	Alanine transaminase – ALT	97,201	\$306,154	\$3.15
BZ	Biochemistry, enzyme tests	BZ9	Other enzymes where specifically requested	15,970	\$56,967	\$3.57
C	Cytology and morbid histology	C10	Cytological examination of cervical smears (per accession)	98	\$2,066	\$21.08
C	Cytology and morbid histology	C20	Cytological examination of smears from other sites (per accession)	26,640	\$1,248,180	\$46.85
C	Cytology and morbid histology	C30	Cytological urgent examination of smear taken during surgery, extra	242	\$22,508	\$93.01
C	Cytology and morbid histology	C40	Cytological examination of fine needle aspiration taken and examined by pathologist	7,717	\$731,541	\$94.80
C	Cytology and morbid histology	C50	Histology (per accession)	215,080	\$13,431,905	\$62.45
C	Cytology and morbid histology	C51	Immunochemistry, first stain	10,248	\$528,833	\$51.60
C	Cytology and morbid histology	C52	Immunochemistry, subsequent stains (up to a maximum of five in total)	19,067	\$534,931	\$28.06
C	Cytology and morbid histology	C53	Immunocytochemistry, first stain	983	\$54,120	\$55.06
C	Cytology and morbid histology	C54	Immunocytochemistry, subsequent stains (up to a maximum of five in total)	2391	\$66,007	\$27.61
C	Cytology and morbid histology	C80	Histology – frozen section during surgery, extra	1420	\$160,555	\$113.07
D	Diagnostic immunological and serological tests	D01	Skin tests, immediate hypersensitivity	189,680	\$497,620	\$2.62
D	Diagnostic immunological and serological tests	D12	Tuberculin skin test	5594	\$33,525	\$5.99
D	Diagnostic immunological and serological tests	D15	Auto-immune disease, anti-nuclear antibody	66,550	\$502,658	\$7.55
D	Diagnostic immunological and serological tests	D16	Auto-immune disease, anti-nuclear antibody titre	14,954	\$246,916	\$16.51
D	Diagnostic immunological and serological tests	D17	Auto-immune disease, thyroid	48,852	\$314,210	\$6.43
D	Diagnostic immunological and serological tests	D19	Autoantibodies, other	242,277	\$2,646,816	\$10.92
D	Diagnostic immunological and serological tests	D20	Rheumatoid factor – Rose Waaler test	65,552	\$387,508	\$5.91
D	Diagnostic immunological and serological tests	D21	C-reactive protein test	730,825	\$4,204,179	\$5.75
D	Diagnostic immunological and serological tests	D22	Antistreptococcal antibodies	14,795	\$118,573	\$8.01
D	Diagnostic immunological and serological tests	D23	Paul-Bunnell (or equivalent)	18,840	\$71,420	\$3.79
D	Diagnostic immunological and serological tests	D24	Syphilis – VDRL or other reagin test	34,447	\$170,520	\$4.95

Type	Type description	Code	Description	Number of tests	Total estimated value	Mean estimated price
D	Diagnostic immunological and serological tests	D25	Syphilis – specific antibody test	72,623	\$403,415	\$5.55
D	Diagnostic immunological and serological tests	D26	Syphilis – confirmatory specific antibody test	546	\$5,516	\$10.10
D	Diagnostic immunological and serological tests	D31	Hydatids antibody	60	\$694	\$11.57
D	Diagnostic immunological and serological tests	D32	Leptospira agglutination screen test	1485	\$14,222	\$9.58
D	Diagnostic immunological and serological tests	D33	Leptospira specific antibody test	97	\$317	\$3.27
D	Diagnostic immunological and serological tests	D34	Brucella antibodies	728	\$5,692	\$7.82
D	Diagnostic immunological and serological tests	D35	Toxoplasma antibodies – IgG	6431	\$95,561	\$14.86
D	Diagnostic immunological and serological tests	D36	Toxoplasma antibodies – IgM	6395	\$74,005	\$11.57
D	Diagnostic immunological and serological tests	D40	Rubella antibodies – IgG	20,059	\$140,138	\$6.99
D	Diagnostic immunological and serological tests	D41	Rubella antibodies – IgM	762	\$11,580	\$15.20
D	Diagnostic immunological and serological tests	D42	Hepatitis B (Anti HBs) antibody	107,639	\$702,358	\$6.53
D	Diagnostic immunological and serological tests	D43	Hepatitis B (HBsAg) surface antigen	118,494	\$793,116	\$6.69
D	Diagnostic immunological and serological tests	D44	Hepatitis B (anti HBc) antibody	51,020	\$520,349	\$10.20
D	Diagnostic immunological and serological tests	D45	Hepatitis B (HBe) e antigen	21,165	\$195,564	\$9.24
D	Diagnostic immunological and serological tests	D46	Hepatitis A IgM antibody	29,725	\$286,256	\$9.63
D	Diagnostic immunological and serological tests	D47	Hepatitis A IgG antibody	36,127	\$350,621	\$9.71
D	Diagnostic immunological and serological tests	D48	Hepatitis C antibody	65,527	\$812,653	\$12.40
D	Diagnostic immunological and serological tests	D60	CM virus, specific antibody titre	28,880	\$247,126	\$8.56
D	Diagnostic immunological and serological tests	D61	Epstein-Barr virus IgM antibody	36,377	\$667,184	\$18.34
D	Diagnostic immunological and serological tests	D62	Epstein-Barr virus IgG antibody	39,062	\$730,987	\$18.71
D	Diagnostic immunological and serological tests	D70	Chlamydia direct antigen test	301,389	\$6,332,527	\$21.01
D	Diagnostic immunological and serological tests	D71	Rotovirus direct antigen test	26,191	\$475,460	\$18.15
D	Diagnostic immunological and serological tests	D72	Herpes virus direct antigen test	5433	\$91,507	\$16.84
D	Diagnostic immunological and serological tests	D73	Giardia direct antigen test	71,082	\$1,152,999	\$16.22
D	Diagnostic immunological and serological tests	D80	HIV screen test	96,416	\$1,043,212	\$10.82
D	Diagnostic immunological and serological tests	D90	Prostate specific antigen	322,853	\$3,369,614	\$10.44
D	Diagnostic immunological and serological tests	D91	Prostate specific antigen	402	\$1,885	\$4.69
H	Haematology tests	H01	Erythrocyte sedimentation rate (ESR)	313,357	\$2,111,067	\$6.74
H	Haematology tests	H03	Bleeding time	223	\$2,000	\$8.97

Type	Type description	Code	Description	Number of tests	Total estimated value	Mean estimated price
H	Haematology tests	H04	Thrombin time	5398	\$44,437	\$8.23
H	Haematology tests	H05	Clot retraction	2	\$4	\$2.14
H	Haematology tests	H06	Plasma prothrombin ratio	867,300	\$7,372,420	\$8.50
H	Haematology tests	H07	Partial thromboplastin clotting time	12,733	\$106,894	\$8.40
H	Haematology tests	H08	Fibrinogen (qualitative)	51	\$178	\$3.48
H	Haematology tests	H09	Fibrinogen (quantitative)	10,744	\$88,372	\$8.23
H	Haematology tests	H10	Coagulation factors individual assays	16,164	\$403,337	\$24.95
H	Haematology tests	H15	Coagulation profile	3685	\$114,372	\$31.04
H	Haematology tests	H16	Coagulation profile (Group H06, H07, S01)	23,287	\$575,794	\$24.73
H	Haematology tests	H19	Red blood cell inclusion bodies	18,305	\$174,468	\$9.53
H	Haematology tests	H20	Anti human globulin test including Coombs test	8962	\$71,234	\$7.95
H	Haematology tests	H33	Red cell or white cell enzyme	1276	\$56,210	\$44.05
H	Haematology tests	H40	Haemoglobin pigments – qualitative	3444	\$49,069	\$14.25
H	Haematology tests	H41	Haemoglobin pigments – quantitative	7798	\$197,786	\$25.36
H	Haematology tests	H50	Bone marrow aspirate – (per site, not per slide)	374	\$88,124	\$235.63
H	Haematology tests	H61	Blood grouping – Rhesus – group	8	\$29	\$3.61
H	Haematology tests	H62	Blood grouping – Rhesus – titre	528	\$5,996	\$11.36
H	Haematology tests	H63	Blood grouping – Rhesus – phenotyping	54	\$948	\$17.56
H	Haematology tests	H64	Blood grouping – ABO/ Rhesus group	21,135	\$122,104	\$5.78
M	Microbiology tests	M01	Swab, skin/wound/pus	166,698	\$2,024,051	\$12.14
M	Microbiology tests	M02	Swab, throat	111,487	\$1,337,531	\$12.00
M	Microbiology tests	M03	Swab, ear	29,570	\$353,083	\$11.94
M	Microbiology tests	M04	Swab, nasal	11,518	\$142,782	\$12.40
M	Microbiology tests	M05	Swab, peri-anal	432	\$5,873	\$13.59
M	Microbiology tests	M06	Swab, vaginal	244,587	\$3,339,295	\$13.65
M	Microbiology tests	M07	Swab, cervical	169,581	\$2,347,223	\$13.84
M	Microbiology tests	M08	Swab, urethral	23,077	\$318,296	\$13.79
M	Microbiology tests	M09	Swab, eye	24,168	\$295,743	\$12.24
M	Microbiology tests	M10	Swab, rectal for sexually transmitted diseases	750	\$10,253	\$13.67
M	Microbiology tests	M11	Enteric pathogens (faeces or rectal swab)	114,887	\$1,623,633	\$14.13
M	Microbiology tests	M15	Ova and cysts	34,333	\$445,386	\$12.97
M	Microbiology tests	M16	Aspirates, culture and sensitivities	5601	\$78,355	\$13.99
M	Microbiology tests	M17	Blood culture	10,607	\$270,468	\$25.50
M	Microbiology tests	M18	Sputum (excluding tuberculosis)	21,546	\$338,369	\$15.70
M	Microbiology tests	M19	Other, culture, sensitivities and identification	77,956	\$1,137,249	\$14.59
M	Microbiology tests	M20	Mycology – skin	53,319	\$985,143	\$18.48
M	Microbiology tests	M21	Film – examination for malaria, filaria, and/or gonococci	42,009	\$320,876	\$7.64
M	Microbiology tests	M22	Film (concentrated) examination for filaria	939	\$13,472	\$14.35
M	Microbiology tests	M25	Seminal fluid – fertility	6402	\$136,927	\$21.39
M	Microbiology tests	M26	Seminal fluid – post-vasectomy	10,058	\$129,459	\$12.87

Type	Type description	Code	Description	Number of tests	Total estimated value	Mean estimated price
M	Microbiology tests	M30	Tuberculosis – sputum	6437	\$157,972	\$24.54
M	Microbiology tests	M32	Tuberculosis – urine	1730	\$42,199	\$24.39
M	Microbiology tests	M33	Tuberculosis – other sites	552	\$12,944	\$23.45
M	Microbiology tests	M40	Urine culture – (with colony count, identification and sensitivities where indicated)	720,058	\$11,015,047	\$15.30
N		N01	NCSP	422,949	\$11,299,880	\$26.72
N		N02	NCSP	12,056	\$838,810	\$69.58
N		N03	NCSP	435	\$25,881	\$59.50
N		N04	NCSP	552	\$16,419	\$29.74
N		N07	NCSP	4	\$492	\$122.94
R		RLC	Reference laboratory collection fee	52,118	\$262,698	\$5.04
S	Other group tests	S01	Complete blood count (CBC)	2,161,435	\$21,897,497	\$10.13
S	Other group tests	S02	First antenatal group	82,492	\$2,849,239	\$34.54
S	Other group tests	S03	Antenatal subsequent groups	74,059	\$998,842	\$13.49
S	Other group tests	S04	Antenatal antibodies, including Coombs test	1173	\$8,398	\$7.16
S	Other group tests	S05	Neonatal group	540	\$13,236	\$24.51
S	Other group tests	S07	HIV antenatal screening	10,378	\$263,096	\$25.35
Unknown dimension	Unknown dimension	Unknown dimension	Unknown dimension	4181	\$31,350	\$7.50

Appendix 3: Community and hospital pharmacy chemical IDs and therapeutic groups used in this report

Chemical ID	Chemical name	Therapeutic group level 1 name	Therapeutic group level 2 name	Therapeutic group level 3 name
1009	Leuprorelin	Hormone preparations – systemic excluding contraceptive hormones	Trophic hormones	GNRH analogues
1018	Interferon gamma-1b	Oncology agents and immunosuppressants	Immunosuppressants	Immune modulators
1055	Aminoglutethimide	Oncology agents and immunosuppressants	Endocrine therapy	Endocrine therapy
1158	Anastrozole	Oncology agents and immunosuppressants	Endocrine therapy	Aromatase inhibitors
1173	Busulphan	Oncology agents and immunosuppressants	Chemotherapeutic agents	Alkylating agents
1181	Letrozole	Oncology agents and immunosuppressants	Endocrine therapy	Aromatase inhibitors
1198	Calcium folinate	Oncology agents and immunosuppressants	Chemotherapeutic agents	Antimetabolites
1255	Chlorambucil	Oncology agents and immunosuppressants	Chemotherapeutic agents	Alkylating agents
1369	Cyclophosphamide	Oncology agents and immunosuppressants	Chemotherapeutic agents	Alkylating agents
1371	Cytarabine	Oncology agents and immunosuppressants	Chemotherapeutic agents	Antimetabolites
1529	Fluorouracil sodium	Oncology agents and immunosuppressants	Chemotherapeutic agents	Antimetabolites
1537	Flutamide	Oncology agents and immunosuppressants	Endocrine therapy	Endocrine therapy
1626	Hydroxyurea	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
1772	Megestrol acetate	Oncology agents and immunosuppressants	Endocrine therapy	Endocrine therapy
1773	Melphalan	Oncology agents and immunosuppressants	Chemotherapeutic agents	Alkylating agents
1781	Mercaptopurine	Oncology agents and immunosuppressants	Chemotherapeutic agents	Antimetabolites
1797	Methotrexate	Oncology agents and immunosuppressants	Chemotherapeutic agents	Antimetabolites
2047	Procarbazine hydrochloride	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
2218	Tamoxifen citrate	Oncology agents and immunosuppressants	Endocrine therapy	Endocrine therapy
2252	Thioguanine	Oncology agents and immunosuppressants	Chemotherapeutic agents	Antimetabolites
2257	Thiotepa	Oncology agents and immunosuppressants	Chemotherapeutic agents	Alkylating agents
2320	Vincristine sulphate	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
2433	Etoposide	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
2540	Goserelin acetate	Hormone preparations – systemic excluding contraceptive hormones	Trophic hormones	GNRH analogues
3715	Toremifene	Oncology agents and immunosuppressants	Endocrine therapy	Aromatase inhibitors
3733	Temozolomide	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
3780	Imatinib mesylate	Oncology agents and immunosuppressants	Chemotherapeutic agents	Protein-tyrosine kinase inhibitors
3808	Capecitabine	Oncology agents and immunosuppressants	Chemotherapeutic agents	Antimetabolites
3811	Irinotecan	Oncology agents and immunosuppressants	Chemotherapeutic agents	Antimetabolites
3816	Vinorelbine	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
3817	Rituximab	Oncology agents and immunosuppressants	Immunosuppressants	Immune modulators
3832	Oxaliplatin	Oncology agents and immunosuppressants	Chemotherapeutic agents	Alkylating agents
3833	Colaspase (L-asparaginase)	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
3834	Docetaxel	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
3837	Carmustine	Oncology agents and immunosuppressants	Chemotherapeutic agents	Alkylating agents
3841	Antithymocyte globulin (equine)	Oncology agents and immunosuppressants	Immunosuppressants	Immune modulators

Chemical ID	Chemical name	Therapeutic group level 1 name	Therapeutic group level 2 name	Therapeutic group level 3 name
3842	Gemcitabine hydrochloride	Oncology agents and immunosuppressants	Chemotherapeutic agents	Antimetabolites
3843	Anagrelide hydrochloride	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
3845	Thalidomide	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
3856	Temozolomide	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents
3872	Exemestane	Oncology agents and immunosuppressants	Endocrine therapy	Aromatase inhibitors
3883	Bicalutamide	Oncology agents and immunosuppressants	Endocrine therapy	Endocrine therapy
3886	Anastrozole-DP	Oncology agents and immunosuppressants	Endocrine therapy	Endocrine therapy
3894	Dasatinib	Oncology agents and immunosuppressants	Chemotherapeutic agents	Protein-tyrosine kinase inhibitors
3897	Amsacrine	Oncology agents and immunosuppressants	Chemotherapeutic agents	Other cytotoxic agents

Appendix 4: Estimation of hospice price of cancer by site group

The reported budget for hospices in New Zealand in 2008/09 was \$73,143,530, and the Ministry of Health funded component of the hospices' operating budget was \$51,200,471 (70 percent) (Ministry of Health 2010b). Data collected from hospices in 1998/99 indicate hospice providers cared for 4886 people who were dying; approximately 90 percent of these people died from cancer (Ministry of Health 2001).

An analysis linking 2006 Births Deaths and Marriages death registration data and Ministry of Health cause of death data found that of all persons registered as dying in 2006, 1617 were recorded as dying in a hospice. Of these, 88 percent (1419) died of cancer (ICD-10-AM in range C01–C99, D00–D09 and D45–D47) and the remaining 12 percent died of other causes.

On the basis that the more recent estimate of 88 percent was based on incomplete data and was still very close to the older estimate of 90 percent, we proceeded with the latter. On the basis that 90 percent of hospice cases had a primary cause of cancer and 70 percent of hospice operating budgets are funded by the Ministry of Health, we estimated that 63 percent (70% x 90%) of the hospice operating budget (\$46,080,424) that is funded by the Ministry of Health is attributable to palliative care of cancer patients.

We then assumed that the distribution of total price for inpatient hospital palliative care of cancer patients by site group is a reasonable proxy for the distribution of the Ministry of Health funding of cancer palliative care in hospices. That is, if 15 percent of all inpatient public hospital palliative care price is on colorectal cancer, then 15 percent of all Ministry of Health funded cancer-related hospice funding is on colorectal cancer. An estimation of the hospice price of cancer by site group is presented in Table 17.

Table 17: Estimation of hospice price of cancer by site group

Group	Description	Actual NZ cancer incidence 2008	Estimated mean public palliative care discharge price per person (over six years)	Total estimated public palliative care discharge price per person (over six years)	Estimated proportion of total price	Estimated hospice spend to cancer site (63% of 2008/09 budget)	Estimated mean hospice funding per cancer
1	C18–C21 – Colorectal	2808	\$1,290	\$3,622,657	15%	\$6,933,964	\$2,469
2	C33–C34 – Respiratory	1871	\$2,278	\$4,262,531	18%	\$8,158,718	\$4,361
3	C43 – Melanoma	2255	\$338	\$761,085	3%	\$1,456,759	\$646
4	C50 – Breast	2735	\$531	\$1,453,352	6%	\$2,781,795	\$1,017
5	C51, C52, C54–C58 – Gynaecological	811	\$1,259	\$1,020,668	4%	\$1,953,614	\$2,409
6	C53 – Cervix	175	\$1,753	\$306,779	1%	\$587,191	\$3,355
7	C61 – Prostate	2940	\$472	\$1,388,885	6%	\$2,658,403	\$904
8	C81–C96 – Lymphoid and haematological	1766	\$1,339	\$2,364,550	10%	\$4,525,879	\$2,563
9	C01–C17, C22–C32, C35–C42, C44–C49, C59, C60, C62–C80, C97–C99, D45–D47 – Other malignant	4983	\$1,725	\$8,596,921	36%	\$16,454,978	\$3,302
10	D00–D09 – In situ	4762	\$62	\$297,339	1%	\$569,124	\$120
	C01–C99, D00–D09, D45–D47 – All registered cancers	25,106		\$24,074,767	100%	\$46,080,424	\$1,835

Appendix 5: Commentary on the projected growth in incidence by site group

Group	ICD10AM – description	Comment
1	C18–C21– Colorectal	Rates are projected to decline in all age groups except 75+ for both sexes, falling overall by approximately one-quarter in the 45–74 age group. This occurs without an organised screening programme. Burden still increases, however (by about 15 percent) because of offsetting demographic effects.
2	C33–C34 – Respiratory	Rates continue their steady long-term decline in males (all ages), falling by one-quarter over the decade. As a result, overall burden remains stable. Trends in incidence rates vary by age group among females, most notably increasing substantively (about 15 percent) in young adults, but the overall outcome is stability. However, female and male rates most probably will not cross over by the projection horizon. Given stable rates, burden must increase for females – an increase of one-quarter is projected over the decade.
3	C43 – Melanoma	Trends in rates are projected to vary by age among males, decreasing in younger and increasing in older age groups (most probably reflecting cohort effects), so that the overall rate remains stable and the total burden increases by one-third. Note, however, that the credible interval around these projections is exceptionally wide (reflecting the very divergent trends by age group). Female rates are projected to decline in all age groups except the oldest, so the overall rate falls slightly. The burden increases by about one-sixth overall.
4	C50 – Breast	Rates are projected to fall among women younger than 45 years of age, remain stable in those aged 45–74 and increase slightly in those aged >75 years, with the result that the overall rate remains stable. This reflects the complex interaction of underlying epidemiological trends with the impact of screening. Total burden nevertheless increases by about one-fifth, reflecting the impact of demographic trends.
5	C51, C52, C54–C58 – Gynaecological	Rates are projected to decrease very slowly. The increase of approximately 25 percent in projected burden reflects the impact of ageing and population size in equal parts.
6	C53 – Cervix	Both rates and counts are projected to continue to fall sharply, although exact estimates are imprecise because of relatively small numbers. This is entirely due to the ongoing effect of the screening programme (insufficient time has elapsed for HPV immunisation to have had a measurable impact on incidence). The steady decline in cervical cancer incidence (since the introduction of the National Cervical Screening Programme) is a notable public health success story.
7	C61 – Prostate	Rates are projected to increase slowly, even after correcting for the impact of opportunistic PSA screening, with the result that the burden of new cases is expected to increase by approximately 70 percent (and would more than double if cases detected solely by PSA screening were included). The steep increase in burden reflects the impact of population ageing in particular, as this cancer has a particularly right-shifted age distribution.
8	C81–C96 – Lymphoid and haematological	Rates are projected to increase slowly. The approximately 35 percent increase in projected burden reflects a relatively equal contribution from ageing and population size.
9	C01–C17, C22–C32, C35–C42, C44–C49, C59, C60, C62–C80, C97–C99, D45–D47 – Other malignant	Rates are projected to decrease. The increase of approximately 25 percent in projected burden reflects the impact of ageing and population size, predominantly the former.
10	D00–D09 – In situ	No projections were calculated for in situ cancers.

Group	ICD10AM – description	Comment
	C01–C99, D45–D47 – All registered malignant cancers	The overall risk of being diagnosed with cancer is projected to reduce slowly in females, by approximately 11 percent over the decade. Among males, the overall risk of cancer – excluding the ‘PSA effect’ – is projected to remain stable (or decline very slightly). At the same time the burden (count) of new cancer patients is projected to increase by about 12 percent in females and a more substantial 29 percent in males, reflecting the offsetting effect of demographic trends (the expected increase in size and structural ageing of the New Zealand population).
	C01–C99, D00–D09 or D45–D47 – All registered cancers	This cannot be provided as no projections were calculated for in situ cancers.

Source: Ministry of Health 2010a

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