CANCER

Introduction

In 2010, children and young people aged 0–24 years accounted for 1.5% of all New Zealand cancer registrations, with the most commonly registered cancers being leukaemia and testicular cancer in males and leukaemia and Hodgkin lymphoma in females [1]. During the same period, there were 51 deaths from cancer among children and young people, which accounted for 0.6% of all New Zealand cancer deaths. Amongst males, leukaemia and brain cancers were the most common causes of cancer mortality, while leukaemia was the most common cause for females [1].

Known risk factors for childhood cancer include family history, as the risk doubles if a sibling has been previously diagnosed with a malignancy in childhood. A number of genetic mutations (e.g. RB1 gene mutation for retinoblastoma) and environmental exposures have also been associated with specific childhood cancers. Examples of environmental risk factors include ionising radiation (e.g. antenatal x-ray exposure), ultraviolet radiation from sunlight (for melanoma and skin cancers) and infective agents (e.g. Epstein-Barr virus for lymphomas; human papilloma virus for cervical cancer). The causes of the vast majority of childhood cancers, however, remain unknown, despite intensive investigation since the mid-20th century [2].

In New Zealand the five year survival ratio for children with cancer is relatively high, although no significant changes in survival occurred between 1998–1999 (0.72) and 2008–2009 (0.80) [3]. Over the longer term, however, there have been significant improvements in child cancer mortality. These gains have largely been achieved through the intensification of therapy using varying combinations of chemotherapy, radiotherapy, surgery and haematopoietic stem cell transplantation [4]. While these therapies are very successful in preventing death in most cases, the families of children newly diagnosed with cancer can still expect multiple hospital admissions, treatments with severe side effects (including immune suppression and an increased risk of infection), and significant disruption to many aspects of their everyday lives [5].

Fortunately, advances in supportive care have paralleled the intensification of cancer treatments, and careful attention is now paid to the hospital environment (e.g. separate rooms and careful hand washing), antibiotic prophylaxis, immunisation, pain management and the use of antiemetics and blood products [6]. It has become increasingly recognised that the psychosocial care of children and their families is crucially important, and that comprehensive family-centred psychosocial support is necessary at each step in the care pathway, from the initial diagnosis, through the various rounds of treatment, to remission and any recurrence [7].

The following section uses data from the New Zealand Cancer Registry and the National Mortality Collection to review the incidence of, and mortality from, cancer in New Zealand children and young people.

Data Source and Methods

Definition

1. New Zealand Cancer Registry notifications for children and young people aged 0–24 years

2. Cancer deaths for children and young people aged 0–24 years

Data Source

1. New Zealand Cancer Registry

Numerator: NZ Cancer Registry notifications for children and young people aged 0–24 years. Cancer site was assigned using ICD-10-AM as follows: Carcinoma in Situ of Cervix (D06), Melanoma in Situ (D03), Hodgkin disease (C81), Non-Hodgkin Lymphomas (C82–C85), Acute Myeloid Leukaemia (C92.0), Other Myeloid Leukaemias (C92.1–C92.9), Acute Lymphoblastic Leukaemia (C91.0), Other Neoplasms Lymphoid and Haematopoietic Tissues (Remainder C81–C96). Malignant Neoplasms of the: Brain (C71); Testis (C62); Melanoma of Skin (C43); Bone and Cartilage (C40–41); Kidney (Excluding Renal Pelvis) (C64); Adrenal Gland (C74); Ovary (C56); Thyroid (C73); Cervix (C53); Retina (C69.2), Other Malignant Neoplasms (Remainder C00–C97), Other In Situ Neoplasms (Remainder D00–D09), Benign Neoplasms (D10–D36), Neoplasms of Uncertain Behaviour (D37–D48).

2. National Mortality Collection

Numerator: Cancer deaths in children and young people aged 0–24 years where the main underlying cause of death was in the ranges outlined above.

Denominator: Statistics NZ Estimated Resident Population (projected from 2007).

Notes on Interpretation

For the majority of analyses, rates per 100,000 children and young people aged 0–24 years have been used. For cancers of the reproductive organs however, gender-specific denominators have been used (malignant neoplasms of the testis, rates per 100,000 males 0–24 years, malignant neoplasms of the ovaries and cervix, rates are per 100,000 females 0–24 years). For carcinoma in situ of the cervix, rates per 100,000 females 0–24 years have been presented in the NZ and DHB tables to allow comparisons with other cancer types. However, in the rate ratio table, which compares rates by ethnicity, rates per 100,000 females 15–24 years have been presented, as the vast majority of notifications are in this age group.

New Zealand Distribution by Cancer Type

NZ Cancer Registry Notifications

In New Zealand during 2002–2011, acute lymphoblastic leukaemia was the most frequent malignant neoplasm notified to the NZ Cancer Registry in children and young people aged 0–24 years, followed by malignant melanoma of the skin. Carcinoma in situ of the cervix however, was the most frequent reason for a NZ Cancer Registry notification, accounting for 61.3% of all notifications during this period (**Table 1**).

Cancer Deaths

In New Zealand during 2001–2010, cancers of the brain were the leading cause of cancer mortality in children and young people aged 0–24 years, followed by acute lymphoblastic leukaemia (**Table 2**).

Table 1. NZ Cancer Registry Notifications for Children and Young People Aged 0–24 Years by Cancer Type, New Zealand 2002–2011

Cancer Registry Notifications	Total No. 2002−2011	Annual Average	Rate per 100,000	% of Malignant Neoplasms	% of All Notifications
New Zealand					
Cancers of Lymphoid and Haematopoietic Tissues					
Acute Lymphoblastic Leukaemia	425	42.5	2.85	14.9	5.3
Acute Myeloblastic Leukaemia	107	10.7	0.72	3.7	1.3
Other Myeloid Leukaemias	52	5.2	0.35	1.8	0.6
Hodgkin Disease	213	21.3	1.43	7.5	2.7
Non-Hodgkin Lymphomas	177	17.7	1.19	6.2	2.2
Other Lymphoid/Haematopoietic Neoplasms	54	5.4	0.36	1.9	0.7
Cancers of Reproductive Organs					
Malignant Neoplasm of Testis	227	22.7	2.98	7.9	2.8
Malignant Neoplasm of Ovary	53	5.3	0.73	1.9	0.7
Malignant Neoplasm of Cervix	41	4.1	0.56	1.4	0.5
Other Malignant Neoplasms					
Malignant Melanoma of Skin	298	29.8	2.00	10.4	3.7
Malignant Neoplasm of Brain	259	25.9	1.74	9.1	3.2
Malignant Neoplasm of Bone and Cartilage	165	16.5	1.11	5.8	2.1
Malignant Neoplasm of Connective Tissue	121	12.1	0.81	4.2	1.5
Malignant Neoplasm of Thyroid	96	9.6	0.64	3.4	1.2
Malignant Neoplasm of Kidney*	72	7.2	0.48	2.5	0.9
Malignant Neoplasm of Retina	46	4.6	0.31	1.6	0.6
Malignant Neoplasm of Adrenal Gland	43	4.3	0.29	1.5	0.5
Other Malignant Neoplasms	409	40.9	2.75	14.3	5.1
Total Malignant Neoplasms	2,858	285.8		100.0	35.7
In Situ Neoplasms or Neoplasms of Uncertain Behaviour					
Carcinoma In Situ of Cervix	4,911	491.1	67.39		61.3
Melanoma In Situ	155	15.5	1.04		1.9
Other In Situ Neoplasms	50	5.0	0.34		0.6
Neoplasm Uncertain/Unknown Behaviour	31	3.1	0.21		0.4
Total In Situ or Uncertain Behaviour	5,147	514.7			64.3
Total: All Cancer Registry Notifications	8,005	800.5			100.0

Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: *Malignant Neoplasm of Kidney excluding renal pelvis; Rates are per 100,000 0–24 years, except for cancers of reproductive organs which are gender-specific (i.e. per 100,000 males or females 0–24 years)

Table 2. Cancer Deaths in Children and Young People Aged 0–24 Years by Cancer Type, New Zealand 2001–2010

Cancer Deaths	Total No. 2001−2010	Annual Average	Rate per 100,000	% of Cancer Deaths
New Zealand				
Cancers of Lymphoid and Haematopoietic Tissues				
Acute Lymphoblastic Leukaemia	79	7.9	0.53	13.2
Acute Myeloblastic Leukaemia	38	3.8	0.26	6.4
Other Myeloid Leukaemias	6	0.6	0.04	1.0
Hodgkin Disease	9	0.9	0.06	1.5
Non-Hodgkin Lymphomas	22	2.2	0.15	3.7
Other Lymphoid/Haematopoietic Neoplasms	15	1.5	0.10	2.5
Cancers of Reproductive Organs				
Malignant Neoplasm of Testis	11	1.1	0.15	1.8
Malignant Neoplasm of Cervix	<3	s	s	s
Malignant Neoplasm of Ovary	4	0.4	0.06	0.7
Other Malignant Neoplasms				
Malignant Neoplasm of Brain	127	12.7	0.86	21.3
Malignant Neoplasms Bone and Cartilage	73	7.3	0.49	12.2
Malignant Neoplasm of Connective and Soft Tissue	39	3.9	0.26	6.5
Malignant Neoplasm of Adrenal Gland	22	2.2	0.15	3.7
Malignant Melanoma of Skin	17	1.7	0.12	2.8
Malignant Neoplasm of Kidney*	6	0.6	0.04	1.0
Other Malignant Neoplasms	110	11.0	0.74	18.4
Benign Neoplasms or Neoplasms of Uncertain Behaviour				
Neoplasm Uncertain/Unknown Behaviour	12	1.2	0.08	2.0
Benign Neoplasms	6	0.6	0.04	1.0
Total: All Cancer Deaths	597	59.7		100.0

Source: Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: *Malignant Neoplasm of Kidney excluding renal pelvis; Rates are per 100,000 0–24 years, except for cancers of reproductive organs which are gender-specific (i.e. per 100,000 males or females 0–24 years); s: suppressed due to small numbers

Cancers of the Lymphoid and Haematopoietic Tissues

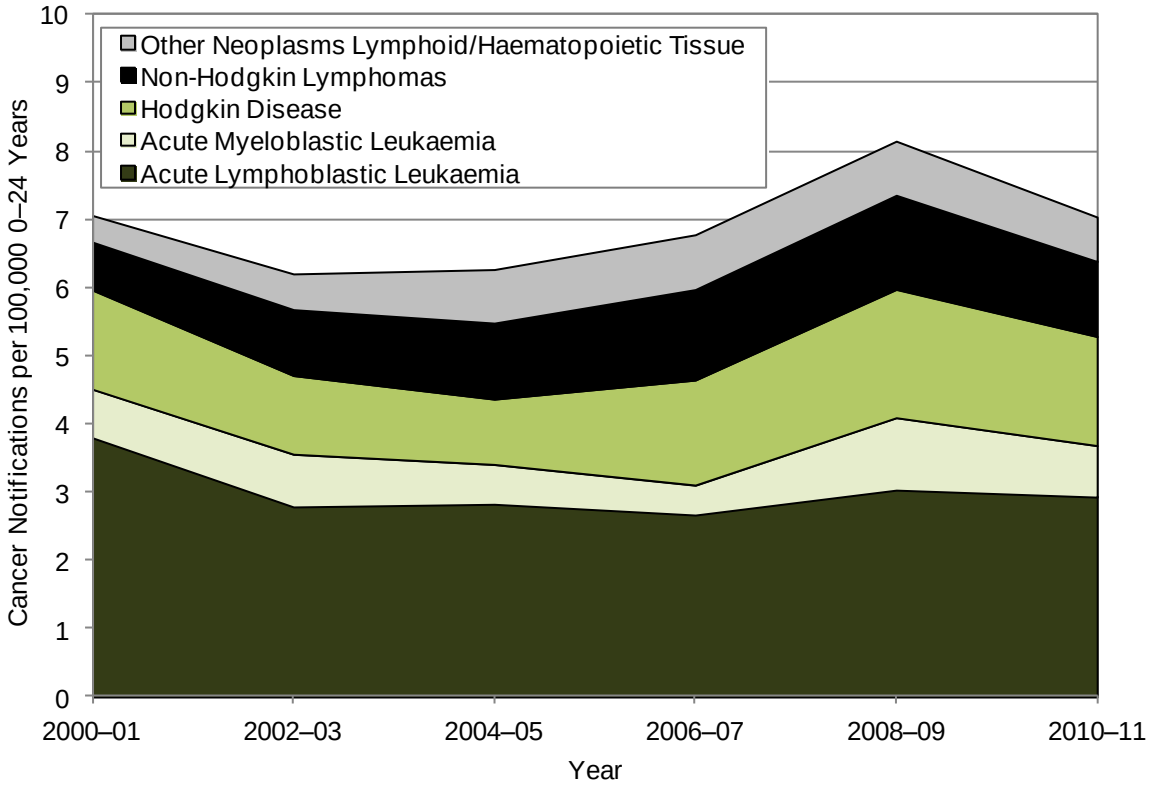
New Zealand Trends

In New Zealand during 2000–2011, acute lymphoblastic leukaemia made the greatest contribution to NZ Cancer Registry notifications for neoplasms of the lymphoid and haematopoietic tissues, followed by Hodgkin disease. Trends for individual neoplasms in this category varied during this period (**Figure 1**).

Distribution by Age

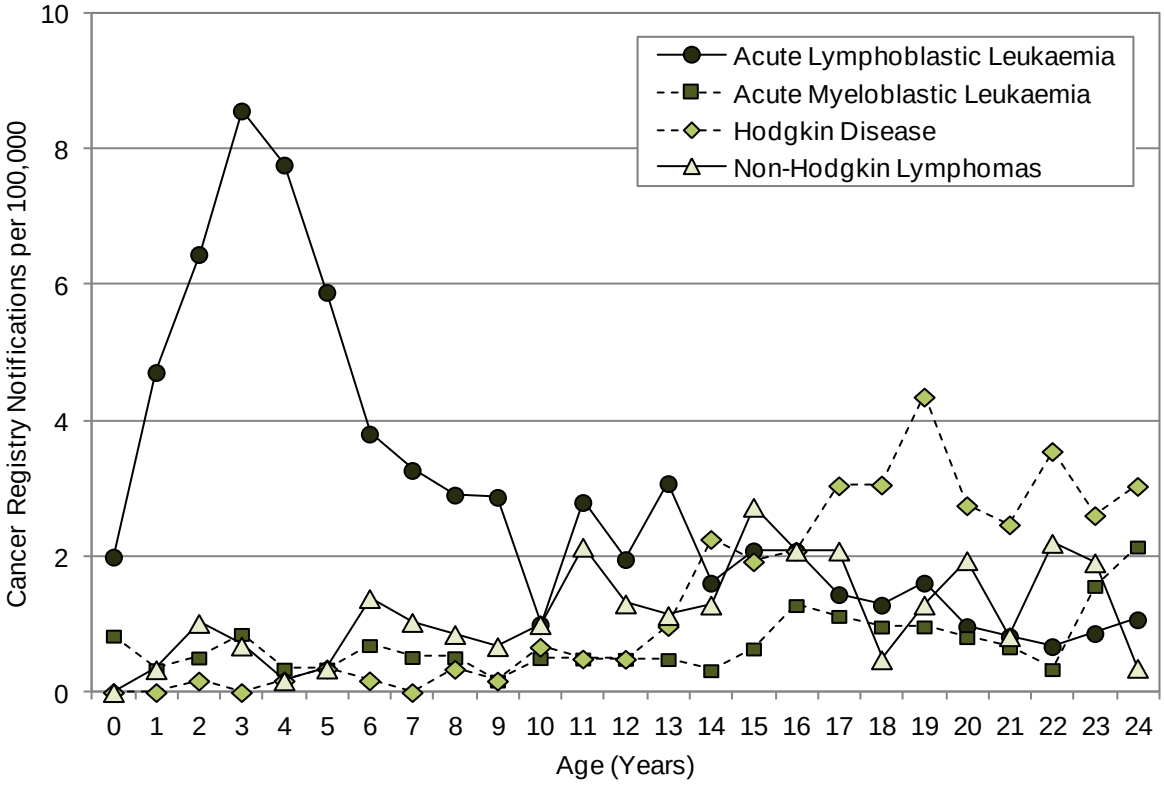
In New Zealand during 2002–2011, NZ Cancer Registry notifications for acute lymphoblastic leukaemia increased during infancy, reached a peak at three years of age and then declined, with the highest rates being seen in those aged 2–5 years. In contrast, notifications for Hodgkin disease were more frequent amongst those in their late teens and early twenties (**Figure 2**).

Figure 1. NZ Cancer Registry Notifications for Cancers of the Lymphoid/Haematopoietic Tissues in Children and Young People Aged 0–24 Years, New Zealand 2000–2011



Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

Figure 2. NZ Cancer Registry Notifications for Cancers of the Lymphoid/Haematopoietic Tissues in Children and Young People by Age, New Zealand 2002–2011



Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

Distribution by Prioritised Ethnicity and Gender

In New Zealand during 2002–2011, there were no *significant* ethnic or gender differences in NZ Cancer Registry notifications for acute lymphoblastic leukaemia, although notifications for Hodgkin disease were *significantly* higher for European/Other children and young people than for those from other ethnic groups (**Table 3**).

Table 3. NZ Cancer Registry Notifications for Acute Lymphoblastic Leukaemia and Hodgkin Disease in Children and Young People Aged 0–24 Years by Gender and Ethnicity, New Zealand 2002–2011

Variable	Notifications: Total Number 2002–2011	Notifications: Annual Average	Notifications per 100,000	Rate Ratio	95% CI
Acute Lymphoblastic Leukaemia					
Gender					
Female	192	19.2	2.63	1.00	
Male	233	23.3	3.06	1.16	0.96–1.41
Prioritised Ethnicity					
Asian/Indian	44	4.4	2.78	0.99	0.72–1.37
European/Other	242	24.2	2.80	1.00	
Māori	85	8.5	2.53	0.90	0.70–1.15
Pacific	49	4.9	3.72	1.33	0.98–1.80
Hodgkin Disease					
Gender					
Female	106	10.6	1.45	1.00	
Male	107	10.7	1.41	0.97	0.74–1.26
Prioritised Ethnicity					
Asian/Indian	8	0.8	0.51	0.27	0.13–0.55
European/Other	161	16.1	1.86	1.00	
Māori	28	2.8	0.83	0.45	0.30–0.67
Pacific	10	1.0	0.76	0.41	0.21–0.77

Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

Malignant Melanoma and Melanoma In Situ

New Zealand Trends

In New Zealand during 2000–2011, malignant melanoma of the skin was more frequently notified to the NZ Cancer Registry than melanoma in situ. Notification rates for malignant melanoma of the skin were variable during the early 2000s, but became relatively static from 2004–05 onwards (**Figure 3**).

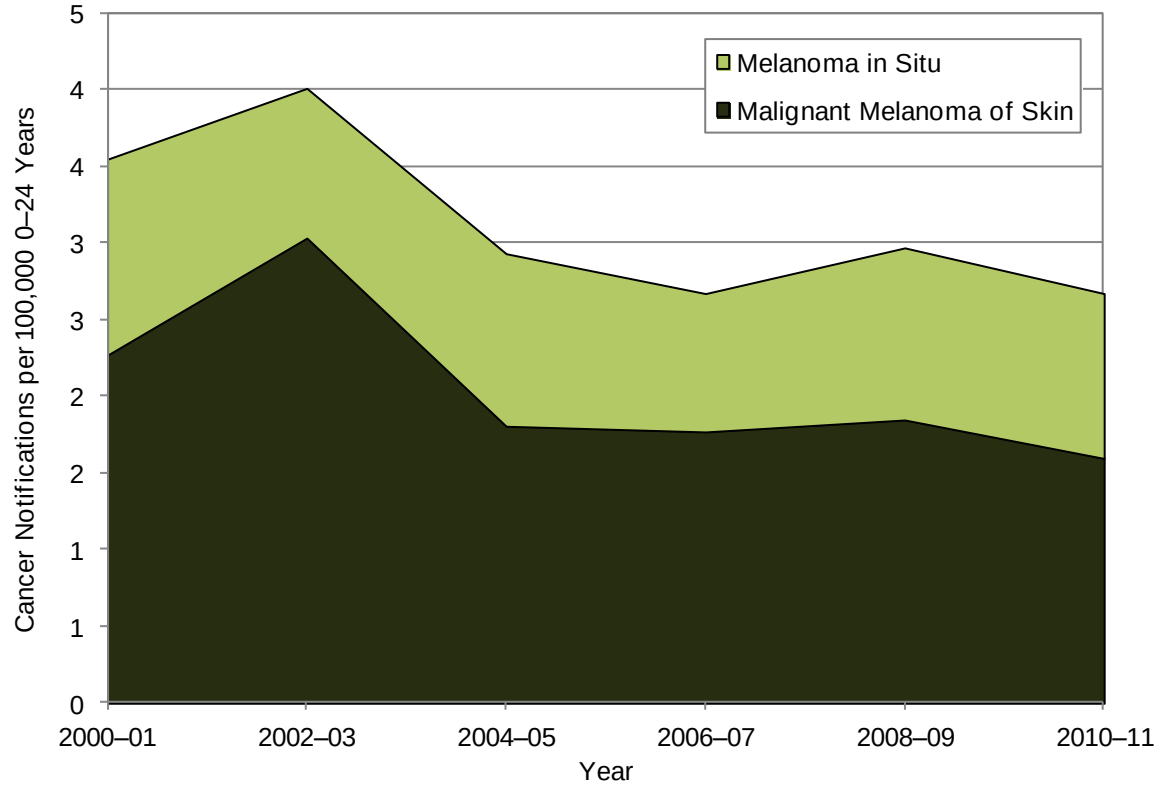
Distribution by Age

In New Zealand during 2002–2011, NZ Cancer Registry notifications for malignant melanoma and melanoma in situ were infrequent during childhood but increased during adolescence, with the highest rates being seen amongst those in their late teens and early twenties (**Figure 4**).

Distribution by Prioritised Ethnicity and Gender

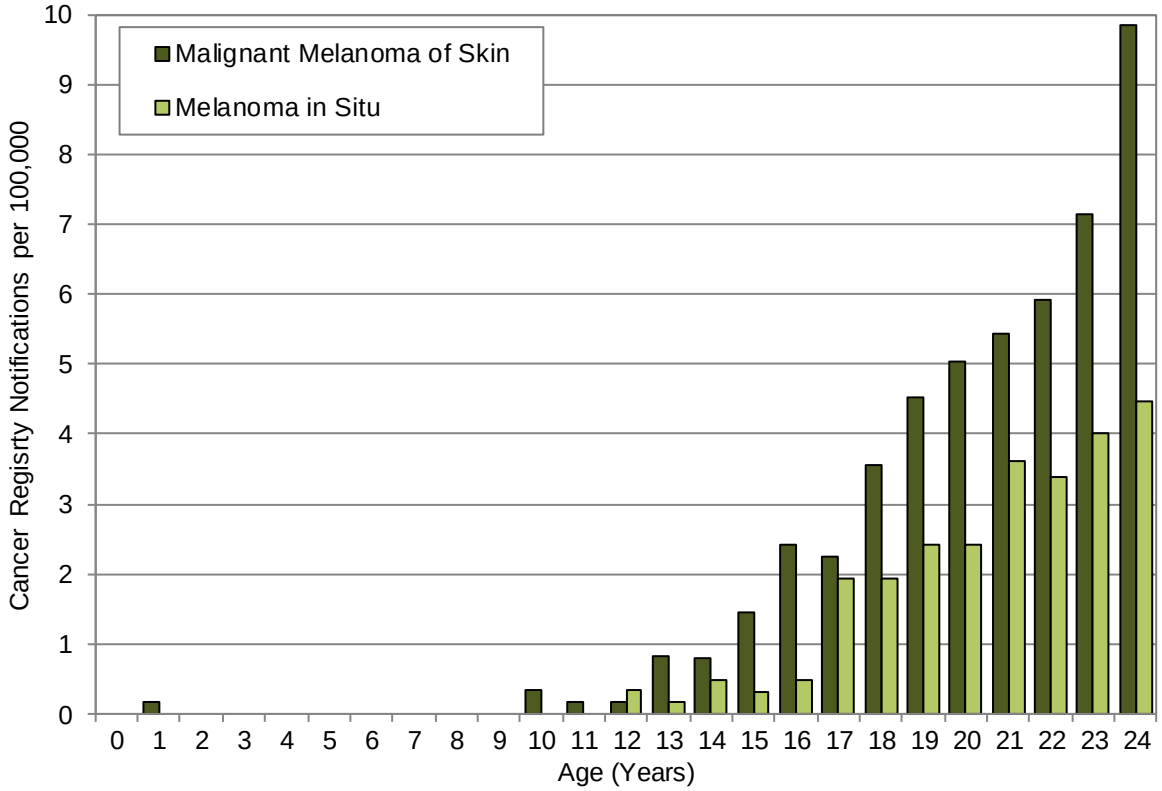
In New Zealand during 2002–2011, NZ Cancer Registry notifications for malignant melanoma and melanoma in situ were *significantly* higher for females and for European/Other children and young people, than for children and young people from other ethnic groups (**Table 4**).

Figure 3. NZ Cancer Registry Notifications for Malignant Melanoma and Melanoma In Situ in Children and Young People Aged 0–24 Years, New Zealand 2000–2011



Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

Figure 4. NZ Cancer Registry Notifications for Malignant Melanoma and Melanoma In Situ in Children and Young People by Age, New Zealand 2002–2011



Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

Table 4. NZ Cancer Registry Notifications for Malignant Melanoma and Melanoma In Situ in Children and Young People Aged 0–24 Years by Gender and Ethnicity, New Zealand 2002–2011

Variable	Notifications: Total Number 2002–2011	Notifications: Annual Average	Notifications per 100,000	Rate Ratio	95% CI
Malignant Melanoma and Melanoma In Situ					
Gender					
Female	268	26.8	3.68	1.00	
Male	185	18.5	2.43	0.66	0.55–0.80
Prioritised Ethnicity					
Asian/Indian	6	0.6	0.38	0.08	0.04–0.19
European/Other	390	39.0	4.52	1.00	
Māori	15	1.5	0.45	0.10	0.06–0.17
Pacific	3	0.3	0.23	0.05	0.02–0.16

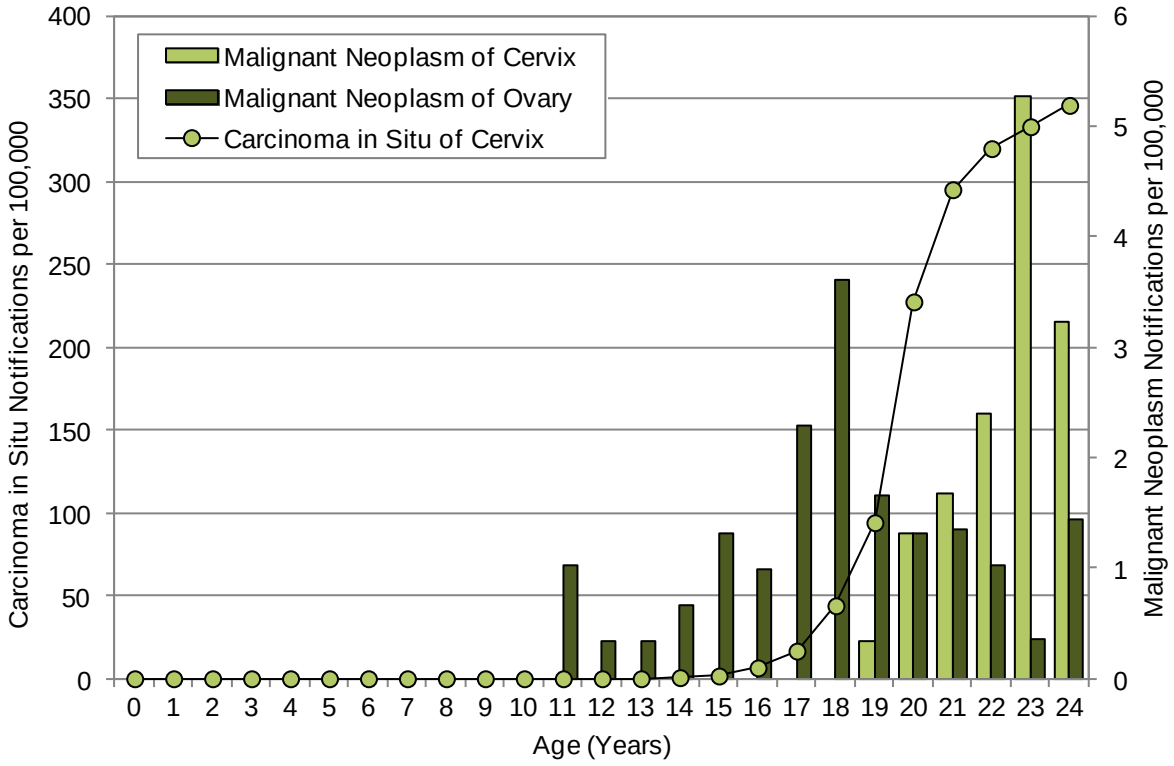
Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

Cancers of the Cervix and Ovaries

Distribution by Age

In New Zealand during 2002–2011, NZ Cancer Registry notifications for carcinoma in situ of the cervix were relatively infrequent during early adolescence, but increased rapidly thereafter, with the highest rates being seen amongst those in their early twenties. Similarly, the majority of notifications for cancer of the cervix were for those in their early twenties. Notifications for cancers of the ovaries occurred from 11 years of age onwards (**Figure 5**).

Figure 5. NZ Cancer Registry Notifications for Cancer and Carcinoma In Situ of the Cervix and Cancer of the Ovary in Children and Young People by Age, New Zealand 2002–2011



Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Female Population (projected from 2007)

Distribution by Prioritised Ethnicity

In New Zealand during 2002–2011, NZ Cancer Registry notifications for carcinoma in situ of the cervix were *significantly* higher for European/Other > Māori > Pacific > Asian/Indian women (**Table 5**). However, caution should be taken when interpreting these figures as it is unclear whether they reflect ethnic differences in the uptake of cervical screening, or the underlying distribution of carcinoma in situ of the cervix in the community.

Table 5. NZ Cancer Registry Notifications for Carcinoma In Situ of the Cervix in Young Women Aged 15–24 Years by Ethnicity, New Zealand 2007–2011

Variable	Notifications: Total Number 2007–2011	Notifications: Annual Average	Notifications per 100,000	Rate Ratio	95% CI
Carcinoma In Situ of the Cervix					
Prioritised Ethnicity					
Asian/Indian	45	9.0	20.70	0.10	0.07–0.13
European/Other	1,845	369.0	208.16	1.00	
Māori	512	102.4	166.50	0.80	0.73–0.88
Pacific	48	9.6	37.78	0.18	0.14–0.24

Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Female Population (projected from 2007).

Other Cancers

New Zealand Trends

In New Zealand during 2000–2011, trends for different cancer types varied (**Figure 6**).

Distribution by Age

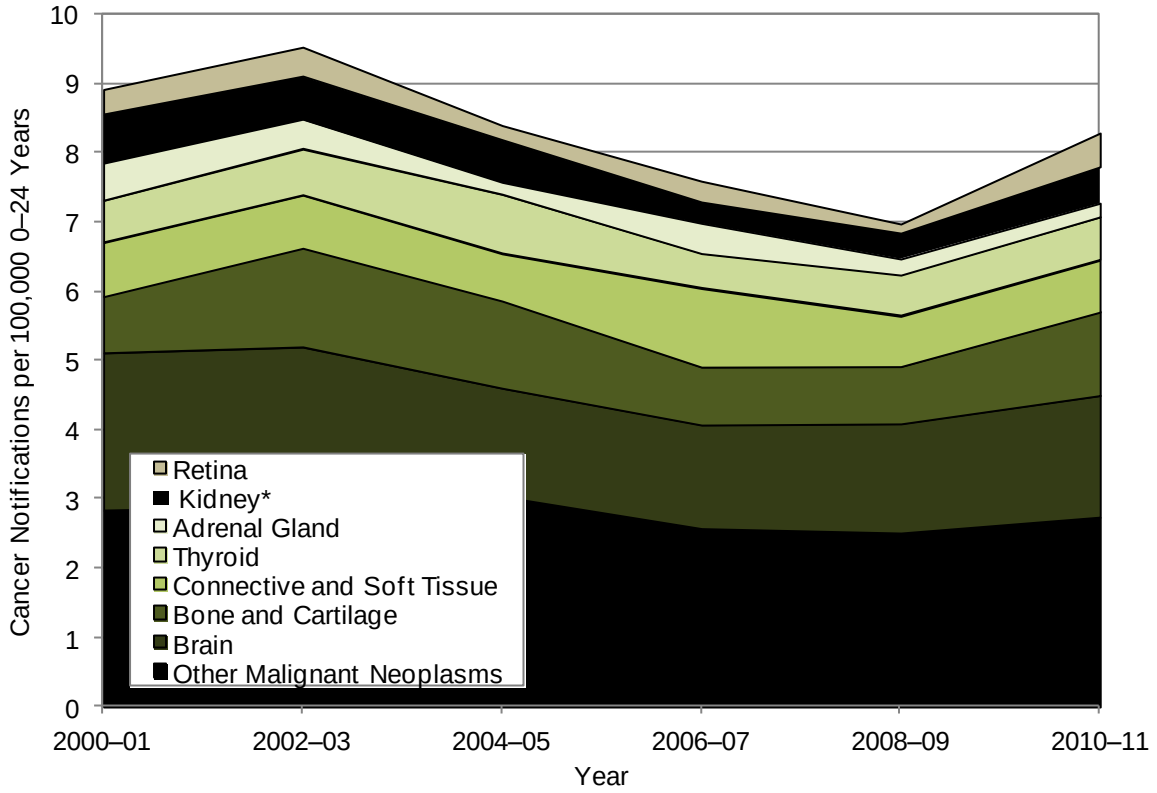
In New Zealand during 2002–2011, NZ Cancer Registry notifications for cancers of the retina were more frequent for those under four years of age, while cancers of the brain were more evenly distributed throughout childhood and adolescence. Cancers of the bone and cartilage were more common after 6 years of age, with the highest rates being seen amongst those in their late teens (**Figure 7**).

Similarly, notifications for cancers of the kidney and adrenal were more common amongst those under eight years of age, while notifications for cancers of the thyroid were more frequent amongst those in their late teens and early twenties (**Figure 8**).

Distribution by Prioritised Ethnicity and Gender

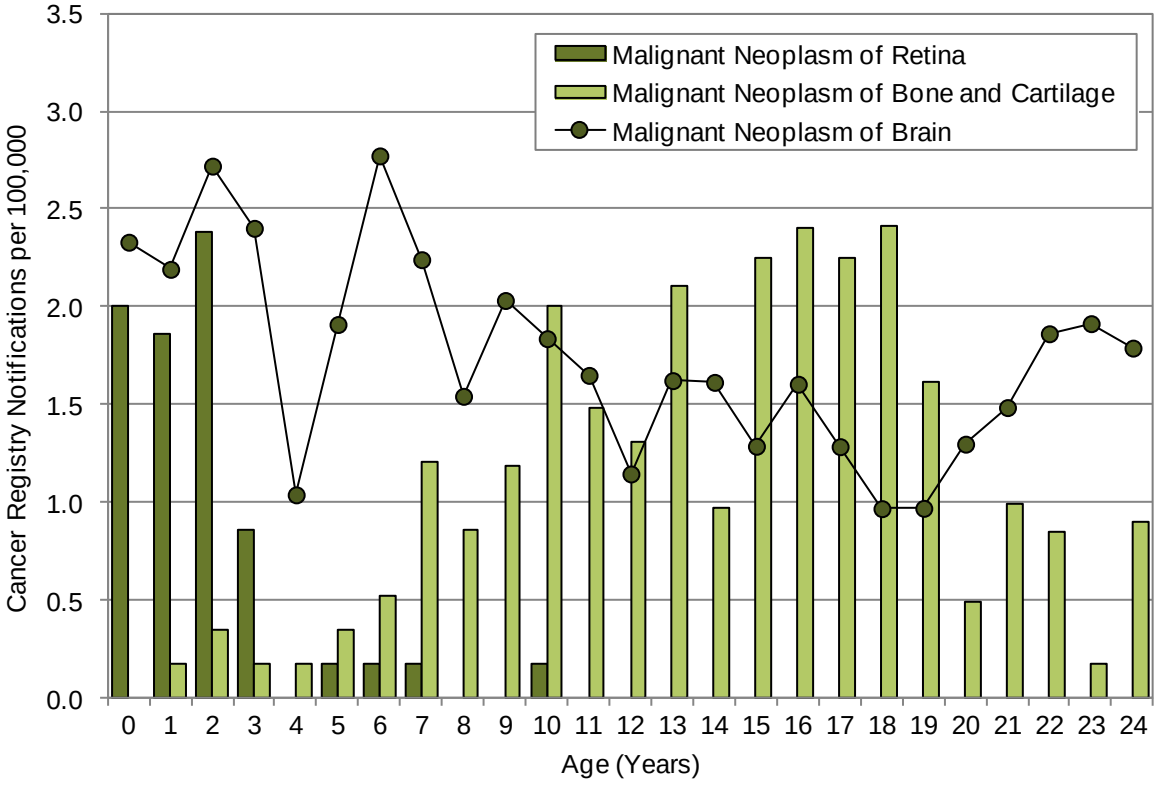
In New Zealand during 2002–2011, there were no *significant* gender differences in NZ Cancer Registry notifications for cancers of the brain, although rates were *significantly* lower for Asian/Indian children and young people, than for European/Other and Pacific children and young people (**Table 6**).

Figure 6. NZ Cancer Registry Notifications for Selected Other Cancers in Children and Young People Aged 0–24 Years, New Zealand 2000–2011



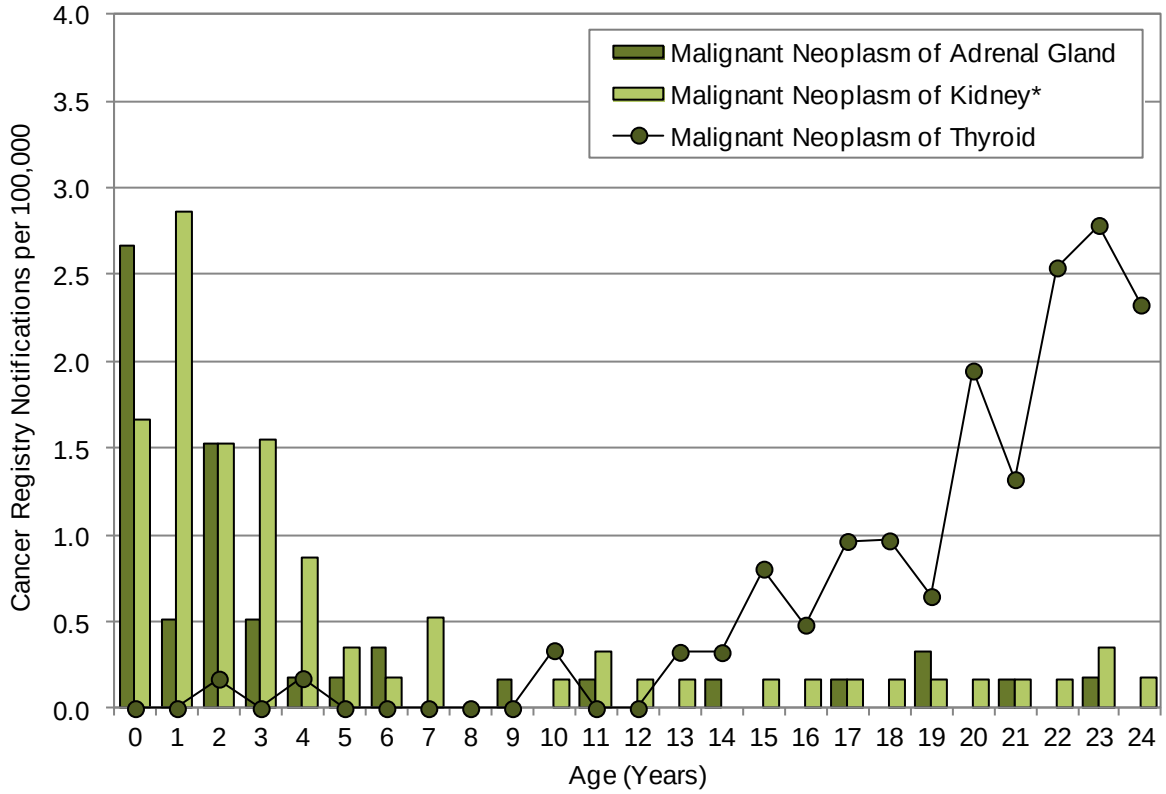
Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: *Malignant Neoplasm of Kidney excludes renal pelvis

Figure 7. NZ Cancer Registry Notifications for Cancers of the Brain, Retina and Bone and Cartilage in Children and Young People by Age, New Zealand 2002–2011



Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

Figure 8. NZ Cancer Registry Notifications for Cancers of the Adrenal, Kidney and Thyroid in Children and Young People by Age, New Zealand 2002–2011



Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: *Malignant Neoplasm of Kidney excludes renal pelvis

Table 6. NZ Cancer Registry Notifications for Cancers of the Brain in Children and Young People Aged 0–24 Years by Gender and Ethnicity, New Zealand 2002–2011

Variable	Notifications: Total Number 2002–2011	Notifications: Annual Average	Notifications per 100,000	Rate Ratio	95% CI
Cancers of the Brain					
Gender					
Female	126	12.6	1.73	1.00	
Male	133	13.3	1.75	1.01	0.79–1.29
Prioritised Ethnicity					
Asian/Indian	12	1.2	0.76	0.40	0.22–0.72
European/Other	163	16.3	1.89	1.00	
Māori	50	5.0	1.49	0.79	0.57–1.08
Pacific	33	3.3	2.50	1.33	0.91–1.93

Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

South Island DHBs Distribution

Cancer Registry Notifications

In the South Island DHBs during 2002–2011, malignant melanomas of the skin and acute lymphoblastic leukaemia were the most frequent malignant neoplasms notified to the NZ Cancer Registry in children and young people. Hodgkin Disease and cancers of the brain, testes, bone and cartilage, and connective and soft tissues also made a contribution. Carcinoma in situ of the cervix however, was the most frequent reason for a NZ Cancer Registry notification in all South Island DHBs (**Table 7**–**Table 10**).

Table 7. NZ Cancer Registry Notifications for Children and Young People Aged 0–24 Years by Cancer Type, Canterbury 2002–2011

Cancer Registry Notifications	Total No. 2002−2011	Annual Average	Rate per 100,000	% of Malignant Neoplasms	% of All Notifications
Canterbury					
Cancers of Lymphoid and Haematopoietic Tissues					
Acute Lymphoblastic Leukaemia	48	4.8	2.96	14.1	4.1
Acute Myeloblastic Leukaemia	12	1.2	0.74	3.5	1.0
Other Myeloid Leukaemias	6	0.6	0.37	1.8	0.5
Hodgkin Disease	29	2.9	1.79	8.5	2.5
Non-Hodgkin Lymphomas	13	1.3	0.80	3.8	1.1
Other Lymphoid/Haematopoietic Neoplasms	7	0.7	0.43	2.1	0.6
Cancers of Reproductive Organs					
Malignant Neoplasm of Testis	23	2.3	2.76	6.7	2.0
Malignant Neoplasm of Ovary	6	0.6	0.76	1.8	0.5
Malignant Neoplasm of Cervix	7	0.7	0.89	2.1	0.6
Other Malignant Neoplasms					
Malignant Melanoma of Skin	52	5.2	3.20	15.2	4.5
Malignant Neoplasm of Brain	30	3.0	1.85	8.8	2.6
Malignant Neoplasm of Bone and Cartilage	15	1.5	0.92	4.4	1.3
Malignant Neoplasm Connective/Soft Tissue	18	1.8	1.11	5.3	1.5
Malignant Neoplasm of Thyroid	13	1.3	0.80	3.8	1.1
Malignant Neoplasm of Kidney*	6	0.6	0.37	1.8	0.5
Malignant Neoplasm of Retina	3	0.3	0.18	0.9	0.3
Malignant Neoplasm of Adrenal Gland	5	0.5	0.31	1.5	0.4
Other Malignant Neoplasms	48	4.8	2.96	14.1	4.1
Total Malignant Neoplasms	341	34.1		100.0	29.2
In Situ Neoplasms or Neoplasms of Uncertain Behaviour					
Carcinoma In Situ of Cervix	789	78.9	99.86		67.7
Melanoma In Situ	22	2.2	1.35		1.9
Other In Situ Neoplasms	8	0.8	0.49		0.7
Neoplasm Uncertain/Unknown Behaviour	6	0.6	0.37		0.5
Total In Situ or Uncertain Behaviour	825	82.5			70.8
Total Cancer Registry Notifications	1,166	116.6			100.0

Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: * Malignant Neoplasm of Kidney excluding renal pelvis; Rates are per 100,000 0–24 years, except for cancers of reproductive organs which are gender-specific (i.e. per 100,000 males or females 0–24 years)

Table 8. NZ Cancer Registry Notifications for Children and Young People Aged 0–24 Years by Cancer Type, Nelson Marlborough and South Canterbury 2002–2011

Cancer Registry Notifications	Total No. 2002−2011	Annual Average	Rate per 100,000	% of Malignant Neoplasms	% of All Notifications
Nelson Marlborough					
Cancers of Lymphoid and Haematopoietic Tissues					
Acute Lymphoblastic Leukaemia	16	1.6	3.82	21.6	6.2
Other Leukaemias	5	0.5	1.19	6.8	1.9
Hodgkin Disease	3	0.3	0.72	4.1	1.2
Non-Hodgkin Lymphomas	5	0.5	1.19	6.8	1.9
Other Lymphoid/Haematopoietic Neoplasms	<3	s	s	s	s
Cancers of Reproductive Organs					
Malignant Neoplasm of Testis	4	0.4	1.84	5.4	1.5
Malignant Neoplasm of Cervix	<3	s	s	s	s
Other Malignant Neoplasms					
Malignant Melanoma of Skin	14	1.4	3.35	18.9	5.4
Malignant Neoplasm of Brain	6	0.6	1.43	8.1	2.3
Malignant Neoplasm of Thyroid	3	0.3	0.72	4.1	1.2
Malignant Neoplasm of Kidney*	3	0.3	0.72	4.1	1.2
Other Malignant Neoplasms	13	1.3	3.11	17.6	5.0
Total Malignant Neoplasms	74	7.4		100.0	28.6
In Situ Neoplasms or Neoplasms of Uncertain Behaviour					
Carcinoma In Situ of Cervix	177	17.7	88.10		68.3
Melanoma In Situ	6	0.6	1.43		2.3
Other In Situ Neoplasms	<3	s	s		s
Neoplasm Uncertain/Unknown Behaviour	<3	s	s		s
Total In Situ or Uncertain Behaviour	185	18.5			71.4
Total Cancer Registry Notifications	259	25.9			100.0
South Canterbury					
Cancers of Lymphoid and Haematopoietic Tissues					
Acute Lymphoblastic Leukaemia	<3	s	s	s	s
Hodgkin Disease	4	0.4	2.37	18.2	3.6
Cancers of Reproductive Organs					
Malignant Neoplasm of Testis	<3	s	s	s	s
Malignant Neoplasm of Ovary	<3	s	s	s	s
Other Malignant Neoplasms					
Malignant Melanoma of Skin	5	0.5	2.97	22.7	4.5
Other Malignant Neoplasms	8	0.8	4.75	36.4	7.3
Total Malignant Neoplasms	22	2.2		100.0	20.0
In Situ Neoplasms					
Carcinoma In Situ of Cervix	85	8.5	105.52		77.3
Melanoma In Situ	3	0.3	1.78		2.7
Total In Situ Neoplasms	88	8.8			80.0
Total Cancer Registry Notifications	110	11.0			100.0

Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: * Malignant Neoplasm of Kidney excluding renal pelvis; Rates are per 100,000 0–24 years, except for cancers of reproductive organs which are gender-specific (i.e. per 100,000 males or females 0–24 years); s: suppressed due to small numbers

Table 9. NZ Cancer Registry Notifications for Children and Young People Aged 0–24 Years by Cancer Type, Otago 2002–2011

Cancer Registry Notifications	Total No. 2002−2011	Annual Average	Rate per 100,000	% of Malignant Neoplasms	% of All Notifications
Otago					
Cancers of Lymphoid and Haematopoietic Tissues					
Acute Lymphoblastic Leukaemia	10	1.0	1.52	8.7	1.9
Acute Myeloblastic Leukaemia	5	0.5	0.76	4.3	1.0
Hodgkin Disease	9	0.9	1.37	7.8	1.7
Non-Hodgkin Lymphomas	11	1.1	1.67	9.6	2.1
Other Lymphoid/Haematopoietic Neoplasms	<3	s	s	s	s
Cancers of Reproductive Organs					
Malignant Neoplasm of Testis	15	1.5	4.52	13.0	2.9
Malignant Neoplasm of Ovary	4	0.4	1.23	3.5	0.8
Other Malignant Neoplasms					
Malignant Melanoma of Skin	24	2.4	3.65	20.9	4.6
Malignant Neoplasm of Brain	13	1.3	1.97	11.3	2.5
Malignant Neoplasm of Bone and Cartilage	4	0.4	0.61	3.5	0.8
Malignant Neoplasm Connective/Soft Tissue	3	0.3	0.46	2.6	0.6
Malignant Neoplasm of Kidney*	3	0.3	0.46	2.6	0.6
Other Malignant Neoplasms	12	1.2	1.82	10.4	2.3
Total Malignant Neoplasms	115	11.5		100.0	21.9
In Situ Neoplasms					
Carcinoma In Situ of Cervix	405	40.5	124.07		77.1
Melanoma In Situ	5	0.5	0.76		1.0
Total In Situ Neoplasms	410	41.0			78.1
Total Cancer Registry Notifications	525	52.5			100.0

Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: * Malignant Neoplasm of Kidney excluding renal pelvis; Rates are per 100,000 0–24 years, except for cancers of reproductive organs which are gender-specific (i.e. per 100,000 males or females 0–24 years); s: suppressed due to small numbers

Table 10. NZ Cancer Registry Notifications for Children and Young People Aged 0–24 Years by Cancer Type, Southland and the West Coast 2002–2011

Cancer Registry Notifications	Total No. 2002−2011	Annual Average	Rate per 100,000	% of Malignant Neoplasms	% of All Notifications
Southland					
Cancers of Lymphoid and Haematopoietic Tissues					
Acute Lymphoblastic Leukaemia	6	0.6	1.64	9.4	2.8
Other Leukaemias	4	0.4	1.09	6.3	1.9
Hodgkin Disease	9	0.9	2.46	14.1	4.2
Non-Hodgkin Lymphomas	4	0.4	1.09	6.3	1.9
Other Lymphoid/Haematopoietic Neoplasms	<3	s	s	s	s
Cancers of Reproductive Organs					
Malignant Neoplasm of Testis	4	0.4	2.11	6.3	1.9
Malignant Neoplasm of Cervix	<3	s	s	s	s
Other Malignant Neoplasms					
Malignant Neoplasm of Brain	9	0.9	2.46	14.1	4.2
Malignant Neoplasm of Bone and Cartilage	6	0.6	1.64	9.4	2.8
Malignant Neoplasm of Thyroid	3	0.3	0.82	4.7	1.4
Other Malignant Neoplasms	16	1.6	4.37	25.0	7.5
Total Malignant Neoplasms	64	6.4		100.0	29.9
In Situ Neoplasms					
Carcinoma In Situ of Cervix	146	14.6	82.69		68.2
Melanoma In Situ	<3	s	s		s
Other In Situ Neoplasms	<3	s	s		s
Total In Situ Neoplasms	150	15.0			70.1
Total Cancer Registry Notifications	214	21.4			100.0
West Coast					
Cancers of Lymphoid and Haematopoietic Tissues					
Acute Lymphoblastic Leukaemia	4	0.4	3.97	33.3	6.3
Hodgkin and Non-Hodgkin Lymphomas	3	0.3	2.98	25.0	4.8
Lymphoid/Haematopoietic Neoplasms	<3	s	s	s	s
Other Malignant Neoplasms					
Other Malignant Neoplasms	3	0.3	2.98	25.0	4.8
Total Malignant Neoplasms	12	1.2		100.0	19.0
In Situ Neoplasms					
Carcinoma In Situ of Cervix	48	4.8	99.25		76.2
Melanoma In Situ	<3	s	s		s
Other In Situ Neoplasms	<3	s	s		s
Total In Situ Neoplasms	51	5.1			81.0
Total Cancer Registry Notifications	63	6.3			100.0

Source: Numerator: NZ Cancer Registry; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Rates are per 100,000 0–24 years, except for cancers of reproductive organs which are gender-specific (i.e. per 100,000 males or females 0–24 years); s: suppressed due to small numbers

Cancer Deaths

In the South Island DHBs during 2001–2010, acute lymphoblastic leukaemia and cancers of the brain and bone and cartilage were the leading causes of cancer related mortality in children and young people (**Table 11**, **Table 12**).

Table 11. Cancer Deaths in Children and Young People Aged 0–24 Years by Cancer Type, Nelson Marlborough, South Canterbury, Canterbury and the West Coast DHBs 2001–2010

Cancer Deaths	Total No. 2001−2010	Annual Average	Rate per 100,000	% of Cancer Deaths
Nelson Marlborough				
Cancers of Lymphoid and Haematopoietic Tissues				
All Leukaemias	3	0.3	0.72	23.1
Other Lymphoid/Haematopoietic Neoplasms	<3	s	s	s
Other Malignant Neoplasms				
Malignant Neoplasm of Brain	<3	s	s	s
Malignant Neoplasms Bone and Cartilage	<3	s	s	s
Other Malignant Neoplasms	5	0.5	1.20	38.5
Total: All Cancer Deaths	13	1.3		100.0
South Canterbury				
Malignant Neoplasm of Brain	<3	s	s	s
Total: All Cancer Deaths	<3	s	s	s
Canterbury				
Cancers of Lymphoid and Haematopoietic Tissues				
Acute Lymphoblastic Leukaemia	6	0.6	0.37	9.5
Acute Myeloblastic and Other Leukaemias	5	0.5	0.31	7.9
Hodgkin and Non-Hodgkin Lymphomas	<3	s	s	s
Cancers of Reproductive Organs				
Malignant Neoplasm of Testis	3	0.3	0.36	4.8
Malignant Neoplasm of Ovary	<3	s	s	s
Other Malignant Neoplasms				
Malignant Neoplasm of Brain	13	1.3	0.81	20.6
Malignant Neoplasms Bone and Cartilage	5	0.5	0.31	7.9
Malignant Neoplasm of Adrenal Gland	3	0.3	0.19	4.8
Malignant Melanoma of Skin	4	0.4	0.25	6.3
Other Malignant Neoplasms	20	2.0	1.24	31.7
Benign Neoplasms				
Benign Neoplasms	<3	s	s	s
Total: All Cancer Deaths	63	6.3		100.0
West Coast				
Neoplasms Lymphoid/Haematopoietic Tissues	<3	s	s	s
Other Malignant Neoplasms	3	0.3	2.98	60.0
Total: All Cancer Deaths	5	0.5		100.0

Source: Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Rates are per 100,000 0–24 years, except for cancers of reproductive organs which are gender-specific (i.e. per 100,000 males or females 0–24 years); s: suppressed due to small numbers

Table 12. Cancer Deaths in Children and Young People Aged 0–24 Years by Cancer Type, Otago and Southland 2001–2010

Cancer Deaths	Total No. 2001−2010	Annual Average	Rate per 100,000	% of Cancer Deaths
Otago				
Cancers of Lymphoid and Haematopoietic Tissues				
All Leukaemias	3	0.3	0.46	15.8
Other Lymphoid/Haematopoietic Neoplasms	<3	s	s	s
Cancers of Reproductive Organs				
Malignant Neoplasm of Testis	<3	s	s	s
Other Malignant Neoplasms				
Malignant Neoplasm of Brain	5	0.5	0.76	26.3
Other Malignant Neoplasms	8	0.8	1.22	42.1
Benign Neoplasms or Neoplasms of Uncertain Behaviour				
Neoplasm Uncertain/Unknown Behaviour	<3	s	s	s
Total: All Cancer Deaths	19	1.9		100.0
Southland				
Cancers of Lymphoid and Haematopoietic Tissues				
All Leukaemias	3	0.3	0.82	21.4
Hodgkin and Non-Hodgkin Lymphomas	<3	s	s	s
Other Malignant Neoplasms				
Malignant Neoplasm of Brain	3	0.3	0.82	21.4
Malignant Neoplasms Bone and Cartilage	3	0.3	0.82	21.4
Other Malignant Neoplasms	<3	s	s	s
Benign Neoplasms				
Benign Neoplasms	<3	s	s	s
Total: All Cancer Deaths	14	1.4		100.0

Source: Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Rates are per 100,000 0–24 years, except for cancers of reproductive organs which are gender-specific (i.e. per 100,000 males or females 0–24 years); s: suppressed due to small numbers

Local Policy Documents and Evidence-Based Reviews Relevant to Cancer in Children and Young People

In New Zealand, a small number of policy documents are relevant to the management of children and young people with cancer and these are reviewed in **Table 13**, along with a range of international guidelines and reviews which consider these issues in the overseas context. Note: The efficacy of particular therapeutic agents in the management of specific types of cancer in children and young people is beyond the scope of this review, with the focus of the table below being on broader management principles only.

Table 13. Local Policy Documents and Evidence-Based Reviews Relevant to Cancer in Children and Young People

Ministry of Health Policy Documents
Ministry of Health. 2012. **Guidance for integrated paediatric palliative care services in New Zealand.** Wellington: Ministry of Health. http://www.health.govt.nz/system/files/documents/publications/guidance-integrated-paediatric-palliative-care-services-nz.pdf This guidance was commissioned by the Ministry of Health to help improve the integration of palliative care service delivery to children and young people in New Zealand, especially to those who live outside Auckland (where many specialist services for children are concentrated). It aims to provide a starting point starting point for the development of paediatric palliative care services, and to act as a resource. It examines paediatric palliative care services, both internationally and in New Zealand and, and uses the insights gained as the basis for a proposed framework for the development of a coherent, integrated and co-ordinated system of paediatric palliative care service delivery.
Ministry of Health. 2012**. Protecting Children with Cancer from Measles.** Wellington: Ministry of Health. http://www.health.govt.nz/system/files/documents/publications/protecting-children-with-cancer-from-measles.pdf Children and young people receiving cancer treatment are especially vulnerable to illnesses such as measles because chemotherapy greatly reduces their immunity and means their previous vaccinations are no longer effective. They cannot be re-vaccinated during their treatment because the measles vaccine contains live virus. Measles has around a 50% fatality rate in children with low immunity. This booklet contains the stories of four young people with cancer and the impact the 2011 Auckland measles outbreak has had on them and their families plus viewpoints from two paediatric oncologists. The booklet stresses the point that the whole community needs to be immunised to protect these children.
Ministry of Health. 2010. **National Plan for Child Cancer Services in New Zealand**. Wellington: Ministry of Health. http://www.health.govt.nz/system/files/documents/publications/national-plan-child-cancer-services-nz-dec11.pdf The National Child Cancer Services Plan was developed with the aim of strengthening services by achieving national agreement on the service delivery model for child cancer services. It recognises the challenges presented by New Zealand's relatively small and dispersed population. The plan recommends that there be two specialist paediatric oncology centres, at Starship Children's Hospital in Auckland DHB and Christchurch Hospital in Canterbury DHB and that these centres make shared care arrangements with other DHBs. This service arrangement is considered to achieve the best balance between the need for access for families and whānau, and the need for consolidation to support a scarce paediatric oncology workforce and best clinical practice.
New Zealand Guidelines
New Zealand Guidelines Group (NZGG). 2009. **Suspected Cancer in Primary Care: Guidelines for investigation, referral and reducing ethnic disparities**. Wellington: New Zealand Guidelines Group. http://www.health.govt.nz/system/files/documents/publications/suspected-cancer-guideline-sep09.pdf This guideline is intended for primary care practitioners to help them to recognise the signs and symptoms suggestive of a cancer diagnosis, make a timely referral to specialist services when cancer is suspected, and be aware of the investigations that may be appropriate to undertake in the primary care setting. Chapter 14 deals with cancer in children and young people. It provides general recommendations for the specific cancers leukaemia, lymphoma, brain and central nervous system (CNS) tumours, neuroblastoma, Wilms' tumour, soft tissue sarcoma, bone sarcomas and retinoblastoma. A brief 2-page summary of key evidence-based recommendations and good practice points for selected site-specific cancers can be found here: http://www.health.govt.nz/system/files/documents/publications/suspected_cancer.pdf This guideline draws on the 2005 NICE guideline *Clinical Guideline 27: Referral Guidelines for Suspected Cancer*, which can be found at http://guidance.nice.org.uk/CG27/Guidance. The section on ovarian cancer was updated in 2011.
Australian Cancer Network Melanoma Guidelines Revision Working Party. 2008. **Clinical Practice Guidelines for the Management of Melanoma in Australia and New Zealand**. The Cancer Council Australia and Australian Cancer Network, Sydney and New Zealand Guidelines Group, Wellington http://www.health.govt.nz/publication/clinical-practice-guidelines-management-melanoma-australia-and-new-zealand Chapter 25 in this guideline provides brief guidance on melanoma in children and Chapter 26, on melanoma and pregnancy, including hormone replacement therapy and oral contraceptives.

International Guidelines
Kremer LC, Mulder RL, Oeffinger KC, et al. 2013. **A worldwide collaboration to harmonize guidelines for the long-term follow-up of childhood and young adult cancer survivors: a report from the International Late Effects of Childhood Cancer Guideline Harmonization Group**. Pediatr Blood Cancer, 60(4), 543-9. This paper reports on an international initiative to promote collaboration and avoid duplication of effort in the development of clinical practice guidelines for long-term follow-up of childhood and young adult cancer survivors, known as the International Late Effects of Childhood Cancer Guideline Harmonization Group. It states that currently there are four such guidelines, independently developed and published by the North American Children's Oncology Group (2008, below), the Dutch Childhood Oncology Group (2008), the United Kingdom's Children's Cancer and Leukaemia Group (2005 http://cclg.org.uk/dynamic_files/LTFU-full.pdf) and the Scottish Intercollegiate Guidelines Network (2013, below).
Scottish Intercollegiate Guidelines Network. 2013. **Long term follow up of survivors of childhood cancer**. http://www.sign.ac.uk/pdf/sign132.pdf The five-year survival rate for child cancer is now around 80% and this has led to an increasing population of adult survivors of childhood cancer. These survivors are at risk of premature death and a range of physical and psychosocial problems as a result of their cancer and its treatment. Lifelong follow-up is considered to be best practice. This guideline is an update and substantial revision of an earlier SIGN guideline. It is intended for primary care staff and those who work in long-term follow-up clinics. It provides recommendations based on current evidence for best practice in identification, assessment and management of late effects in childhood cancer survivors. The recommendations are graded according to the strength of the supporting evidence (not their clinical importance) and grouped under the following headings: subsequent primary cancers, fertility issues, cardiac effects, bone health and metabolic syndrome.
Loren AW, Mangu PB, Beck LN, et al. 2013. **Fertility Preservation for Patients With Cancer: American Society of Clinical Oncology Clinical Practice Guideline Update**. Journal of Clinical Oncology, 31(19), 2500–10. This guideline is an update of the 2006 American Society of Clinical Oncology (ASCO) guideline. It addresses four clinical questions: (1) Are patients with cancer interested in interventions to preserve fertility? (2) What is the quality of evidence supporting current and forthcoming options for preservation of fertility in males? (3) What is the quality of evidence supporting current and forthcoming options for preservation of fertility in females? (4) What is the role of the oncologist in advising patients about fertility preservation options? The guideline also gives special attention to the fertility preservation needs of children. It is based on a systematic review of the literature published from March 2006 through to January 2013. In total there were 222 new publications meeting the review's inclusion criteria: 18 RCTs, 16 systematic reviews, meta-analyses or previous guidelines and many narrative reviews, case series, case studies and editorials. The guidelines recommend that, where infertility is a potential risk of cancer therapy, fertility preservation should be discussed with all patients of reproductive age and with the parents or guardians of children and adolescents, and a referral to a reproductive specialist should be offered. They state that, at present, fertility preservation (semen cryopreservation and oocyte cryopreservation) is an established technology only for post-pubertal individuals and that methods for pre-pubertal children are still experimental.
Dupuis L L, Boodhan S, Holdsworth M, et al. 2012. **Guideline for the Prevention of Acute Nausea and Vomiting due to Antineoplastic Medication in Pediatric Cancer Patients**. Toronto: Pediatric Oncology Group of Ontario. http://www.pogo.ca/_media/File/guidelines/POGO_Acute_AINV_Full_Guideline_Feb_28_2013.pdf Antineoplastic-induced nausea and vomiting (ANIV) is a common problem for children being treated for cancer. This guideline deals with prevention of AINV in the acute phase (occurring within 24 hours of administration of an antineoplastic agent). It is intended for healthcare personnel who care for children aged 1 month to 18 years who are receiving antineoplastic medication. It is based on a review of existing guidelines and a comprehensive literature search for relevant primary pediatric studies and adapted from two existing guidelines primarily focussed on adult patients: Tipton JM, McDaniel RW. Barbour L, Johnston MP, Kayne M. LeRoy P, Ripple ML. **Putting Evidence Into Practice: Evidence-Based Interventions to Prevent, Manage, and Treat Chemotherapy-Induced Nausea and Vomiting**. Clinical Journal of Oncology Nursing. 2007;11(1):69-78. Kris MG, Hesketh PJ, Somerfield MR, Feyer P, Clark-Snow R, Koeller JM, Morrow GR, Chinnery LW, Chesney MJ, Gralla RJ, Grunberg SM. American Society of Clinical Oncology **Guidelines for Antiemetics in Oncology**: Update 2006. Journal of Clinical Oncology 2006;24(18):2932-47. http://jco.ascopubs.org/content/24/18/2932.full.pdf+html Meta-analysis of primary study results was performed when feasible. For each of the six clinical questions addressed there is a summary table giving a list of recommendations. Each recommendation is accompanied by an indication of the strength of the recommendation and the quality of the evidence. Where there were suitable relevant studies identified, there is also a table giving a summary of the results of synthesis of studies. A brief summary of the guideline can be found here: http://www.pogo.ca/_media/File/guidelines/POGO_Acute_AINV_Guideline_Quick_Summary_Feb_21_2013.pdf

Alberta Provincial Tumour Council. 2012. **Influenza immunization for adult and pediatric patients undergoing cancer treatment**. Edmonton (Alberta): Alberta Health Services. http://www.albertahealthservices.ca/hp/if-hp-cancer-guide-supp002-vaccination.pdf

This Canadian guideline provides detailed recommendations for influenza immunisation in adult and paediatric patients with cancer and also a discussion of the research evidence. The guideline states that, in general, there is scant evidence from well-controlled studies on influenza immunisation in adult and child cancer patients and that recommendations are based, in part, on data extrapolated from healthy populations together with the best practices and opinions of experts in Alberta. Appendix B provides tables summarising the research evidence. These guidelines recommend that all paediatric cancer patients aged six months or older should have annual administration of the inactivated influenza vaccine. They strongly recommend annual influenza immunisation of family members, out-of-home caregivers, and hospital or clinic staff in contact with child cancer patients.

National Institute for Health and Care Excellence. 2012. **Neutropenic sepsis: prevention and management of neutropenic sepsis in cancer patients**. London: National Institute for Health and Care Excellence. http://www.nice.org.uk/nicemedia/live/13905/60866/60866.pdf

Neutropenic sepsis is a potentially fatal complication of cancer treatment, particularly chemotherapy. It has a higher mortality in children and young people than in adults. It occurs when a person whose natural defences against infection (the white blood cells produced by the bone marrow) have been suppressed by chemotherapy or radiotherapy acquires an infection that their body cannot fight off. This guideline aims to improve management of this complication by providing evidence-based recommendations for prevention, identification and management. It is an abbreviated version of the full guideline:

National Collaborating Centre for Cancer. 2012. **Neutropenic sepsis: prevention and management of neutropenic sepsis in cancer patients (full guideline)**. London: National Collaborating Centre for Cancer. http://www.nice.org.uk/nicemedia/live/13905/60864/60864.pdf

Within these guidelines are a series of clinical questions relating to key clinical issues. For each question there is a summary of the research evidence (relating to both clinical and cost effectiveness) and recommendations. Where this was possible data from multiple studies was combined in a meta-analysis and synthesised into a GRADE “evidence profile” (for more information on this process, see http://www.gradeworkinggroup.org/). The evidence profile shows, for each outcome, an overall assessment of both the quality of the evidence as a whole (low, moderate or high) as well as an estimate of the size of effect. For each question there is also a LETR (Linking Evidence to Recommendations) statement which is intended to explain to the reader how the final recommendations were arrived at. The LETR statement usually covers: the relative value placed on the outcomes considered; the strength of evidence about benefits and harms for the intervention being considered; the costs and cost-effectiveness of an intervention; the quality of the evidence (see GRADE); the degree of consensus within the Guideline Development Group; and other considerations such as equalities issues.

Lehrnbecher T, Phillips R, Alexander S, et al. 2012. **Guideline for the management of fever and neutropenia in children with cancer and/or undergoing hematopoietic stem-cell transplantation**. J Clin Oncol 30(35) 4427-38. http://jco.ascopubs.org/content/30/35/4427.full

Febrile neutropenia (FN, fever in association with a low white blood cell count) is a common complication in children receiving cancer treatment. These guidelines were produced by The International Pediatric Fever and Neutropenia Guideline Panel which included representatives from oncology, infectious disease, nursing, and pharmacy, as well as a patient advocate, from 10 different countries. They address a number of clinical questions related to assessing the level of risk associated with an episode of FN, on-going management of FN from 24 to 72 hours after initiation of empiric antibacterial treatment, and empiric antifungal treatment more than 96 hours after initiation of empiric antibacterial treatment. For each question members of the panel undertook a literature review and used the Grades of Recommendation Assessment, Development, and Evaluation (GRADE) approach to generate summaries and classify the evidence as high, moderate, low, or very low based on methodological considerations. Each recommendation is accompanied by grades indicating the strength of the recommendation and the quality of the evidence.

National Institute for Health and Clinical Excellence. 2011. **Skin cancer prevention: information, resources and environmental changes**. London: National Institute for Health and Clinical Excellence. http://www.nice.org.uk/nicemedia/live/13310/52562/52562.pdf

This guidance is intended for health sector personnel and others who have a role in, and responsibility for, preventing skin cancer, for example GPs, pharmacists, practice nurses, school nurses and those responsible for employee health and wellbeing. The recommendations in the guidance aim to raise awareness and maintain knowledge about the risks of UV exposure and to influence attitudes and prompt behaviour change. They cover: delivery of national mass-media campaigns and local information provision; how to develop and evaluate information campaigns and interventions; the factual content of information; the tone of messages and how to tailor them for specific audiences; the workplace, and especially protecting children, young people and outdoor workers; and provision of shade as part of the design of new buildings Appendix C lists the evidence statements underpinning the recommendations.

Dupuis L L, Boodhan S, Sung L, et al. 2010. **Guideline for Classification of the Acute Emetogenic Potential of Antineoplastic Medication in Pediatric Cancer Patients** Toronto: Pediatric Oncology Group of Ontario. http://www.pogo.ca/_media/File/guidelines/POGO%20Emetogenicity%20Classification%20Guideline%20Final-rev-%20250111.pdf

Antineoplastic-induced nausea and vomiting (AINV) is distressing for all cancer patients, including children. This guideline is intended to provide physicians, nurses, pharmacists and other health care providers who care for children (aged 1 month to 18 years) receiving antineoplastic medication with a way to assess the potential of antineoplastic regimens to produce acute ANIV, i.e. ANIV within 24 hours of administration. It is most applicable to children who are receiving their first course of anti-neoplastic drugs. It considers the emetogenic potential of both single agents and multi-agent regimens given over either single or multiple days. The guidelines are based on National Comprehensive Cancer Network's (NCCN) guideline for adults "Antiemesis v.2 2008", and a comprehensive literature review. For each clinical question there is a summary table with brief details of the relevant studies and an assessment of the level of evidence and a grade of recommendation (the grading scheme is explained in Appendix C).

A short summary version of this guideline can be found here:
http://www.pogo.ca/_media/File/guidelines/POGO%20Emetogenicity%20Classification%20Guideline%20-%20Summary%20-Final-rev-%20250111.pdf

Children's Oncology Group. 2008. **Long-term follow-up guidelines for survivors of childhood, adolescent, and young adult cancers**, Version 3.0. Arcadia (CA): Children's Oncology Group. http://www.survivorshipguidelines.org/pdf/LTFUGuidelines.pdf

These guidelines were developed as a resource for clinicians who provide continuing healthcare for survivors of childhood cancer. They are based on a thorough literature review and consensus from a panel of experts. They provide recommendations for screening and management of the late effects that may follow exposure to anti-cancer therapies including surgery, blood and serum products, radiation, chemotherapy, and haematopoietic cell transplant during treatment for paediatric cancer. The authors of this guideline noted that there were no randomised clinical trials (and none forthcoming in the foreseeable future) on which to base recommendations for periodic screening evaluations in this population; therefore, the guidelines should not be misconstrued as representing conventional "evidence-based clinical practice guidelines" or "standards of care".

Recent Systematic Reviews

Braam KI, van der Torre P, Takken T, et al. 2013**. Physical exercise training interventions for children and young adults during and after treatment for childhood cancer.** Cochrane Database of Systematic Reviews (10).

Decreased physical fitness and impaired social functioning have been reported in childhood cancer survivors. This may be due to the effects of the cancer itself, cancer treatment or the behavioural, social and psychological consequences of the whole cancer experience. This review evaluated the effect of a physical exercise training intervention, offered either at home, at a physical therapy centre or at a hospital, on the physical fitness of children with cancer in comparison to that of children with cancer in a care-as-usual group. Intervention studies were eligible for this review if the intervention was offered within five years from cancer diagnosis and they were RCTs or controlled clinical trials (CCTs). Four RCTs (14, 14, 28, and 51 participants) and one CCT (24 participants) were included. In total there were 131 participants, all being treated for childhood acute lymphoblastic leukaemia (ALL). All the interventions were home-based exercise programmes implemented during chemotherapy treatment but they differed in duration of the entire intervention, the duration of each training session, the timing and the type of the interventions, and the outcomes assessed. Most outcomes were assessed by only one study, except for BMI (two studies). The authors considered that, overall, the studies were of low or very low quality with very small numbers and inadequate methodologies. They concluded that, based on the currently available evidence, they could not draw any conclusions about the best physical exercise training intervention for childhood cancer survivors, nor about the best timing for such interventions, but they noted that the studies indicated that physical training is feasible for children with ALL and that the intervention groups had some outcomes that were better than control groups, such as body composition, flexibility, and cardiorespiratory fitness, although for other outcomes, including muscle strength/endurance, the level of daily activity, health-related quality of life, fatigue, and adverse events, there were no differences between groups.

Coyne I, O'Mathuna DP, Gibson F, et al. 2013**. Interventions for promoting participation in shared decision-making for children with cancer.** Cochrane Database of Systematic Reviews (6).

The 1989 UN Convention on the Rights of the Child gives children the right to have their views heard in matters that affect their lives. Children with cancer generally prefer to be involved in decisions relating to their healthcare and even in those relating to their end-of-life issues. It is therefore important for health professionals to know the best ways of involving children with cancer in shared decision making (SDM). This review aimed to examine the effects of SDM interventions on the process of SDM for children with cancer aged from four to 18 years. Studies were eligible for inclusion in the review if they were RCTs of SDM interventions for children with cancer aged four to 18 years. The authors were unable to find any studies meeting their criteria and so they stated that they were unable to draw any conclusions about on the effects of interventions to promote SDM for children with cancer aged four to 18 years. They stated that they plan to include non-randomised studies in future reviews to expand the range of evidence.

Crosignani P, De Stefani A, Fara GM, et al. 2013. **Towards the eradication of HPV infection through universal specific vaccination**. BMC Public Health, 13, 642 http://www.biomedcentral.com/1471-2458/13/642

Human papilloma virus (HPV) is generally recognised to be the cause of cervical cancer. Vaccination against HPV is included in the immunisation programmes of many countries. There is increasing recognition that HPV has a role in the development of other neoplasms including condylomas (genital warts) and penile, anal, vulvar, vaginal, and oro-pharyngeal cancers. Men are affected by HPV almost as much as women but they receive no screening for HPV-related disease and no vaccination, and they are the main route for transmission of the virus from person to person. This open-access review presents the consensus of a panel of experts who met at three workshops organized and moderated by the Fondazione Giovanni Lorenzini Medical Science Foundation (Milan, Italy and Houston, TX, USA). It focuses on scientific, medical, and economic studies, and on the achievements from health organizations' intervention programmes for dealing with HPV infection. The consensus reached was that "the reviewed studies on the natural history of HPV infection and related diseases in women and men, the increasing experience of HPV vaccination in women, the analysis of clinical effectiveness vs. economic efficacy of HPV vaccination, are even more supportive of the economic sustainability of vaccination programmes both in women and men. Those achievements address increasing and needed attention to the issue of social equity in healthcare for both genders".

Bowers DC, Nathan PC, Constine L, et al. 2013. **Subsequent neoplasms of the CNS among survivors of childhood cancer: a systematic review**. Lancet Oncol, 14(8), e321-8.

Childhood cancer survivors are at risk for subsequent central nervous system (CNS) neoplasms which have poor survival rates. This review aimed to answer three questions: (1) what is the risk of CNS tumours after radiation to the cranium (skull) for a paediatric cancer, compared with the risk in the general population; (2) what are the outcomes in children who received CNS-directed radiation for a paediatric cancer and develop subsequent neoplasms of the CNS; (3) are outcomes of subsequent neoplasms different from those of primary neoplasms of the same histology? It included 18 studies. Fourteen retrospective cohort studies (150,000 survivors of childhood or young adult cancer from 1940 to 2005, among who there were 959 subsequent CNS tumours) assessed the risk of subsequent CNS tumours after treatment for a childhood or young adult malignancy. The numbers of studies relating to outcomes following subsequent CNS neoplasms varied with the outcome in question. The studies indicated that childhood cancer survivors have an incidence of CNS neoplasms that is between 8·1 and 52·3-times higher than that of the general population. Nearly all the cancer survivors who developed a subsequent CNS neoplasm had been exposed to cranial radiation and some studies showed a correlation between CNS cancer risk and radiation dose. Five year survival rates for subsequent high-grade gliomas were poor, ranging from 0–19·5% while survival rate for subsequent meningiomas, were similar rates to those observed in patients with primary gliomas or meningiomas (57·3–100%).The authors noted that quality of evidence was limited by variations in study design and details about treatment and outcomes, and by limited follow-up and small sample sizes. They stated that current literature is insufficient to draw conclusions about the potential harms and benefits of routine screening for subsequent CNS neoplasms in child cancer survivors.

Lip SZL, Murchison LED, Cullis PS, et al. 2013. **A meta-analysis of the risk of boys with isolated cryptorchidism developing testicular cancer in later life.** Archives of Disease in Childhood 98(1) 20-6.

Cryptorchidism (undescended testis/testes) affects around six per cent of all newborn boys and is one of the most common congenital abnormalities. Testicular cancer is the most common malignancy in men aged between 20 and 45 years. Cryptorchidism is widely regarded as the most significant risk factor for testicular cancer but published estimates of the magnitude of the increased risk range from threefold to almost 50-fold. The aim of this review was to perform a meta-analysis to clarify the magnitude if this risk, for those without genetic syndromes or other conditions associated with an increased predisposition to the development of cryptorchidism. The authors identified nine relevant case control studies (2281 cases and 4811 controls) and three cohort studies. The cohort studies included 2,177,941 boys, of whom 345 later developed testicular cancer. (The total length of follow-up was 58,270,679 person-years). The pooled relative risk was 2.90 (95% CI 2.21 to 3.82) with significant heterogeneity ($p<0.00001$; $I^2=89\%$). The authors concluded that boys with isolated cryptorchidism are three times more likely to develop testicular cancer than other boys. They stated that there were some limitations to their review, especially possible publication bias and the lack of high-quality evidence focusing on the risk of malignancy in boys with isolated cryptorchidism.

Ranmal R, Prictor M, Scott TJ. 2012**. Interventions for improving communication with children and adolescents about their cancer.** Cochrane Database of Systematic Reviews (4).

Communicating effectively with children and adolescent with cancer about their condition, its treatment and its implications is an important part of good quality care. This review, which is an update of an earlier 2003 review, aimed to assess the effects of improving communication with children and adolescents about their cancer. In total ten studies met the review's inclusion criteria: four RCTs, two non-randomised controlled trials, one non-randomised controlled trial with an historical control group, one before-and-after study with an historical control group and two uncontrolled before and after studies. Only one study, a RCT, was new since the earlier review. The studies varied considerably in interventions evaluated, study designs, types of participants and outcomes measured. The authors concluded that interventions to enhance communication with children and adolescents with cancer have not been widely or rigorously evaluated but the weak evidence that exists suggests that some children and adolescents with cancer may get some benefit from specific information-giving programmes, from support before and during particular procedures, and from interventions that aim to facilitate their reintegration into school and social activities.

Jones L, Watling RM, Wilkins S, et al. 2012**. Nutritional support in children and young people with cancer undergoing chemotherapy.** Cochrane Database of Systematic Reviews (1).

Malnutrition can be a consequence of both cancer itself and cancer treatment. To combat this problem, nutritional liquids can be delivered through a central or peripheral vein (parenteral nutrition, PN); or nutritional liquids or solids can be delivered to the gut, either orally or via a tube (enteral nutrition, EN). This nutritional support can be either instead of, or additional to, normal eating. This review aimed to determine the effects of any form of parenteral or enteral nutritional support in children and young people with cancer undergoing chemotherapy. The authors identified eight RCTs (159 participants aged < 21 years with leukaemia or solid tumours) meeting their criteria, all of low quality. One small trial found that compared to EN, PN significantly increased weight (mean difference (MD) 4.12; 95% CI 1.91 to 6.33), serum albumin levels (MD 0.70; 95% CI 0.14 to 1.26), calorie intake (MD 22.00; 95% CI 5.12 to 38.88) and protein intake (MD 0.80; 95% CI 0.45 to 1.15). One trial comparing peripheral PN and EN with central PN found that mean daily weight gain (MD −27.00; 95% CI −43.32 to −10.68) and energy intakes (MD −15.00; 95% CI −26.81 to −3.19) were significantly less for the peripheral PN and EN group, whereas mean change in serum albumin was significantly greater for that group (MD 0.47; 95% CI 0.13 to 0.81, p=0.008). The authors concluded that there was limited evidence from individual trials suggesting that PN is more effective than EN in well-nourished children and young people with cancer undergoing chemotherapy but the evidence regarding other comparisons and nutritional support in malnourished children remains unclear. They stated that “further research, incorporating larger sample sizes and rigorous methodology utilising valid and reliable outcome measures, is essential”.

van Dalen EC, Mank A, Leclercq E, et al. 2012. **Low bacterial diet versus control diet to prevent infection in cancer patients treated with chemotherapy causing episodes of neutropenia.** Cochrane Database of Systematic Reviews (9).

Neutropenia (low white blood cell count) is a common side effect of chemotherapy and a risk for life-threatening infections. It has been suggested that a low bacterial diet (LBD) can prevent infections and infection-related mortality in people who are neutropenic as a result of cancer therapy. This review aimed to examine the evidence for this and also to assess the time to first febrile episode, the need for empirical antibiotic therapy, diet acceptability and quality of life. The authors identified three RCTs comparing intervention and control diets. In total 192 patients (children and adults) with various malignancies were included. The studies differed in regard to intervention and control diets, outcome definitions, and co-interventions (e.g. protective environment, antimicrobial prophylaxis, central venous catheter care, oral care, hygiene practices and colony-stimulating factors). All studies had serious methodological limitations and pooling of results was not possible. The authors conclude that currently there is no evidence from individual RCTs in children and adults that supports the use of LBDs for the prevention of infection and related outcomes in neutropenic cancer patients. They noted, however, that “no evidence of effect” is not the same as “evidence of no effect”. They stated that they were unable to make any recommendations for clinical practice and that more high-quality research is needed.

Manji A, Beyene J, Dupuis LL, et al. 2012. **Outpatient and oral antibiotic management of low-risk febrile neutropenia are effective in children--a systematic review of prospective trials**. Support Care Cancer, 20(6), 1135-45.

The objective of this review was to determine whether there was any difference in efficacy between outpatient and inpatient management of children with low-risk febrile neutropenia (FN) as a result of cytotoxic chemotherapy. The authors identified 16 relevant studies for inclusion in the review. All of them dealt only with low-risk patients. Eight were RCTs and eight were prospective non-randomised studies. None of the RCTs directly compared inpatient to outpatient treatment. Five of the eight RCTs compared oral to parenteral (IV) antibiotics. In total, the 16 studies described the outcomes of 24 different treatment regimens. Results of two meta-analyses indicated that treatment failure, including antibiotic modification, was less likely to occur in the outpatient setting than the inpatient setting (15% vs. 28%, p=0.68), but was not significantly different between oral and parenteral antibiotic regimens (20% vs. 22%, p=0.68). There were no infection-related deaths in either the 953 episodes treated in the outpatient setting or the 676 episodes treated with oral antibiotics. This review did not report confidence intervals for between-group differences. The authors concluded that, based on the combination of results from all prospective studies to date, both outpatient and oral antibiotic management of low-risk FN in children are effective and should be made a part of clinical care where feasible.

Lu B, Kumar A, Castellsague X, et al. 2011. **Efficacy and safety of prophylactic vaccines against cervical HPV infection and diseases among women: a systematic review & meta-analysis**. BMC Infectious Diseases 11 13. http://www.biomedcentral.com/content/pdf/1471-2334-11-13.pdf

This paper reports on a systematic review and meta-analysis assessing the efficacy and safety of vaccines against the oncogenic types of human papilloma virus. The review included seven RCTs of HPV vaccines involving 44,142 females. The authors synthesised efficacy data using fixed-effect models, and evaluated for heterogeneity using the I^2 statistic. In the per-protocol population (PPP, only those trial participants who adhered to the trial protocol), the fixed-effect relative risk (RR) and 95% confidence intervals were 0.04 (0.01 to 0.11) and 0.10 (0.03 to 0.38) for HPV-16 and HPV 18-related high-grade cervical lesions or worse (CIN2+). In the intention-to-treat population (ITT, all trial participants including those who dropped out, were lost to follow-up or did not receive some or all of their vaccine doses if they were randomised to a treatment group) the corresponding RR was 0.47 (0.36 to 0.61) and 0.16 (0.08 to 0.34). Overall, the vaccines also highly efficacious against 6-month persistent infection with HPV 16 and 18, both in the PPP cohort (RR: 0.06, [95% CI 0.04–0.09] and 0.05, [95% CI 0.03–0.09], respectively), and the ITT cohorts (RR: 0.15 [0.10-0.23] and 0.24 [0.14-0.42], respectively). The vaccine had limited prophylactic effect against CIN2+ and 6-month persistent infections associated with non-vaccine oncogenic HPV types. There were no differences between the vaccine and control groups in the risk of serious adverse events (RR: 1.00, 0.91–1.09) or vaccine-related serious adverse events (RR: 1.82; 0.79–4.20). The most common serious adverse effects were abnormal pregnancy outcomes but these were under-reported since only three out of the seven trials reported on them. The authors concluded that prophylactic HPV vaccines are safe, well tolerated, and highly efficacious in preventing persistent infections and cervical diseases associated with vaccine-HPV types among young women but that future trials are needed to address long-term efficacy and safety.

Moyer VA. 2012. **Behavioral counseling to prevent skin cancer: U.S. Preventive Services Task Force recommendation statement**. Ann Intern Med, 157(1), 59-65 http://annals.org/data/Journals/AIM/24329/0000605-201207030-00009.pdf

This guideline is an update of the 2003 U.S. Preventive Services Task Force (USPSTF) recommendation statement. It is based on a targeted literature search for new evidence that counselling patients about sun protection reduces skin cancer or intermediate outcomes (such as sunburn).The USPSTF found that there was convincing evidence linking UV radiation exposure during childhood and youth to a moderately increased risk for skin cancer later in life, and adequate evidence linking adult UV radiation exposure to a small increase in risk for skin cancer risk. It stated that there is moderate certainty that counselling has a moderate net benefit for children, adolescents and young adults aged 10 to 24 years with fair skin. The USPSTF made no recommendations for children under the age of 10 years because there were few trials available to determine the effectiveness of counselling parents or guardians to prevent children's UV exposure. It found adequate evidence that, for young people and adults, there are no appreciable harms associated with counselling or sun-protective behaviours.

Lin JS, Eder M, Weinmann S. 2011. **Behavioral counseling to prevent skin cancer: a systematic review for the U.S. Preventive Services Task Force**. Ann Intern Med, 154(3), 190-201 http://annals.org/data/Journals/AIM/20224/0000605-201102010-00009.pdf

This review was undertaken for the USPSTF to assist them with updating their 2003 recommendation on behavioural counselling to prevent skin cancer. The authors identified no trials meeting their criteria that directly examined whether behavioural counselling can reduce skin cancer but they did find 11 fair or good quality RCTs examining the effect of counselling interventions on sun-protective behaviours. Four trials in university-age young adults used "appearance-based" behavioural interventions that emphasised the aging effect of ultraviolet light on skin and norms about tanning and looking tanned instead of a "health-based" message about skin cancer. Three of these trials (897 participants) found that the intervention reduced indoor tanning among women who had the intention to tan indoors, by up to 35%, although follow up was only three to six months. The other trial (133 participants) used a brief video intervention, with or without an ultraviolet facial photograph, and found it led to a moderate decrease in objectively measured skin pigmentation (using skin reflectance spectrophotometry) at 12 months, based on Cohen's *d* statistic. One trial in adolescents (n =819) found that computer support can increase sunscreen use and decrease midday sun exposure.

The reviewers identified thirty-five observational studies, of mainly fair quality, examining the relationship between ultraviolet exposure or sunscreen use and skin cancer. Increased intermittent sun exposure in childhood is associated with increased risk for basal cell carcinoma, squamous cell carcinoma, and melanoma. The results of one fair-quality RCT (1621 participants) suggested that regular sunscreen use can prevent squamous cell carcinoma, but not basal cell carcinoma. The evidence from cohort and case-control studies regarding the effect of sunscreen on the risk of melanoma was equivocal. There is evidence from one fair quality case-control and a number of fair quality cohort studies that regular or early use of indoor tanning may increase melanoma risk

The reviewers note that observational studies are limited by the complexity of measuring ultraviolet exposure and sunscreen use, and inadequate adjustment for important confounders. They concluded that RCTs suggest that primary care-relevant counselling can increase sun-protective behaviours and decrease indoor tanning.

The publications above, and related material, can be found on this web page:

U.S. Preventive Services Task Force. 2012. **Behavioral Counseling to Prevent Skin Cancer, Topic Page**. http://www.uspreventiveservicestaskforce.org/uspstf/uspsskco.htm accessed November, 2013.

Goossen GM, Kremer CML, van de Wetering MD. 2011**. Influenza vaccination in children being treated with chemotherapy for cancer.** Cochrane Database of Systematic Reviews (1).

Influenza can be (but is not usually) a serious illness in children with cancer, therefore vaccination against influenza is generally recommended. There is conflicting data about the immune response to influenza vaccination in children with cancer and so the value of vaccination for these children is unclear. This review aimed to assess the efficacy of influenza vaccination in stimulating immune response (compared to control groups) and in preventing influenza-like illness (compared to placebo), in children (aged one to 18 years) receiving chemotherapy for cancer. It also aimed to determine the adverse effects of influenza vaccination in these children. The review included one RCT (comparing responses to two different influenza vaccination protocols) and eight controlled clinical trials. In total there were 708 participants. None of the studies compared influenza vaccine to placebo and none reported on clinical outcomes such as confirmed influenza, hospitalisation, delay in chemotherapy or mortality, but all reported on influenza immunity and adverse reactions. The studies' results indicated that paediatric cancer patients receiving chemotherapy are able to generate an immune response to influenza vaccination but their immune response is weaker than that of healthy children, children with asthma or children with cancer who completed chemotherapy one month or more before vaccination. These differences between trial groups in immune response were found irrespective of the method used to assess immune response. Adverse effects were mild local reaction and low grade fever. There were no serious adverse reactions. The authors concluded that paediatric cancer patients receiving chemotherapy do generate an immune response to influenza vaccination but it is unclear whether this protects them from influenza infection or its complications and therefore it is uncertain if vaccination has any clinical benefits for this population. They stated that further well-designed RCTs are needed to address this issue.

Phillips RS, Gopaul S, Gibson F, et al. 2011**. Antiemetic medication for prevention and treatment of chemotherapy induced nausea and vomiting in childhood.** Cochrane Database of Systematic Reviews (2).

Nausea and vomiting are common problems in children being treated with chemotherapy for cancer. This review aimed to assess the effectiveness and adverse effects of pharmacological interventions in controlling anticipatory, acute and delayed nausea and vomiting in children and young people (aged < 18 years) either about to receive or receiving chemotherapy. It included 28 RCTs which examined a range of different antiemetic drugs, used different doses and comparators, and reported a variety of outcomes Most studies were small. Most of the quantitative data from these studies related to the control of acute (within 24 hours) vomiting (22 studies). Twenty-four studies reported on adverse events and ten on nausea. Two studies assessed the addition of dexamethasone to 5-HT_3 antagonists for complete control of vomiting and found that the two drugs together were superior: pooled risk ratio 2.03, 95% confidence interval 1.35 to 3.04 (indicating that patients receiving the combination were about twice as likely not to have vomiting). Three studies compared granisetron 20 mcg/kg with 40 mcg/kg for complete control of vomiting (pooled RR 0.93; 95% CI 0.80 to 1.07). No other pooled analyses could be done. It appeared that 5-HT_3 antagonists are more effective than older antiemetic agents, even when those agents are combined with a steroid and that, of the 5-HT_3 receptor antagonists, granisetron may be more effective at higher doses. Cannabinoids appear to be effective but frequently cause side effects (particularly drowsiness and dizziness). The authors concluded that our knowledge about the best anti-emetics for preventing chemotherapy-induced nausea and vomiting in children with cancer is limited. They stated that 5-HT_3 antagonists with added dexamethasone are effective but noted that the use of steroids as an antiemetic is somewhat controversial because some in-vitro studies have suggested that glucocorticoids (such as dexamethasone) reduce the sensitivity of a wide range of cell lines to chemotherapy agents (although no studies have found an association between steroids as an antiemetic and worsened outcomes).

Shepherd JP, Frampton GK, Harris P. 2011**. Interventions for encouraging sexual behaviours intended to prevent cervical cancer.** Cochrane Database of Systematic Reviews (4).

Infection with the sexually transmitted human papilloma virus (HPV) is the key risk factor for cervical cancer. This review aimed to assess the effectiveness of behavioural interventions for young women intended to encourage safer sexual practices to prevent transmission of HPV, cervical cancer and other sexually transmitted infections (STIs). It included 23 RCTs, most conducted in the U.S. in healthcare settings such as family planning clinics. Most of the interventions provided information about STIs and taught safer sex skills such as communication. Some also provided resources, for example free sexual health services. There was considerable variation (i.e. heterogeneity) among the trials in behavioural aims, provider, contact time, duration and outcomes, so meta-analysis was not considered appropriate. The trials addressed a variety of STIs including HIV and chlamydia but none explicitly mentioned HPV or cervical cancer. Trials commonly reported statistically significant effects on behavioural outcomes such as increased condom use, although this was not universal and varied with type of outcome. No trials reported statistically significant effects on reducing or abstaining from sexual activity. There were few statistically significant effects on biological outcomes related to STIs. The authors concluded that behavioural interventions for young women aimed at promoting behaviours that reduce the risk of acquiring a STI can be effective, primarily at encouraging condom use. They stated that future evaluations should have a greater focus on HPV and its link to cervical cancer and involve long-term follow up to assess impact on behaviour change, rates of HPV infection and progression to cervical cancer.

Everett T, Bryant A, Griffin MF, et al. 2011**. Interventions targeted at women to encourage the uptake of cervical screening.** Cochrane Database of Systematic Reviews (5).

Cervical screening is used to detect pre-cancerous changes in the cervix so that they can be dealt with before they develop into invasive cervical cancer. Increasing the uptake of cervical screening is important to reduce the number of women who develop cervical cancer but there is increasing debate about 'informed uptake' in recognition of the fact that screening has both positive and negative effects for individual women and that increasing uptake at all costs may not be justified. This review aimed to assess the effectiveness of interventions aimed at increasing uptake, and informed uptake of cervical screening. It included 27 RCTs and eight quasi-RCTs of variable quality. Interventions studied included invitation letters and telephone calls, face-to-face invitations, mass letter campaigns, educational interventions, counselling, risk factor assessment, procedures (for example revealing the gender of the smear taker and using a health promotion nurse), and economic incentives (such as free transport or parking). Due to the heterogeneity between the studies only limited pooling of data was possible and the review's conclusions are largely based on a narrative synthesis. The authors concluded that there was evidence from good quality RCTs to support the use of invitation letters for increasing the uptake of cervical screening via Pap smears and some evidence for the use of educational interventions. They noted that no studies considered that uptake of informed cervical screening.

Henderson TO, Amsterdam A, Bhatia S, et al. 2010. **Systematic Review: Surveillance for Breast Cancer in Women Treated With Chest Radiation for Childhood, Adolescent, or Young Adult Cancer**. Annals of Internal Medicine, 152(7), 444-5 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2857928/?report=classic

This review aimed to answer three clinical questions: 1) what is the incidence and excess risk for breast cancer in women after chest radiation for paediatric or young adult cancer? 2) for these women, are the clinical characteristics of breast cancer and the outcomes after therapy different from those of women with sporadic breast cancer in the general population? and 3) what are the potential benefits and harms associated with breast cancer surveillance among women exposed to chest radiation? For question 1, the authors identified eleven retrospective cohort and three case-control studies meeting their eligibility criteria. The cohort studies included over 14,000 young women, of whom 7000 were treated with chest radiation, mostly for Hodgkin's lymphoma, and 422 subsequently developed breast cancer. All of the studies reported a significantly increased incidence and/or absolute excess risk of breast cancer in women who had received chest radiation. Among the higher quality cohort studies, the standardised incidence ratios ranged from 13.3 to 55.5 and the absolute excess risk ranged from 18.6 to 79.0 per 10,000 person-years. The cumulative incidence of breast cancer by age 40–45 years ranged from 13–20% and the risk of breast cancer increased linearly with chest radiation dose. The evidence for questions 2) and 3) was of limited quality due to substantial study heterogeneity, variations in study design, and small sample size but suggested that characteristics of the breast cancers in these women and the outcomes following diagnosis are similar to those in the general population and that these breast cancers can be detected by mammography, though sensitivity is limited.

Cochrane Reviews relating to more specific aspects of childhood cancer treatment

The following Cochrane review relate to specific aspects of childhood cancer treatment. There is not space to summarise the contents of all of them here, but the following list of titles is provided to indicate the topics that have been the subject of recent Cochrane reviews.

Schoot RA, van Dalen EC, van Ommen CH, et al. 2013. **Antibiotic and other lock treatments for tunnelled central venous catheter-related infections in children with cancer**. Cochrane Database of Systematic Reviews (6).

Knijnenburg SL, Mulder RL, SchoutenVan Meeteren YNA, et al. 2013. **Early and late renal adverse effects after potentially nephrotoxic treatment for childhood cancer.** Cochrane Database of Systematic Reviews (10).

de Lijster MS, Bergevoet RM, van Dalen EC, et al. 2012. **Minimally invasive surgery versus open surgery for the treatment of solid abdominal and thoracic neoplasms in children.** Cochrane Database of Systematic Reviews (1).

van As JW, van den Berg H, van Dalen EC. 2012. **Medical interventions for the prevention of platinum-induced hearing loss in children with cancer.** Cochrane Database of Systematic Reviews (5).

Sieswerda E, van Dalen EC, Postma A, et al. 2011. **Medical interventions for treating anthracycline-induced symptomatic and asymptomatic cardiotoxicity during and after treatment for childhood cancer.** Cochrane Database of Systematic Reviews (9).

Mulder RL, van Dalen EC, Van den Hof M, et al. 2011. **Hepatic late adverse effects after antineoplastic treatment for childhood cancer.** Cochrane Database of Systematic Reviews (7).

Arora RS, Roberts R, Eden OBT, et al. 2010**. Interventions other than anticoagulants and systemic antibiotics for prevention of central venous catheter-related infections in children with cancer.** Cochrane Database of Systematic Reviews (12).

Arora RS, Roberts R, Eden OBT, et al. 2010**. Interventions other than anticoagulants and systemic antibiotics for prevention of central venous catheter-related infections in children with cancer.** Cochrane Database of Systematic Reviews (12).

Cheuk KLD, Chiang KSA, Chan CFG, et al. 2010. **Urate oxidase for the prevention and treatment of tumor lysis syndrome in children with cancer.** Cochrane Database of Systematic Reviews (6).

Note: The publications listed were identified using the search methodology outlined in Appendix 1 (Search Methods for Policy Documents and Evidence-Based Reviews)

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