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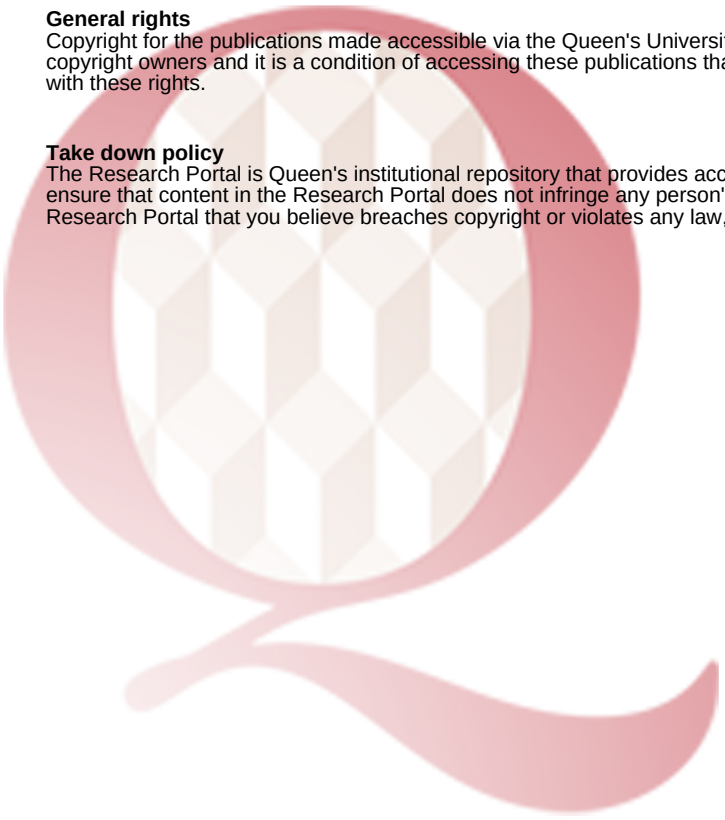

Mortality among children and young people who survive cancer in Northern Ireland

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Introduction:

While survival rates for childhood cancers are excellent it is known that these patients have an increased risk of death from disease recurrence and other causes. In Northern Ireland approximately 125 children and young people aged 0-24 are diagnosed with cancer for the first time each year. Long term survival for these people is generally good, with four out of five patients still alive five years from their diagnosis. We investigate patterns, trends and survival of cancers in children and young adults in N. Ireland.

Methods:

21 years (1993-2013) of cancer incidence data (ICD10 C00-C97) including non-malignant brain tumours (ICD 10- D32, D33.0-33.4, D35.2-35.4, D42, D43.0-43.4, D44.3-44.5) from the N. Ireland Cancer Registry for persons aged 0-24 years at diagnosis was analysed using Joinpoint regression for trends and the Kaplan Meier method for survival analysis up to end of 2013 with excess mortality calculated at one and five years after first cancer diagnosis using standardised mortality ratios with expected mortality based on person years.

Results:

2633 children and young people were diagnosed with cancer, 1386 (52.6%) male and 1247 female with 1139 (43.3%) aged 0-14. While trends increased over time they did not reach statistical significance except in the 15-24 age group for males and females combined. The most common cancers for age 0-14 were brain, eye and central nervous system and leukaemia with skin (including non-melanoma skin) the most common in the 15-24 age group (See Figure). 59 patients (2.2%) had a record of a second cancer. Survival was high at 90.7% after 1 year, better among females than males and similar for older and younger age groups. Although mortality in children is low overall, there was an excess mortality among cancer survivors of 24.7% (22.0-27.5; p<0.001) at one year (table 1) and 7.3% (5.5-9.2;p<0.001) for those who survived 5 years (table 2). For one year survivors mortality from causes other than the primary cancer was double that of the background level (SMR=2.2 (1.3-3.0), p=0.005). Excess mortality was also higher among 5 year survivors (SMR=1.5 (0.6-2.3), p=0.269) however this was not statistically significant.

Table 2: Excess mortality among five year survivors aged 0-24 at diagnosis diagnosed with cancer during 1993-2008:

Cause of death	Observed deaths	Expected deaths	Mortality rate	Standardised mortality ratio (95% CI)		Absolute excess risk (95% CI)
Male						
All causes	33	5.5	576.9	**6.0 (4.0, 8.1)**	**p<0.001**	480.9 (284.6, 677.2)
First cancer	28	0.0	489.5			489.5 (308.6, 670.3)
All but first cancer	5	5.5	87.4	0.9 (0.1, 1.7)	p=0.826	-8.6 (-85.2, 68.0)
Female						
All causes	27	2.7	471.5	**10.1 (6.3, 13.9)**	**p<0.001**	424.7 (247.2, 602.1)
First cancer	20	0.0	349.3			349.3 (196.5, 502.1)
All but first cancer	7	2.7	122.3	2.6 (0.7, 4.5)	p=0.103	75.4 (-15.1, 165.9)
Both sexes						
All causes	60	8.2	524.2	**7.3 (5.5, 9.2)**	**p<0.001**	452.8 (320.5, 585.1)
First cancer	48	0.0	419.3			419.3 (301.0, 537.7)
All but first cancer	12	8.2	104.8	1.5 (0.6, 2.3)	p=0.269	33.4 (-25.9, 92.7)
Second cancer	5	1.5	43.7	3.2 (0.4, 6.1)	p=0.122	30.2 (-8.1, 68.5)
Non-cancer	7	6.6	61.2	1.1 (0.3, 1.8)	p=0.889	3.2 (-42.1, 48.5)
External causes	4	3.7	34.9	1.1 (0.0, 2.1)	p=0.894	2.3 (-31.9, 36.6)

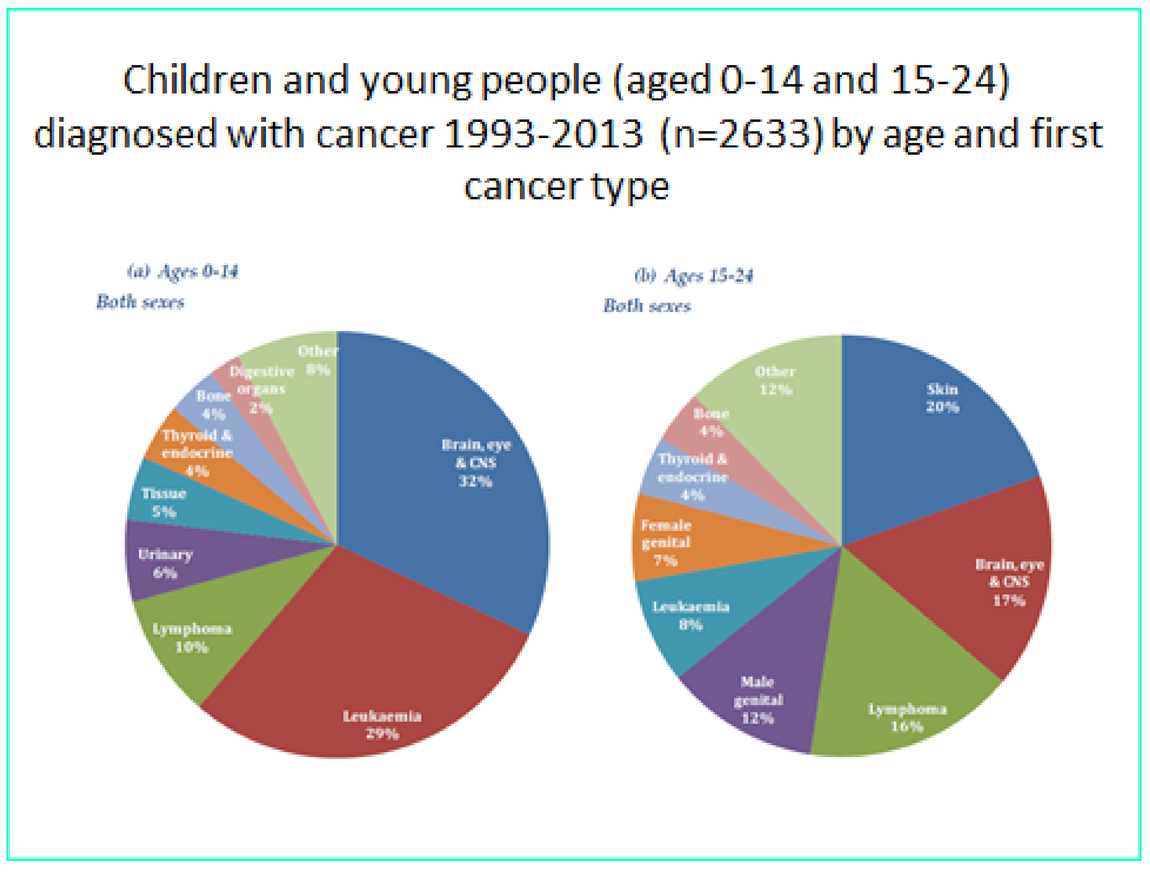
Note: 14 patients who died but had no recorded cause of death were assumed to have died from their first cancer

Table 1. Excess mortality among one-year survivors aged 0-24 at diagnosis diagnosed with cancer during 1993-2008:

Cause of death	Observed deaths	Expected deaths	Mortality rate	Standardised mortality ratio (95% CI)		Absolute excess risk (95% CI)
Male						
All causes	188	8.5	1,976.4	**22.1 (18.9, 25.3)**	**p<0.0011**	1887.0 (1607.3, 2166.7)
First cancer	174	0.0	1,829.2	-	-	1829.2 (1559.9, 2098.6)
All but first cancer	14	8.5	147.2	1.6 (0.8, 2.5)	p=0.142	57.8 (-19.3, 134.8)
Second cancer	3	1.0	31.5	2.9 (-0.4, 6.2)	p=0.257	20.6 (-15.1, 56.3)
Non-cancer	11	7.5	115.6	1.5 (0.6, 2.3)	p=0.287	37.1 (-31.2, 105.4)
Female						
All causes	121	4.0	1,295.3	**30.4 (24.9, 35.8)**	**p<0.001**	1252.7 (1023.3, 1482.0)
First cancer	108	0.0	1,156.2	-	-	1156.2 (939.4, 1372.9)
All but first cancer	13	4.0	139.2	**3.3 (1.5, 5.0)**	**p=0.012**	96.5 (20.9, 172.1)
Second cancer	4	1.2	42.8	3.3 (0.1, 6.5)	p=0.166	29.7 (-12.3, 71.6)
Non-cancer	9	2.8	96.3	**3.3 (1.1, 5.4)**	**p=0.037**	66.8 (3.9, 129.7)
Both sexes						
All causes	309	12.5	1,639.0	**24.7 (22.0, 27.5)**	**p<0.001**	1572.7 (1391.5, 1754.0)
First cancer	282	0.0	1,495.8	-	-	1495.8 (1322.5, 1669.0)
All but first cancer	27	12.5	143.2	**2.2 (1.3, 3.0)**	**p=0.005**	77.0 (23.0, 130.9)
Second cancer	7	2.3	37.1	3.1 (0.8, 5.4)	p=0.073	25.1 (-2.4, 52.6)
Non-cancer	20	10.2	106.1	**2.0 (1.1, 2.8)**	**p=0.029**	51.8 (5.4, 98.3)
Circulatory disease	4	1.3	21.2	3.1 (0.1, 6.1)	p=0.178	14.3 (-6.5, 35.1)
Congenital malformations	4	0.2	21.2	16.2 (0.3, 32.1)	p=0.061	19.9 (-0.9, 40.7)
External causes	7	5.9	37.1	1.2 (0.3, 2.1)	p=0.667	6.0 (-21.5, 33.5)

Note: 14 patients who died but had no recorded cause of death were assumed to have died from their first cancer

Figure



Conclusions:

While survival from childhood cancers is excellent this work in common with larger studies highlights the need for ongoing monitoring of cancer survivors.

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