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Suicides among cancer patients in Estonia: a population-based study

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Abstract

The objective of this study was to determine the suicide risk among cancer patients in Estonia. This risk was examined in a cohort of 65 419 persons diagnosed with cancer in 1983–1998. Standardised mortality ratios (SMR) were calculated using the suicide rates of the population of Estonia as a reference. During 192 078 person-years of follow-up between 1983 and 2000, 197 suicides occurred in the cohort. An increased suicide risk was found for men (SMR = 1.73; 95% Confidence Interval (CI) 1.45–2.01), but not for women (SMR = 0.50; 95% CI 0.37–0.66). Men had the highest risk 90–179 days following their diagnosis (SMR = 4.27; 95% CI 2.81–6.21). During this time interval, among men, the risk was more pronounced for cancers of the oesophagus (SMR = 35.63; 95% CI 9.71–91.22) and pancreas (SMR = 14.53; 95% CI 1.76–52.50). This study provides further evidence that cancer is a risk factor for suicide, at least in men.

Keywords: Cancer patients; Suicide; Estonia; Cohort study

1. Introduction

A number of cancer registry-based studies have reported an increased risk of suicide among cancer patients [1–5]. An excess of suicides and suicide attempts was observed among hospitalised cancer patients in Sweden [6]. Cancer patients were shown to have several formal psychiatric disorders, with anxiety and depression as central symptoms [7]. However, in a recent study, cancer diagnosis was associated with suicidal ideation and suicide attempts even after adjusting for depressive illnesses [8]. Most previous studies have reported an increased suicide risk both in male and female cancer patients, although some have found a higher risk in men [3–5] and some have found a higher risk in women [1,9,10].

Suicide mortality in Estonia (population 1.4 million in 2000) is among the highest in the world and there is a large gender difference; in 1999, male and female suicide rates were 56.0 and 12.1 per 100 000, respectively [11]. The transition to democracy and a market economy, beginning in 1991, has involved major political, social and economic changes in the society, including the introduction of a new insurance-based healthcare system. Suicide mortality in Estonia, particularly among men, has reflected these societal changes [12]. The association of suicides with major somatic illnesses has never been studied in Estonia. In this article, we examine the risk of suicide among cancer patients in Estonia and look specifically at the effect of gender, time since diagnosis, cancer site and time period of diagnosis.

2. Patients and methods

The study cohort included cases of cancer diagnosed in Estonia between 1 January 1983 and 31 December 1998 and registered in the Estonian Cancer Registry. The Estonian Cancer Registry is a population-based and nationwide registry with data from 1968 [13]. Patients with multiple primaries, *in situ* cancers, other skin cancers (International Classification of Diseases, 9th revision (ICD-9) code 173) [14] and postmortem cases were excluded from the study cohort.

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In order to obtain the underlying cause of death and to verify the date of death available in the cancer registry, the cohort was linked to the Estonian Mortality Database [15] for the years 1983–2000. For linkage, a personal identification number and/or other variables (name, date of birth, place of living) were used. A unique personal identification number was introduced in Estonia in 1992, and 42% of the cohort members had one. As the records for 1986–1988 in the Estonian Mortality Database are without the names of the deceased, the underlying cause of death for these years was obtained via manual linkage with the original death certificates stored in the archives of the Statistical Office of Estonia. Suicides were defined as E950–E959 according to the ICD-9. We also considered violent deaths such as transport accidents (E800–E848), homicides (E960–E978) and other violent deaths (E850–E949, E980–E999). Other vital status information was obtained from the cancer registry database that is periodically updated by information from the Estonian Population Registry.

Person-years at risk were computed from the date of cancer diagnosis until the earliest of the following events: date of death, date of emigration or 31 December 2000. The analysis is based on a computation of observed and expected suicide deaths in the cohort. The expected number of suicides for patients with a given cancer was calculated by multiplying the age-, gender- and period-specific national suicide rates by the corresponding number of person-years at risk in the cohort. Standardised mortality ratios (SMR) and their 95% Confidence Intervals (CI) were computed assuming a Poisson distribution for the observed number of suicides.

The actual suicide mortality rates among men and women in Estonia were calculated on the basis of the Estonian Mortality Database and the population estimates of the Statistical Office of Estonia [16] and the Estonian Interuniversity Population Research Centre [17]. The rates were standardised for age using the world standard population [18].

3. Results

In Estonia, 79 024 cancer cases were diagnosed between 1983 and 1998. After exclusions, 65 419 incident cases (32 524 men and 32 895 women) were available for analysis that contributed 192 078 person-years of follow-up (Table 1). By the end of the follow-up period, 50 083 subjects had died and, among those, 197 were registered as suicides; cause of death other than cancer remained untraceable for 100 (0.4%) men and 99 (0.4%) women.

During the whole study period of 1983–2000, the number of suicides among cancer patients accounted for 2.3% of all 8606 registered suicides in Estonia. The annual crude and age-standardised mortality rates for suicides are shown in Fig. 1. Fluctuation in the rates was more pronounced for men; the lowest mortality took place in the second half of the 1980s and the highest in the middle of the 1990s.

Table 2 details the risk of suicide among male and female cancer patients by time since diagnosis, age at diagnosis, cancer site and time period of diagnosis. Overall, the number of suicides among men was significantly greater than expected based on suicide rates in the general population (SMR 1.73, 95% CI 1.45–2.01), whereas the number of suicides among women was significantly reduced (SMR 0.50, 95% CI 0.37–0.66). The risk of suicide in men was 3 times higher than expected during the first year after cancer diagnosis. Excess risk

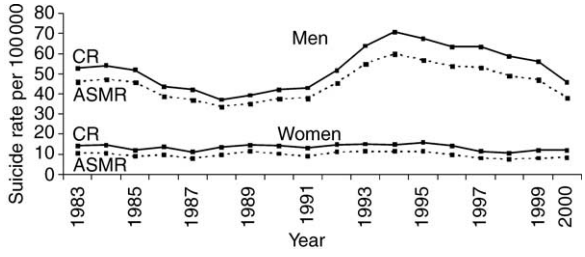

Fig. 1. Trends in the crude (CR) and age-standardised (ASMR, world standard population) mortality rates of suicides in Estonia, 1983–2000, by gender.

Table 1
Number of persons and person-years at risk in the follow-up of the cohort of cancer patients in Estonia, 1983–2000, by gender and age

Age at diagnosis (years)	Men		Women	
	No. of persons	Person-years	No. of persons	Person-years
0–14	313	930.2	290	979.0
15–49	4088	9969.5	5910	22 102.6
50–59	8036	15 100.5	6533	27 130.4
60–69	10 935	22 864.7	9018	34 696.9
⩾70	9152	21 734.5	11 144	36 569.5
Total	32 524	70 599.4	32 895	121 478.4

disappeared when 3 or more years had lapsed since the diagnosis.

The risk of suicide was highest in men aged 15–49 years at the time of diagnosis and had a tendency to decrease in the older age groups, although the excess remained significant in all age groups, except for children aged 0–14 years.

Among men with oesophageal and pancreatic cancers, suicide mortality was approximately 7 times higher than expected. A significantly increased suicide risk was also seen in male patients with cancers of the lip, oral cavity and pharynx, stomach, lung and prostate. While the risk of suicide after the diagnosis of most cancers in women was decreased (and significantly decreased in women with cancers of the breast and genital organs), the number of suicides in women with lung cancer was almost four times higher than expected.

Only follow-up for 2 years after the cancer diagnosis was included in the analysis by time period of diagnosis (Table 2). The risk remained significantly increased for men during the whole period, and was lower in men diagnosed in more recent years.

In order to determine whether there were any differences in the timing of suicide after cancer diagnosis, we calculated the suicide risk by site for three time intervals (Table 3). For all sites combined and almost for all sites studied, the risk in men and women was highest between 90 and 179 days of follow-up. The highest values of SMR for men were observed with oesophageal and pancreatic cancers. Two of the six suicides among women with lung cancer were seen within the first three months after diagnosis (SMR 8.78, 95% CI 1.06–31.71).

Additionally, we calculated the suicide risk during the first 2 years after diagnosis. For all sites combined, the

Table 2
Risk of suicide among cancer patients in Estonia, 1983–2000, by selected characteristics

	Men			Women		
	O	SMR	95% CI	O	SMR	95% CI
Total	150	1.73	1.45–2.01	47	0.50	0.37–0.66
Time since diagnosis						
First year	76	3.06	2.41–3.83	17	0.90	0.53–1.45
Second year	23	1.63	1.03–2.45	9	0.66	0.30–1.24
Third year	18	1.73	1.02–2.73	3	0.27	0.06–0.79
Fourth and later years	33	0.89	0.61–1.25	18	0.35	0.21–0.56
Age at diagnosis (years)						
0–14	0	0.00	0.00–21.58	0	0.00	0.00–19.71
15–49	27	1.94	1.28–2.82	9	0.28	0.13–0.54
50–59	40	1.84	1.32–2.51	11	0.41	0.20–0.73
60–69	45	1.83	1.34–2.45	16	0.78	0.45–1.27
⩾70	38	1.45	1.03–1.99	11	0.72	0.36–1.29
Cancer site						
Lip, oral cavity, pharynx	16	2.87	1.64–4.66	1	0.88	0.02–4.88
Digestive organs	49	2.03	1.50–2.69	11	0.69	0.35–1.24
Oesophagus	5	7.22	2.34–16.84	0	0.00	0.00–29.25
Stomach	18	1.91	1.13–3.02	4	0.79	0.21–2.01
Pancreas	7	6.59	2.65–13.57	0	0.00	0.00–7.01
Respiratory organs	34	2.07	1.43–2.89	6	2.93	1.08–6.38
Lung	29	2.66	1.78–3.82	6	3.73	1.37–8.11
Prostate	25	1.69	1.09–2.50	–		
Breast	–			10	0.34	0.16–0.63
Female genital organs	–			8	0.28	0.12–0.56
Other sites	26	1.01	0.66–1.48	11	0.61	0.31–1.10
Year of diagnosis[a]						
1983–1986	26	3.59	2.35–5.26	7	1.11	0.45–2.28
1987–1990	30	3.85	2.59–5.49	6	0.91	0.33–1.98
1991–1994	22	1.95	1.22–2.95	8	0.86	0.37–1.69
1995–1998	21	1.66	1.03–2.53	5	0.48	0.16–1.13

O, observed number of suicides; SMR, standardised mortality ratio; CI, Confidence Interval.
[a] A 2-year follow-up period.

Table 3
Risk of suicide among cancer patients in Estonia, 1983–2000, by selected cancer site and time since diagnosis

Cancer site	Gender	Time since diagnosis								
		0–89 days			90–179 days			180–364 days		
		O	SMR	95% CI	O	SMR	95% CI	O	SMR	95% CI
All sites	Men	24	2.87	1.84–4.27	27	4.27	2.81–6.21	25	2.50	1.62–3.70
	Women	5	0.90	0.29–2.11	8	1.70	0.73–3.34	4	0.47	0.13–1.21
Lip, oral cavity, pharynx	Men	0	0.00	0.00–7.94	3	7.41	1.53–21.64	4	6.20	1.69–15.88
	Women	0	0.00	0.00–51.16	1	15.18	0.38–84.59	0	0.00	0.00–32.31
Digestive organs	Men	7	2.73	1.10–5.62	12	6.66	3.44–11.64	6	2.22	0.82–4.84
	Women	1	0.70	0.02–3.90	2	1.91	0.23–6.91	1	0.61	0.02–3.39
Oesophagus[a]	Men	0	0.00	0.00–21.04	4	35.63	9.71–91.22	0	0.00	0.00–31.86
Stomach	Men	4	3.71	1.01–9.51	3	4.04	0.83–11.81	3	2.87	0.59–8.38
	Women	0	0.00	0.00–6.91	0	0.00	0.00–9.76	1	1.79	0.05–9.98
Pancreas[a]	Men	2	7.08	0.86–25.57	2	14.53	1.76–52.50	0	0.00	0.00–23.99
Respiratory organs	Men	11	4.54	2.27–8.13	9	5.32	2.43–10.10	4	1.73	0.47–4.43
	Women	2	7.75	0.94–27.98	0	0.00	0.00–20.48	0	0.00	0.00–14.30
Lung	Men	11	5.20	2.60–9.31	8	5.68	2.45–11.18	4	2.22	0.60–5.68
	Women	2	8.78	1.06–31.71	0	0.00	0.00–24.01	0	0.00	0.00–17.34
Prostate	Men	2	1.99	0.24–7.21	2	2.21	0.27–7.99	4	2.36	0.64–6.03
Breast	Women	1	0.77	0.02–4.29	1	0.80	0.02–4.48	1	0.41	0.01–2.28

O, observed number of cases; SMR, standardised mortality ratio; CI, confidence interval.
[a] Women not shown because of the lack of suicides.

risk in men was increased (99 suicides, SMR 2.54, 95% CI 2.06–3.09), and in women it was closer to that in the general population (26 suicides, SMR 0.80, 95% CI 0.52–1.17).

4. Discussion

Our finding of a significantly increased suicide risk among men with cancer in Estonia is consistent with a number of previous studies of similar design [2–5,9,19]. However, while most earlier studies in Northern European countries [1,3,5] and other European countries [4,9] have revealed an increased suicide risk in both men and women, we found, surprisingly, that the risk of suicide among female cancer patients in Estonia was significantly lower than expected. In a study in Connecticut, Fox and colleagues [2] observed no excess of suicides in women diagnosed with cancer from 1940 to 1969, while a significant excess was seen in men.

The reduced suicide risk among female cancer patients, compared with the general population, was the most striking finding, and the reasons for this decrease are unclear. In other countries, it has been proposed that some suicides are reported as due to other causes of death in official statistics, but there is little scientific evidence for this proposal [20–22]. The excess of other accidents and homicides, in addition to suicides, during the first year after diagnosis of a cancer, observed in a Danish study, suggested that there is some misclassification between these causes of death [5]. We examined the pattern of other violent deaths in our cohort, but the data did not suggest an underreporting of suicides in women with cancer in Estonia. The degree of misclassification of the underlying cause of death is considered to be small in Estonia [23], and is probably not dependent on the decendent's gender and/or cancer status.

A possible limitation of the present study is that for 0.4% of the deaths in the cohort, where the death had been recorded by the Estonian Cancer Registry, there was no match after linking with the mortality database, or the cause of death was unknown. If there were suicides among these deaths, then one would expect somewhat higher SMRs than those that were found. Moreover, while it is theoretically possible, it is hard to believe that when manually linking a part of the cohort with the original death certificates for the years 1986–1988, suicidal and other deaths among women remained undetected because the woman had changed her family

name shortly after the cancer diagnosis. Nevertheless, it is possible that the observed decreased risk in women is caused by chance alone.

In the Estonian population, mortality from suicides is substantially higher in men than in women, a pattern that is similar to that observed in other European countries. However, this difference between genders is larger in Estonia. For example, suicide rates in men are approximately twice as those high as in Sweden or Denmark, while the rates in women are only slightly higher than in the neighbouring countries [11]. Men seem to respond more readily to social and political changes in society, as evidenced by the curve of the underlying population suicide rate in Estonia [12]. It was also shown in a recent study in Sweden that serious physical illness, including cancer, was more strongly associated with suicidal ideation and suicide attempts in men than in women [24].

The most critical time for cancer patients has been observed to be soon after diagnosis and our finding in men is in line with previous studies in this respect [2–5,9]. People who committed suicide within 1 year after diagnosis were shown to have advanced or rapidly progressing disease [25]. Physical and social impairment caused by specific cancers rather than by the cancer diagnosis *per se* seems to be important in determining the suicide risk [6]. The highest risk in men in our study was seen after the diagnosis of cancers of the upper digestive tract, pancreas and lung, and most of these suicides were committed soon after diagnosis. These are all cancers that cause severe symptoms like pain, and difficulties in vital functions like breathing and eating. Lung cancer was the only diagnosis after which the suicide risk in women was increased in our data. In the Danish study, women with breast cancer remained at an increased risk throughout their follow-up [5], but we did not observe any increase in our cohort within 2 years after the diagnosis of breast cancer, and the risk was in fact significantly reduced. It should be noted that in a recent Australian population-based study of women with breast cancer, the prevalence of possible psychological morbidity due to depression was 45% [26].

The causal mechanism of several cancers that were associated with an increased suicide risk in men in our study, such as cancers of mouth, pharynx and oesophagus, includes alcohol [27]. Moreover, among head and neck cancer patients, alcohol intake, smoking and depressive symptoms are highly prevalent [28]. While alcohol consumption may contribute to the development of some types of cancer, it could also have contributed to the subsequent suicides in these patients. In Estonia, for example, a forensic autopsy-based study of almost all suicidal deaths in 1999–2001 reported that alcohol was detected in blood of 45% of men and of 23% of women (calculated from Ref. [29]). However, a recent study [30] found that cancer patients who committed suicide were less often under the influence of alcohol than non-cancer suicide victims.

A strength of the present study is that it is a population-based approach in which the cohort was assembled from the records of the cancer registry that covers the whole country. The existence of the national mortality database including personal identifiers, particularly identification number and the names of the deceased, markedly facilitated record linkage procedures. Similarly, the follow-up of the cohort for vital status was successful due to the presence of a national population registry.

The risk of suicide, when compared with that in the general population, was lower in persons who entered the cohort in more recent years. This trend, particularly among men, should be interpreted with caution, since suicide mortality in the population of Estonia has not been stable during the study period of 18 years. There have been fluctuations in the suicide rate in the male population associated with major political and socio-economic changes in the society [12]. The changes we found in the suicide risk in men in the cohort, for example, between 1987–1990 and 1991–1994, do not necessarily reflect a sharp decline in their risk from suicide over time, but rather a smaller suicide risk in the male population of Estonia in the first time period, and higher risk in the second time period. In contrast, the female suicide curve has been relatively stable. Access to medical care was more equally distributed during the Soviet era, while the new health insurance system makes it more difficult for people who do not have regular employment to obtain access to care. However significant new diagnostic and treatment options have become increasingly available, and this knowledge might help people to cope better with their diagnosis.

This study provides further evidence that cancer is a risk factor for suicide, at least in men. The reported decreased suicide risk among female cancer patients might be caused by chance or some biases which we were not able to specify. We feel that a discussion on the nature and range of interventions that could be applied to prevent suicides among cancer patients is outside of the scope of this paper. This issue is also adequately addressed in the psychosocial oncology literature [31,32].

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