Suicide Risk among Cancer Patients: Experience at One Medical Center in Japan, 1978–1994

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In order to identify the risks, methods and locations of suicide among Japanese cancer patients, we followed up 23,979 cancer patients aged 15 years and older, who were newly diagnosed at one medical center between 1978–94. Suicide risk was evaluated by comparing the observed number (O) with the expected number (E), which was calculated from the suicide mortality rate among Osaka residents. By the end of 1994, there were 48 suicide death among 109,374 person-years of follow-up. Suicide risk was significantly increased within the first five years following cancer diagnosis (male: O/E=1.62, 95% confidence interval (CI)=1.03–2.43, female: O/E=2.13, 95%CI=1.22–3.47), and decreased to unity after five years had elapsed following the cancer diagnosis. Patients in their fifties (O/E=1.93, 95%CI=1.48–4.37), diagnosed between 1978–85 (O/E=1.93, 95%CI=1.19–2.95), having remote metastasis at their initial diagnosis (O/E=4.66, 95%CI=2.12–8.84), the site being in the female genital organs (O/E=3.58, 95%CI=1.54–7.06) or in the male genital organs (O/E=5.86, 95%CI=1.58–15.05), had a significantly higher suicide risk within five years following cancer diagnosis. The highest suicide mortality was observed between the third and fifth months after cancer diagnosis (O/E=4.35, 95%CI=1.87–8.58); most of these suicides (7/8) occurred soon after discharge from hospital. Among the 39 patients who committed suicide within five years after their diagnosis, the most common method among those who took their lives while in hospital was by jumping to their death (10/16), and that among those who committed suicide in other locations was by hanging (14/23). These findings indicate that Japanese patients with cancer run the highest risk of suicide soon after having been discharged from hospital. Clinicians should assess cancer patients' psychological distress and potential risk of suicide before approving discharge from hospital.

Key words: Cancer patient — Suicide — Cohort study — Epidemiology — Hospital-based cancer registry

Cancer patients face several forms of distress which frequently cause psychiatric disorders, particularly adjustment disorders with anxiety and depression.[1] An increased risk of suicide has been reported among cancer patients in several population-based studies.[2–8] Some of these studies found a high risk close to the time of diagnosis,[3–8] in patients in advanced clinical stages,[2, 5] and in patients with specific cancer sites including the digestive organs,[2, 4–6] upper airways and lungs,[4, 7] male genital organs,[4, 5] female genital organs,[4, 7] and the hematopoietic system.[6] A report from the Connecticut Tumor Registry[3] confirmed an increased risk among male patients, but not among female patients. The differences among population-based studies in several countries may derive from differences in socio-cultural backgrounds, cancer care systems, patients' characteristics in relation to survival, and the suicide rates in the general populations in these countries. All of these population-based studies, except for one from Italy,[8] used cancer patients who were diagnosed before the mid-1980s. Improvements in cancer survival seen during the past decades[9–11] might have influenced the potential risk of suicide.

We conducted a retrospective cohort study in order to identify the risks, methods and locations of suicide among cancer patients who were diagnosed at one medical center between 1978 and 1994. The purpose of this study is to obtain information useful for the prevention of suicide deaths among current cancer patients in Japan.

SUBJECTS AND METHODS

The subjects were obtained from the hospital-based cancer registry of the Osaka Medical Center for Cancer and Cardiovascular Diseases, which was established by the Osaka Prefectural Government in 1964. Since 1964, the hospital registry has registered medical information on cancer diagnosis and treatments of patients who were newly seen and diagnosed with cancer at the hospital, together with their prognosis. Their vital status was con-

firmed by checking against the hospital records and the data of the Osaka Cancer Registry (the population-based cancer registry in Osaka), and referring to the resident registries of local municipal offices. Lost-to-follow-up has been kept to less than 1% at five and ten years after diagnosis. The underlying causes of death were also compiled from the data of the Osaka Cancer Registry and through its own inquiries to the local offices of justice.

We included in our study only those cancer patients who were aged 15 years and older, and who resided in Osaka Prefecture at the time of diagnosis, which was between January 1978 and December 1994. A total of 24,295 patients were identified as study subjects. All the study subjects, except for the deceased already known to the hospital registry, were linked with files of the Osaka Cancer Registry to obtain information on their vital status and underlying causes of death. As of the end of 1994, 11,857 patients had died. Of these, 316 cases (1.4%) were excluded due to unknown cause of death. All of these excluded patients had moved outside of Osaka Prefecture prior to their death. In total, 23,979 cases (13,140 males and 10,839 females) were eligible for analysis.

Suicide was defined as death caused by one of E950–E959 in the International Classification of Diseases, 9th edition (ICD-9), as an underlying cause of death described in death certificates prepared by physicians or coroners. We also considered undetermined violent causes of death (whether accidentally or purposely inflicted) (E980–E989) for the risk assessment because a substantial proportion of these deaths is generally considered to be due to suicide.[7] Sex, period after diagnosis, age, time of diagnosis, extent of cancer, and the primary site were examined as suicide risk factors. The extent of cancer was assessed to be that at the time of diagnosis of the cancer. It was classified into three categories[11]: 1) localized: confined to the original organ; 2) regional: spread to regional lymph nodes and/or spread to adjacent tissue; and 3) distant: metastasis to distant organs. The extent of cancer was unknown in 18.8% (4,366/23,279) of the patients, most often because they had been referred to other hospitals before they underwent any initial treatment at our hospital. In order to identify the specific period bearing the highest risk, the period from the time of cancer diagnosis up to five years was divided into nine intervals. To determine whether the suicide had occurred at the hospital or after discharge from hospital, we reviewed the medical records of the patients who died from suicide.

We accumulated person-years of observation from the date of cancer diagnosis through the date of death or the end of 1994, whichever occurred first. The observed number of suicides was compared with the expected number. The expected number was obtained by multiplying number of person-years at risk, stratified by sex, 5-year age and 5-year calendar time, with the suicide rate among Osaka res-

idents in each corresponding stratum. The official suicide rate were obtained from the Osaka Prefectural Government.

Statistical calculations and the 95% confidence interval (CI) of the ratio of observed to expected cases (O/E ratio), were based on the assumption that the observed number of cases followed a Poisson distribution. If the lower limit of the 95%CI was larger than 1.0, the O/E ratio was considered to be significantly elevated ($P<0.05$).

RESULTS

By the end of 1994, there were 48 suicide deaths among 109,374 person-years of follow-up. The crude annual mortality rate for suicide was $57.4/10^5$ person-years among males, and $33.7/10^5$ person-years among females. The suicide risk among all cancer patients was 1.35 times higher than that of the general population at a marginally significant level (O/E=1.35, 95%CI=0.99–1.79) (Table I). A similar finding was confirmed for both genders. The risk was significantly higher within one year after diagnosis (males: O/E=2.12, 95%CI=1.01–3.90; females: O/E=3.89, 95%CI=1.67–7.66), and decreased with the passage of time following diagnosis with O/E ratios of 0.74 (95%CI=0.20–1.89) among males and 1.19 (95%CI= 0.38–2.77) among females in the period between the fifth and ninth years (Table I). None of the patients who had been tracked for ten or more years committed suicide after ten years past cancer diagnosis. Eight patients (six males, two females) had died from undetermined violent causes. The risk of undetermined violent causes of death remained not statistically different from 1.0 (O/E=1.18, 95%CI=0.51–2.32). This finding was confirmed in both genders (males: O/E=1.27, 95%CI=0.46–2.76; females: O/E=0.97, 95%CI=0.11–3.48). Therefore, the following evaluations are limited to the suicide risk within first five years following cancer diagnosis.

Thirty-nine suicide deaths occurred within the first five years following diagnosis, compared to an expected number of 21.68 (O/E=1.80, 95%CI=1.28–2.46) (Table II). Patients aged 50–59 years at the time of diagnosis had a significantly increased risk of suicide (O/E=2.65, 95%CI=1.48–4.37). There were no substantial differences observed across the years of diagnosis (in 1978–85: O/E=1.93; in 1986–94: O/E=1.67), although the risk among those who were diagnosed in 1978–85 was statistically elevated. The risk increased according to deterioration of clinical stage at the time of diagnosis, from an O/E ratio of 1.08 among patients with localized cancer to an O/E ratio of 4.66 among patients with distant metastasis (Table II). Female patients with cancer in their genital organs (ICD-9 :179–184) and male patients with cancer in their genital organs (ICD-9 :185–187) had a significantly increased risk of suicide (O/E=3.58, 95%CI=1.54–7.06;

Table I. Observed Numbers (O) and Risk of Suicide among Cancer Patients by Sex and Follow-up Period

Sex (Mean age)	Follow-up period (years)	$n^{a)}$	O	O/E	95%CI
Male (61.3 yrs)	0	13,140	10	2.12	1.01–3.90
	1–4	8,313	13	1.37	0.73–2.35
	5–9	3,434	4	0.74	0.20–1.89
	Total	13,140	27	1.24	0.82–1.80
Female (55.5 yrs)	0	10,839	8	3.89	1.67–7.66
	1–4	8,576	8	1.47	0.63–2.90
	5–9	4,966	5	1.19	0.38–2.77
	Total	10,839	21	1.52	0.94–2.32
Total (58.7 yrs)	0	23,979	18	2.66	1.57–4.20
	1–4	16,889	21	1.41	0.87–2.15
	5–9	8,400	9	0.93	0.43–1.77
	Total	23,979	48	1.35	0.99–1.79

95%CI: 95% confidence interval.
a) The numbers of subjects at the beginning of each follow-up period.

Table II. Observed Numbers (O) and Risk of Suicide among Cancer Patients by Various Variables within 5 Years after Diagnosis

| Variable	n	Mean age at diagnosis (years)	O	O/E	95%CI
Total	23,979	58.7	39	1.80	1.28–2.46
Male	13,140	61.3	23	1.62	1.03–2.43
Female	10,839	55.5	16	2.13	1.22–3.47
Age at diagnosis					
15–49 yrs	5,953	41.3	9	2.12	0.97–4.03
50–59	6,325	55.3	15	2.65	1.48–4.37
60–69	6,801	64.9	7	1.19	0.48–2.45
70 yrs or more	4,900	75.6	8	1.36	0.59–2.68
Time at diagnosis					
1978–85	11,052	57.7	21	1.93	1.19–2.95
1986–94	12,927	59.5	18	1.67	0.99–2.64
Stage at diagnosis					
Localized	9,694	57.4	12	1.08	0.55–1.88
Regional	5,603	59.5	8	1.69	0.73–3.33
Distant	4,316	58.5	9	4.66	2.12–8.84
Unknown	4,366	60.6	10	2.60	1.25–4.79
Cancer site					
Stomach	4,389	60.3	6	1.18	0.43–2.57
Colorectum	1,841	59.8	5	2.37	0.76–5.53
Lung	2,976	65.1	5	2.47	0.80–5.77
Female genital organ	2,971	52.5	8	3.58	1.54–7.06
Male genital organ	473	61.0	4	5.86	1.58–15.01
Others	11,329	57.7	11	1.15	0.57–2.06

95%CI: 95% confidence interval.
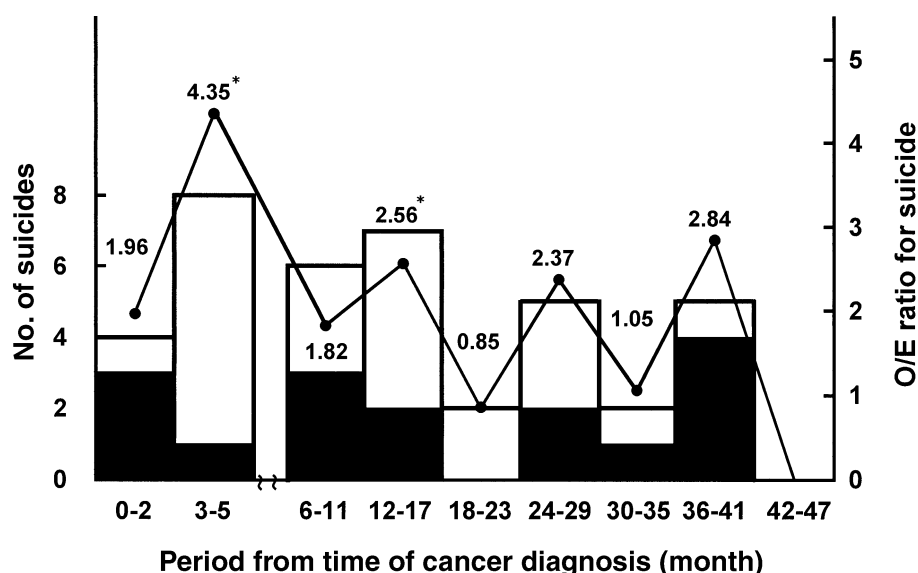
Fig. 1. The number of suicides among the study subjects divided into nine periods of time from cancer diagnosis and by location at which suicide was attempted and committed. The closed circles show the O/E ratio for each period (∗ $P<0.05$). ☐ death in another place, ■ death in hospital, ● O/E ratio for suicide death.

Table III. Methods and Location of Suicide among Study Subjects within 5 Years after Diagnosis of Cancer

Method of suicide	In hospital	In another place	Total
E950: Drug overdose	0	0	0
E951: Poisoning of gas for house	0	1	1
E952: Poisoning of gas for others	0	1	1
E953: Hanging	6	14	20
E954: Drowning	0	2	2
E955: Firearms	0	0	0
E956: Cutting	0	1	1
E957: Jumping	10	1	11
E958: Others	0	3	3
Total	16	23	39

O/E=5.86, 95%CI=1.58–15.01, respectively). Significant excess risk was not evident among patients with cancer in other sites.

The five-year period following diagnosis was divided into nine short periods. Fig.1 shows the number of suicides in the cancer patients divided into the nine short periods and by location at which suicide was attempted and committed, and the O/E ratio for each period. The highest risk was observed between the third and fifth months after diagnosis (O/E=4.35, 95%CI=1.87–8.58, O =8). Of the eight patients in this period, seven killed themselves soon after their discharge from hospital.

Among the 39 patients who took their lives within five years following diagnosis, 16 (41.0%) committed suicide in hospital. Jumping to their death was the most common method (Table III). Twenty-three killed themselves in their houses or at other locations outside of hospital, and hanging was the most common method.

DISCUSSION

In our study, overall suicide risk of cancer patients compared to that of the general population remained at 1.35-fold, which is lower than those reported from Western countries (1.3–2.8).[2–8] The main reason for the relatively lower risk of suicide in this study might be that our study subjects would have had a better prognosis than those in the Western population-based studies because: 1) while the

subjects of the studies conducted in Western countries were comprised of cancer patients who had been registered in each country's regional cancer registry, the subjects of our study were diagnosed at one medical center, where about 80% of them continued to receive treatment; 2) the period (1978–94) during which cancer was diagnosed in the patients in our study, is more recent than those of preceding studies. In addition, our hospital had mental health care professionals available in the oncology wards during the study period, and that might have contributed to the relatively lower risk of suicide.

The present study found that the suicide risk in cancer patients is closely associated with the elapsed time following cancer diagnosis. According to our findings, the suicide risk in patients who survived five years beyond the time of diagnosis does not differ from that of the general population. This study, therefore, focused on the suicide risk factors within the first five years following cancer diagnosis. The suicide risk of patients in their 50s was significantly higher, and the suicide risk of patients 49 years old and younger was marginally significantly higher, than that in the general population. In contrast, the risk of patients in their 60s and older was not higher than that in the general population. It has been considered that the primary issues in psychological adjustment to cancer are: 1) medically related issues, 2) personality, 3) socio-cultural issues, 4) availability of social support, and 5) age-specific developmental life tasks that are threatened or disrupted by cancer.[12] In our cohort, the distribution of clinical stages in the patients aged 59 and younger was not skewed more toward advanced stages than in the patients aged 60 and older (data not shown). A plausible explanation for the higher suicide risk among cancer patients aged 59 or younger is that they are more likely to face psychological adjustment disorders that are triggered by the thwarting of their life goals and by a failure to fulfill their social role, than are the older patients. However, the current study could not define whether the prevalences of other unmeasured but important risk factors for suicide were similar in the cancer patients by age group. Further study would be needed to take account of personality, socio-cultural issues, and social support, which might have influenced suicide attempts among cancer patients.

The present study found an obvious tendency towards higher suicide risk among cancer patients in advanced clinical stages. Bukberg *et al.*[13] reported that 77% of cancer patients whose physical functions were deteriorating with advancing symptoms, exhibited seriously depressed mood. Furthermore, as cancer progresses, patients often experience hyponutrition and a resulting low cholesterol concentration. Engelberg[14] hypothesized that a lowered cholesterol concentration alters the metabolism of brain serotonin, which results in poorer suppression of aggressive behaviors such as suicide. Since the subjects of our study consisted only of patients who were diagnosed at one medical center, there should be a smaller possibility of misclassification of clinical stage compared with cancer patients who are registered in a country's regional cancer registry, as in earlier studies. As a result, we consider that the correlation between the clinical stage of cancer and suicide risk is clearly demonstrated.

Our present study indicates a significantly higher suicide risk in patients with cancer in their genital organs among both male and female patients. Since the prognosis of female patients with cancer in their genital organs is generally more favorable than in those with cancer at other sites, there is only a slight possibility that an unfavorable prognosis might impact the elevation of risk. A Swedish report[4] and a Danish report[5] indicated that a significantly elevated risk was observed in male patients with cancer in their genital organs. However, since the actual incidence of suicidal deaths becomes smaller if categorized by site, care is required in assessing this finding in our study.

We found that the suicide risk among patients diagnosed in 1978–85 was significantly elevated, whereas there were no significant excess risk among patients diagnosed in 1986–94. Generally speaking, the percentage of physicians who disclose a cancer diagnosis to patients in Japan was lower than that in other developed countries.[15] However, the notification rate of identified cancer to patients diagnosed at the OMCC has been increasing and reached 88% on average in 1997 (unpublished data). Therefore, it is unrealistic to consider that the truth-telling practice in our hospital would have influenced the excess risk of suicide among cancer patients.

Some of the earlier cohort studies found evidence of a high risk of suicide occurring close to the time of cancer diagnosis.[3–8] We divided the period from the time of diagnosis up to five years following diagnosis into nine segments, and calculated the risk in each period in order to identify the specific period bearing the highest risk. The highest risk was observed over the period between the third and fifth months following cancer diagnosis, and the review of the medical records showed that seven of the eight patients who committed suicide in this period killed themselves soon after discharge from hospital. In Japan, the National Cancer Survey reported that cancer patients who are discharged alive after their initial admission stayed in the hospital for 56 days on the average.[16] For many Japanese cancer patients, the period between the third and fifth months corresponds to the time immediately following their discharge. Compared with the time spent in hospital, patients are thought to receive less support in terms of medical care after their discharge, and have greater access to various means of committing suicide. In addition, the discharged patients are often confronted with various issues such as returning to their household responsibilities, returning to their jobs, and resuming their nor-

mal family role and function. If cancer patients are not able to adjust themselves successfully when they resume their social roles and responsibilities, they would lose confidence, which would tend to intensify their feelings of insecurity, anxiety and depression.[17] In order to reduce the high suicide rate which occurs during this short period, clinicians should consider asking cancer patients about suicide risk factors before they are discharged. It is also important to note the need for easier access to counseling provided by psychologists or psychiatrists for cancer patients having psychological issues.

Hanging was the most frequent method of suicide among those who committed suicide within five years of their diagnosis (20/39). There was no case of drug overdose, although this method is often used among patients in Western countries.[18, 19] As for methods of suicide by location, 61% (14/23) of patients who committed suicide out-side hospital hanged themselves. This is approximately equivalent to the Japanese national average of 63% for suicide by hanging.[20] On the other hand, the most frequent method of suicide committed in the hospital was jumping to their death (10/16). This finding indicates that Japanese medical workers engaged in cancer care should consider improved guard systems within their buildings.

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