Proportion of Cancer Deaths Occurring in Hospital, Canada, 1994-2000

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ABSTRACT

Background: Most terminally ill cancer patients would prefer not to die in hospital, but only a minority achieve their wish. Our objective was to examine the proportion of cancer deaths occurring in Canadian hospitals.

Methods: The two sources of data (1994-2000) were: 1) all hospital separations (HS) with a primary diagnosis of cancer and discharge as 'dead'; 2) all death certificates (DC) with cancer as underlying cause of death. Proportions of hospital deaths were estimated with two different numerators: 1) hospital cancer deaths from HS data, and 2) deaths with hospital as location from DC data; the denominator for both were all cancer deaths identified from the DC data.

Results: Proportions of hospital deaths from HS data decreased from 55% to 40% over 1994-2000, was slightly lower for females, decreased with age, but varied widely among provinces. Proportions of hospital deaths from DC data started at 80% and showed a small downward trend over the years. While age, sex, and cancer site distributions stayed the same, the proportion of hospital deaths from DC data again varied among provinces. For provinces with the home category completed on the DC data, 1999-2000, Alberta had most home deaths at 15.6% and PEI least at 5.7%.

Interpretation: This is the first Canada-wide data on place of death for terminal cancer, which is important for determining and comparing present-day practices, as well as for planning for the future.

MeSH terms: Neoplasms; death; hospital; home

La traduction du résumé se trouve à la fin de l'article.

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Nearly half of palliative care patients and most terminally ill cancer patients prefer not to die in hospital, yet only a minority achieve their wish.¹⁻⁴ Indications are that the disparity between desired and actual place of death is changing. Cancer deaths occurring in acute care hospitals declined by nearly 10% from 1992 to 1997 in Nova Scotia.⁵ Prior to the 1992/1993 implementation of a palliative care program in Edmonton, 86% of cancer deaths occurred in acute care hospitals, but three years later, this had dropped to 49%.⁶ Abroad, the proportion of in-hospital deaths varied from 63% in Australia in 1993,⁷ to 42% in Ireland in 1997,⁸ with studies in the United States (US), Europe, and Australia closer to 50%.⁹⁻¹¹ Within their own context, most study populations show decreasing trends in hospital deaths.^{7,10-12}

Certain patient characteristics sometimes affect the likelihood of dying in hospital, but results are highly variable. The Nova Scotia study found that younger patients were more likely to die in hospital;⁵ this was corroborated in a number of other studies,^{6,9-11,13} but was not the case in some.^{7,10,14} The Nova Scotia study also found that females were more likely to die out of hospital,⁵ and other studies tended to agree.^{7,10,12,13} Australian and United Kingdom studies found that prostate, breast and haematological cancer patients were more likely to die in hospital than those with other types of cancers.^{10,15}

Both in Canada and elsewhere, most, if not all, the information on place of death has come from short-term and localized studies. In order to help more patients fulfil their wish of not dying in hospital, more information is needed on trends over a longer period of time covering larger populations. Our objective is to use Canadian national databases to determine what proportion of cancer deaths occurred in hospitals, and of those not occurring in hospital, whether they occurred at home. While Canadian national databases are valuable resources for comprehensive nationwide data, they do have limitations, and thus, a secondary objective will be to examine the extent to which such information can reliably be derived from these databases.

METHOD

The two sources of data were the Hospital Morbidity Databases (HMD) and the

Vital Statistics Database which includes the death certificates (DC). Hospital separations (HS) with cancer as primary cause for hospitalization and with discharge as 'dead' were selected from HMD. Deaths with cancer as underlying cause of death were selected from DC data. Both datasets included sex, age, year of death, province of residence and diagnosis, and both covered the years 1994-2000. Options for place of death on DCs include hospital, home, other facility, and unknown.

Using DC data, the percentage of hospital cancer deaths was calculated by dividing number of DC deaths with location of death coded as hospital (numerator), by total DC cancer deaths (denominator). Using HS data, the percentage of hospital cancer deaths was estimated by dividing cancer hospitalizations discharged as dead (numerator), also by the total DC cancer deaths (denominator). Both sets of percentages are presented so that the differences in meaning of 'hospital deaths' from the two data sets would provide extra information on location of death. Differences are:

1. DC deaths coded as occurring in hospital also include those dead on arrival and/or occurring in emergency departments, while HS hospital deaths include only patients officially admitted to hospital.
2. DC deaths coded as occurring in hospital also include chronic care hospital deaths which are not usually included with HS deaths. The latter are generally limited to acute care hospitals.
3. All Canadian deaths are captured in DC data, including Canadian residents who died in the US, while HS deaths are assigned to province of residence.
4. DC data were selected using underlying cause of death, while HS data were selected using the primary diagnosis for hospital admission.

RESULTS

During 1994-2000, 77% of cancer deaths occurred in hospital according to death certificates data and 46% as estimated from hospital separations data (Table I). Both sources show that women and the elderly are least likely to die in hospital. DC data indicated that 80% of cancer deaths occurred in hospital in 1994 fol-

TABLE I

Proportion of Cancer Deaths in Hospital by Selected Variables, from Death Certificates (DC) and Hospital Separations (HS)

		All DC Cancer Deaths	DC Hospital Cancer Deaths*	HS Hospital Cancer Deaths*
Sex	Male	228,506	78.5	47.9
	Female	197,943	75.6	44.7
Age (years)	<20	1,820	70.2	51.8
	20-39	8,667	78.8	52.0
	40-59	73,394	77.8	49.4
	60-79	234,791	78.6	48.6
	80+	107,758	73.5	39.2
Cancer sites	Breast	34,468	74.1	24.7
	Prostate	25,573	74.5	29.1
	Lung	110,446	79.1	44.7
	Colorectal	44,027	75.4	40.3
	Other	203,359	77.2	56.5
Years	1994	58,291	82.2	55.3
	1995	58,798	79.2	53.0
	1996	60,273	77.0	48.6
	1997	59,757	75.7	45.4
	1998	61,710	74.7	43.0
	1999	62,751	75.0	41.8
	2000	64,869	76.5	39.0
Provinces	NF	7,853	77.7	32.2
	PEI	2,202	67.1	44.2
	NS	16,052	71.1	37.0
	NB	11,771	87.8	46.2
	QC	113,928	87.3	60.6
	ON	156,827	71.2	43.4
	MB	17,890	83.5	59.4
	SK	15,677	72.2	43.5
	AB	31,159	65.6	34.1
	BC	52,393	79.0	33.9
	YUK	247	73.7	42.5
	NWT	399	55.6	17.3
	NVT	53	9.4	3.8
Total		426,449	77.1	46.4

* expressed as percent of total DC cancer deaths

lowed by a decline before levelling in later years, while HS data recorded 50-60% of cancer deaths in hospital in 1994 and declined steadily thereafter. The two oldest age groups, which include most of the deaths, show a clear difference between sexes in proportion of hospital death, with males having the higher rate. Figure 2 demonstrates that the DC data showed little variation by cancer site, while hospital deaths as estimated from HS data varied over time by as much as 30%, with prostate and breast cancer the lowest and 'other cancers' the highest.

Provincial data show considerable variation in level and trend (Figure 3). Quebec showed the highest proportions with DC hospital deaths at 85-90% and HS data rates at 55-69%. Ontario shows a decrease for the DC data (82% to 66%) followed by a rebound, and a steady decline (53% to 35%) for the HS data. Prince Edward Island (PEI)'s smaller population likely accounts for the higher variability shown. Most provinces show higher rates of hospital deaths for men than for women.

Information on proportion of deaths in non-hospital facilities or at home is available on DC data for some provinces (Figure 4). Alberta began collecting this information in 1996, and other provinces followed suit in later years. By 1999-2000, information on home deaths was available for Newfoundland, PEI, New Brunswick (NB), Manitoba, and Alberta. Figure 4 shows that Alberta has most home deaths (vertical stripes) at 15.6% followed by NB at 12.7%. Deaths occurring in 'other facilities' (horizontal broken lines) are greatest in PEI at 24.0% followed by Alberta at 16.5%. Information in the bottom two sections of the bars is similar to that for years 1999-2000 in earlier figures. The lowest cross-hatched section of each bar indicates HS inpatient deaths, while the fine cross-hatched section indicates the gap between reported hospital deaths from DC and HS data.

DISCUSSION

This study represents the first Canada-wide analysis of place of death for cancer

deaths and is based on two national databases, each with their own story to tell. Especially striking is that the percentages of cancer deaths in death certificates data coded as hospital deaths consistently were around 80%, while hospital separations cancer deaths as a percentage of all cancer deaths were approximately 46% when averaged over the entire period, but decreased from 55% to 40% from the start to the end of the study period (Figure 1). The discrepancies between proportions of hospital deaths, when derived from DC or from HS data, may be partially attributable to differences in meaning of the concept of hospital death in the two datasets. For example, DC data also include chronic or emergency care deaths with hospital deaths, while HS-based data would have been limited to general hospital deaths. The disparity may also be partially attributable to different data selection processes. DC cancer deaths were selected by underlying cause of death, while HS cancer deaths were selected by primary cause for hospitalization, which do not necessarily mean the same thing.

Another issue is the variation in proportions of hospital deaths by province (Figure 3), e.g., Quebec exhibits considerably higher proportions than Ontario. While these differences could genuinely reflect actual differences in health care practices such as the availability of home care, it cannot be discounted that variation may be due to administrative differences among the provinces, e.g., different coding conventions, or proportion of chronic beds in general hospitals. That administrative differences exist is obvious from Figure 4. For example, the listed options for place of death on DC data include 'hospital', 'home', 'other facility', and 'unknown', but currently only half of the provinces are providing results for all options. Even if all available choices were completed, the coding of place of death might still have different meanings among provinces, e.g., hospital might or might not include chronic beds.

Two Canadian studies provided comparable data on cancer deaths on smaller populations.^{5,16} The Nova Scotia study selected cancer deaths based on death certificate data and linked them to other data sets to determine place of death more accurately. The proportion of cancer deaths in

Figure 1. Trends in % cancer deaths in hospital by sex and age, Canada, 1994-2000

Figure 2. Trends in % cancer deaths in hospital by cancer sites, Canada, 1994-2000

Figure 3. Trends in % cancer deaths in hospital by sex and province, Canada, 1994-2000

Figure 4. Place of death by province, Canada, 1999/2000

Nova Scotia in acute care hospitals changed from 80.2% to 70% during 1992-1997.⁵ Since their cases were also selected from DC data, they are similar to the DC data of this study for those years (Figure 3). The Edmonton study had cancer deaths identified by a census of possible locations and found that 86% of cancer deaths occurred in acute care hospitals in 1992/1993.¹⁶ This is higher than the rate in the first year of our Alberta DC data. After the introduction of a palliative care program, the proportion of cancer deaths in acute care hospitals dropped to 49% and a drop in proportion of hospital deaths in our study was noted in Alberta after 1994 (Figure 4). The DC data of the present study appear more in agreement with these two studies, and it is possible that deaths with cancer as underlying cause on the DC occurred in hospital without cancer noted as the primary cause of hospitalization in the HS data.

Patient characteristics also affect the likelihood of dying in hospital (Figures 2 and 3). The Nova Scotia study found that elderly cancer patients were the least likely to die in hospital. The present study found that the youngest (0-19) age group (not in Nova Scotia study) was the least likely to die in hospital, followed by the over 80 group. The Nova Scotia study found men most likely to die in hospital,⁵ as did the present study, especially for the older age groups. While Australian and UK studies found that patients with prostate or breast cancer were more likely to die in hospital,^{10,15} the present study found little difference between the cancer sites in the DC data, although the HS data showed lower proportions for breast and prostate cancer than for other cancers. Because of the protracted course of these cancers, it is possible that associated deaths were more often attributed to competing causes.

In spite of the wish of patients to die at home, it seems that the majority will die in hospitals.¹⁻⁴ The present study confirmed that in Canada only a small proportion of cancer deaths are outside of hospital and still fewer at home. No other nationwide data are available on place of cancer deaths. These data are crucial in planning the type of health care that not only has high patient satisfaction but is also cost-effective. Care outside of hospital has been shown to be more cost-effective while providing

equal or higher levels of patient satisfaction.¹⁷ Although the per capita cost (\$60 to \$90 per day for the years of this study) of home care is increasing, it is still only a fraction of hospital care.¹⁸ At present, home care reaches only a small proportion of Canadian terminal cancer patients as seen from this study (Figure 4), even though keeping convalescent or palliative care patients out of acute care hospital would save millions of dollars. With decreasing hospital beds and increasing community-based care,¹⁹ one would expect the proportion of terminally ill patients dying in hospitals to decline. Providing adequate information about place and circumstances of death is the first step in effective health service planning. A simple way of improving place of death information would be by using all the options for place of death on DC. Some additions to the options, e.g., distinguishing between acute, chronic and palliative care, would make the data even more valuable. The DC data will then be such that there is no need to add the extra complexity of using the data from the Hospital Morbidity Databases. A minor change in the completion of death certificates will reap great benefits in being able to plan health care that is not only cost-effective but also leads to greater patient satisfaction.

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RÉSUMÉ

Contexte : La plupart des personnes atteintes d'un cancer en phase terminale préféreraient ne pas mourir à l'hôpital, mais seule une faible minorité d'entre elles voit son souhait exaucé. Notre objectif était d'examiner la proportion de personnes atteintes d'un cancer qui meurent dans les hôpitaux.

Méthode : Les deux sources de données (pour 1994-2000) étaient les suivantes : 1) tous les congés de l'hôpital à la suite d'un diagnostic primaire de cancer ou d'un décès; 2) tous les certificats de décès indiquant un cancer comme cause initiale du décès. La proportion de décès survenus à l'hôpital a été estimée au moyen de deux numérateurs : 1) décès causés par un cancer survenus à l'hôpital, tirés des données sur les congés de l'hôpital, et 2) décès survenus à l'hôpital, selon les certificats de décès. Le dénominateur commun est le décès causé par un cancer, selon les certificats de décès.

Résultats : La proportion des décès survenus à l'hôpital, selon les données sur les congés de l'hôpital, est tombée de 55 % à 40 % entre 1994 et 2000. Elle était légèrement plus faible dans le cas des femmes et diminuait avec l'âge, mais elle variait considérablement entre les provinces. La proportion des décès survenus à l'hôpital, selon les certificats de décès, commençait à 80 % et diminuait légèrement au fil des ans. Tandis que la répartition selon l'âge, le sexe et la localisation du cancer demeurait la même, la proportion de décès survenus dans les hôpitaux, selon les certificats de décès, variait d'une province à l'autre. Dans le cas des provinces où les décès à domicile étaient indiqués dans les certificats de décès pour 1999-2000, l'Alberta avait la plus grande proportion de décès à domicile, soit 15,6 %, tandis que l'Île-du-Prince-Édouard avait la plus faible, soit 5,7 %.

Interprétation : Ce sont les premières données au Canada sur le lieu de décès par suite d'un cancer terminal, données qui sont importantes pour déterminer et comparer les pratiques actuelles et pour planifier l'avenir.