



Project Report

What Is the “Right” Number of Hospital Beds for Palliative Population Health Needs?

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Abstract: Healthcare services are one of the twelve determinants of population health. While all types of healthcare services are important, timely access to hospital-based care when needed is critical. For three decades, long waits and wait lists for hospital admission and inpatient care have been a concern in Canada. Undersupply of hospital beds to meet population needs may be the cause of this as hospitals were downsized due to government funding cutbacks and hospital expansion has not occurred since despite population growth and aging. The availability of hospital beds for palliative population health needs may therefore be an issue, particularly as longstanding concern exists about terminally-ill and dying people being frequently admitted to hospital and having long hospital stays. A decline in hospital deaths in many developed countries, including Canada, could indicate that palliative population needs for hospital-based care are not being met. This paper compares the number of hospitals and hospital beds that exist in 9 Canadian provinces and 15 developed countries in relation to population and spatial considerations in an attempt to determine an optimal number of hospital beds for the general public and thus also palliative population health needs. **Methods:** Document analysis. Publicly-available hospital, population, and geographic information was sought for 9 Canadian provinces and 15 developed countries and compared. **Results:** Major differences in citizen to hospital bed ratios and citizen to hospital ratios across provinces and countries were found. The availability of hospitals and hospital beds clearly varies. **Conclusion:** Some regions may have too few hospitals and hospital beds to meet the palliative and other care needs of their citizens. Sufficient beds should exist so necessary admissions to hospital can occur without harmful delay.

Keywords: hospital; accessibility; benchmarking; indicators; palliative

1. Introduction

Healthcare services are one of the twelve determinants of population health [1]. All healthcare services have value, but acute care hospitals are an essential component of all healthcare systems. The age-old consolidation of healthcare services in hospital is of great benefit to all people, including terminally-ill and dying people, as a wide range of accessible onsite services and service providers are often required to address their healthcare needs. Although most hospitals now have an ambulatory division comprised of emergency, day surgery, and outpatient services; inpatient care continues to be a major feature. Very-ill people, including those who are approaching death, may require days, if not weeks, of inpatient care [2,3]. In Canada, the average length of hospital stay is now 7.7 days, slightly more than the Organization for Economic Co-operation and Development (OECD) average of 7.2 [4]. Given the importance of hospitals, hospital accessibility for terminally-ill and dying people in need of hospital-based end-of-life or other hospital-based care services should be a matter of considerable

worldwide interest [5]. Terminally-ill and dying people are among the most vulnerable of all people, and they often develop health concerns that tend to worsen over time [2,3].

To date, hospital accessibility has been commonly recognized as an issue for rural and remote populations, with travelling to larger communities often required for hospital access and with this situation raising concern over delayed access to necessary health care [5–7]. Reduced urban hospital accessibility has also been identified as a problem for new immigrants, disabled people, elderly persons, people living in poverty, minimally-educated people, homeless persons, and other defined disadvantaged sub-populations [8]. Although end-of-life care needs are often present [2,3], terminally-ill and dying people could also have reduced access to necessary hospital-based care such as specialist palliative care.

Hospital accessibility is a major concern in Canada, as despite a 1966 national *Medical Care Act* that mandates universal accessibility to medically-necessary healthcare services in hospitals and other places, long waits for inpatient hospital tests and treatments have been a concern for at least 30 years [9,10]. Hospital downsizing could be a reason for these long waits and wait lists. Starting in the 1985/86 year but accelerating in the 1990s, hospital downsizing occurred across Canada in response to a series of government funding reductions [9,11]. By 1997, an overall 25% bed reduction meant only 132,000 hospital beds were open as compared to 139,000 beds five years previously [9,11]. Hospital downsizing was not uniform across Canada, however. In the province of Alberta, one half of all hospital beds were closed due to a major 1993–1995 cost cutting and health system reform exercise [12]. Few beds have reopened since in Alberta or across Canada, despite considerable population growth and population aging. For instance, Alberta's population nearly doubled in size from 2.4 million in 1993 when the hospital beds began to close to 4.1 million in 2015, and yet the number of hospital beds in the province grew marginally over this time period [13,14].

In 2004, a 10-year Federal government initiative called The Accord sought to reduce hospital waits and wait lists across Canada, as these were increasingly evident and problematic at many levels, including political ones [10]. Of concern was that delays in tests and treatments were jeopardizing health, with secondary illnesses and even deaths being attributed to long waits for hospital services [10]. What was not featured was the concern that terminally-ill and dying people could have also been severely impacted by this substantial and sustained hospital downsizing. The final report on The Accord revealed increased hospital efficiency had occurred over this 10-year project but with no reduction in waits or wait lists as the total volume of procedures performed had markedly increased [10]. Again, no mention was made of palliative patient accessibility concerns or accessibility improvements in this final report.

Hospital accessibility issues are not confined to Canada; many other countries have identified bed shortages and also geographic mismatching of beds to various sub-populations [15]. To date, it does not appear that consideration has been given to determining the “right” number of hospital beds to meet general population health needs or, more specifically, palliative population health needs. This paper uses a comparative analysis of publicly-available hospital, population, and geographic information to emphasize the concern that hospital beds need to be readily available for palliative and other purposes, with recommendations based on the findings.

2. Materials and Methods

In 2018, publicly-available hospital, population, and geographic information was sought through government, health department, and other online sources of information for 9 of the 10 Canadian provinces, as each province manages its own healthcare system. Quebec, the 10th province, does not release healthcare information for comparative purposes. Similar information was sought for 15 developed OECD countries with primarily public healthcare systems, as the Canadian healthcare system is essentially public in relation to healthcare services funding, management, and delivery. Information for countries with mixed private and public or entirely private systems was not sought, as market forces greatly impact hospital accessibility and utilization.

Hospital, population, and geographic information (after this information was confirmed through at least one additional information source) was placed in Table 1, along with associated descriptive-comparative findings. These findings feature ratios, notably a citizen to hospital ratio and a citizen to hospital bed ratio, for each reported province and country.

Table 1. Hospital, Hospital Bed, Population, and Spatial Information by Jurisdiction.

Province or Country	Hospitals (N)	Hospital Beds (N)	Population (N)	Citizens per Hospital (ratio)	Citizens per Bed (ratio)	Jurisdiction's Geographical Area (square kilometers)	Average Area per Hospital (square kilometers)
Canadian Provinces							
Alberta	106	9079	4.067M	38,368	448	661,848	6244
British Columbia	98	10,527	4.777M	48,745	454	944,735	9640
Manitoba	71	4245	1.278M	18,000	301	647,797	9124
New Brunswick	24	2347	747,101	31,129	318	73,440	3060
Newfoundland and Labrador	33	1361	519,716	15,749	382	405,720	12,295
Nova Scotia	36	2811	923,598	25,656	329	55,284	1536
Ontario	144	26,013	13.448M	93,392	517	1,076,395	7475
Prince Edward Island	7	488	142,907	20,415	293	5620	803
Saskatchewan	61	3079	1.158M	18,984	376	651,900	9488
Cross-border Average				34,493	380		6629
International							
Australia	1322	89,019	24.772M	18,738	278	7,692,024	5818
Belgium	177	69,464	11.499M	64,966	166	30,528	172
Denmark	89	14,871	5.754M	64,652	387	43,094	484
England	1895	169,995	66.573M	35,131	392	130,279	69
France	3089	408,245	65.233M	21,118	160	547,030	177
Germany	3108	664,364	82.293M	26,478	124	357,021	115
Ireland	69	14,076	4.803M	69,609	341	84,421	1223
Italy	1115	194,065	59.291M	53,176	306	301,340	270
Japan	8480	1,672,594	127.185M	14,998	76	378,000	45
New Zealand	159	12,821	4.750M	29,874	370	268,021	1686
Norway	62	19,519	5.353M	86,339	274	385,252	6214
Scotland	275	21,525	5.405M	19,655	251	80,240	292
Sweden	78	23,885	9.983M	127,987	418	449,964	5769
Switzerland	288	37,965	8.544M	29,667	225	41,293	143
The Netherlands	505	70,310	17.084M	33,830	243	41,526	82
Cross-border Average				46,415	267		1504

Table Information Sources (in addition to jurisdiction-specific government and health department information):

Canadian Institute for Health Information. (2018). *Number of hospital beds staffed and in operation: Breakdown by care setting*. Canadian MIS Database (CMDB), 2016–2017. <https://www.cihi.ca/en/access-data-reports/results?query=Number+of+hospital+beds+staffed+and+in+operation%3A+Breakdown+by+care+setting.+Canadian+MIS+Database+%28CMDB%29%2C+2016%E2%80%932017&Search+Submit=>.

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3. Results

Major differences in citizen to hospital and citizen to bed ratios were found across the studied jurisdictions. Citizen to bed ratios in the Canada provinces ranged from 293:1 in Prince Edward Island to 517:1 in Ontario (a 176.5% difference), and internationally from 76:1 in Japan to 418:1 in

Sweden (a 550.0% difference). Table 1 also reveals pronounced differences in citizen to hospital ratios; ranging across the Canadian provinces from a low of 15,749 citizens per hospital in Newfoundland and Labrador to a high of 93,392 citizens per hospital in Ontario (a 593.0% difference). Internationally, these differences ranged from 14,998 citizens per hospital in Japan to 127,987 citizens per hospital in Sweden (an 853.4% difference). The average geographical space per hospital also varied greatly across the 9 provinces (a 1531.1% difference): from 803 square kilometers in Prince Edward Island to 12,295 square kilometers in Newfoundland and Labrador. Similarly, these differences ranged internationally from as little as 45 square kilometers in Japan to 6214 square kilometers in Norway (a 13,808.9% difference).

4. Discussion

With major differences in citizen to hospital and citizen to hospital bed ratios found across the 9 Canadian provinces and the 15 comparison countries, it is evident that hospital accessibility varies considerably across these jurisdictions. The citizen-based ratios that demonstrate some jurisdictions have more hospitals and hospital beds respectively than other jurisdictions may simply reflect greater population healthcare needs, although this conclusion is unlikely as a relatively similar health status of all developed country populations could be expected [1]. However, some hospital accessibility and subsequent utilization differences across these jurisdictions can be expected. For instance, in the Canadian province of Alberta, 25% of the province's hospital beds are situated in rural/remote areas where only 17% of the province's citizens reside [13,14]. Moreover, most rural and remote Alberta hospitals only have <70% bed occupancy while large urban hospitals consistently have 95%+ bed occupancy, and yet 1 in 3 patients in urban hospitals live in rural or remote areas of the province [13,14]. Although rural/remote people typically have more health problems than urbanites, and they also tend to be older and therefore are more likely to need palliative care [16], this rural/urban hospital accessibility and hospital utilization mismatch helps explain Alberta's long waits for scheduled hospital services.

Moreover, the greater relative availability of hospitals and hospital beds in some jurisdictions over others suggests highly variable hospital utilization. For instance, Japan's much more accessible hospitals and hospital beds, both in terms of hospital/citizen and bed/citizen ratios as well as spatial considerations, helps explain their 16.5 day average hospital stay, the longest average hospital stay of all OECD countries [4,17].

However, the analyzed data does not explain if terminally-ill and dying people are able to get hospital-based care services, including end-stage end-of-life care, when they need it. In this regard, unfortunately, the accessibility and use of hospitals for palliative care purposes is not profiled in these ratios, nor are they profiled in any reports from these jurisdictions, although it has long been thought that terminally-ill and dying people everywhere are often hospitalized and that they typically have long hospital stays [18–21]. It is possible that terminally-ill and dying people are more readily admitted to hospital than many other people who arrive in emergency departments for care, with research needed to confirm or refute this potential utilization pattern. It is also possible that terminally-ill and dying people in some countries or jurisdictions have more non-hospital care services available to them now as compared to the services that are available for other people.

Cross-border hospital utilization differences by terminally-ill and dying persons are also extremely likely because of varying local or regional numbers of hospices, palliative ambulatory care services, palliative home care services, and other palliative services such as those provided by communities including churches through their home visitation and support services. Furthermore, additional cross-border differences should be considered before drawing major hospital accessibility conclusions; for example, the cultural beliefs and social standards that people in every country or perhaps every distinct community have and follow regarding the care of older people (the target population for having palliative care needs) and also the care of people of all ages who are dying. As such, although there is a common tendency to compare the same variables and thus the same data across countries or

other jurisdictions, caution is needed in making policy or other determinations. Even the developed countries that are compared in Table 1 are likely to have important differences in culture, healthcare beliefs and preferences, family size and proximity to family members, and other salient factors. This diversity is one of the main reasons why a holistic and detailed analysis is needed to determine in each jurisdiction if hospital and hospital bed excesses or shortages exist, and more specifically if the hospital-based palliative and other needs of their citizens are being met or not. This analysis should consider hospital size, as some onsite services such as specialist palliative care units are usually only situated in larger hospitals, and also consider travelling times and travelling difficulty for terminally-ill and dying citizens in relation to their accessing hospital [22].

Moreover, this analysis needs to consider that differences in the current placement and number of hospitals in each region typically reflect historic political and socio-demographic factors [22]. The existing placement and number of hospitals may not match current or future palliative population needs, and particularly as the annual number of deaths is expected to increase greatly with population growth and aging. Much information is needed then to determine if citizens with palliative care needs are advantaged or disadvantaged in relation to hospital accessibility now or likely to be advantaged or disadvantaged in the future. Chronic long waits for scheduled inpatient care is an indicator of inaccessibility, however. Other measures such as in-hospital mortality and the occurrence of deaths in emergency departments in combination with information profiling the characteristics of these patients (i.e., cause of death, age, marital status and living arrangement, etc.) may be additional helpful indicators.

This examination is essential as it is of great significance to terminally-ill and dying people, as well as the family members who are providing home-based end-of-life care or the family members who cannot help but are still concerned about their terminally-ill and dying family member. During a terminal illness, necessary admissions to hospital should occur in a timely fashion as delays contribute to illness progression, higher drug and other healthcare costs, and earlier mortality, not to mention additional pain and suffering [10]. The ratios that were devised for this report, together with other data, may be helpful then for seeking to ensure an optimal number of hospital beds exist in developed countries for people with palliative care needs.

5. Conclusions

Highly diverse citizen to hospital and citizen to hospital bed ratios were found across 9 Canadian provinces and 15 developed countries. These differences are an enigma for palliative care. Most governments are currently seeking new ways to better meet the wide range of healthcare needs of citizens. The findings of this report should focus attention to the concern that hospitals and hospital beds are also needed for palliative populations.

Excess hospital accessibility is a macro-level problem, as hospitals are costly both directly and indirectly as hospital utilization improvements and community-based care innovations may be delayed. In contrast, inadequate hospital accessibility is of major significance at both the individual and family level. Although there is hope that terminally-ill and dying people should not have to rely on hospitals for their end-of-life care needs, the reality is that some people die in hospital now and some people will always die in hospital. Some will die in hospital after appropriate treatments there have failed to sustain life. Others will die in hospital because their pain and suffering is not managed or controlled elsewhere. Some will die in hospital because they have no family members or friends to provide end-of-life care elsewhere. It is therefore important to emphasize that “high-performing health systems provide timely access to care for their citizens,” [10] and this includes their terminally-ill and dying citizens.

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