Age, costs of acute and long-term care and proximity to death: evidence for 1987–88 and 1994–95 in British Columbia

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Abstract

Background: the consequences of ageing populations for health care costs have become a concern for governments and health care funders in most countries. However, there is increasing evidence that costs are more closely related to proximity to death than to age. This means that projections using age-specific costs will exaggerate the impact of ageing. Previous studies of the relationship of age, proximity to death and costs have been restricted to acute medical care.
Objective: to assess the effects of age and proximity to death on costs of both acute medical care and nursing and social care, and to assess if this relationship was stable in a time of rapid change in health care expenditure.
Design and methods: we compared all decedents in the chosen age categories for the years 1987–88 and 1994–95 with all survivors in the same age groups. We measured use of health and social care for each individual using the British Columbia linked data, and costs of care assessed by multiplying the number of services by the unit cost of each service.
Setting: the Province of British Columbia.
Subjects: all decedents in 1987–88 and 1994–95 in British Columbia in the chosen age groups, and all survivors in the same age groups.
Results: costs of acute care rise with age, but the proximity to death is a more important factor in determining costs. The additional costs of dying fall with age. In contrast, costs of nursing and social care rise with age, but additional costs for those who are dying increase with age. Similar patterns were found for the two cohorts.
Conclusions: age is less important than proximity to death as a predictor of costs. However, the pattern of social and nursing care costs is different from that for acute medical care. In planning services it is important to take into account the relatively larger impact of ageing on social and nursing care than on acute care.

Keywords: *ageing, health care costs*

Introduction

The others...tallied their age not in relation to the number of years they had lived, but in relation to the time left to them before they died.
    Gabriel Garcia Marquez, *Love in the Time of Cholera* (London: Penguin Books, 1989)

Understanding the effects of population ageing is important for planning the finance and provision of health care. Concerns about the effects of the ageing of the population on health care costs have a long history. It has been suggested that uncertainty about the effects forms "a smoke screen behind which advocates of particular social policies advance their agendas" [1].

The degree to which increasing costs are simply responses to changing demographic variables (as opposed to being the result of care choices made) is small [2–7]. Older people are getting access to a wider

range of services and the increase in costs that is attributable to the larger number of older people is relatively small. In many cases this is desirable, but increased costs are the result of decisions to enhance access rather than pure ageing effects. While the use of all health care services is strongly correlated with age at any point in time, it is not appropriate to extrapolate from this to a prediction of the effects of population ageing on future cost increases [8]. Costs of care are more closely related to proximity to death than age [1, 2, 9–14].

Although costs of care generally rise with age, the main reason why costs of acute care appear to be much higher for older populations is that more people are near the end of their lives, and are receiving treatment for diseases that will lead eventually to their deaths. Yet even this is not a straightforward relationship. The costs of dying have been found to be inversely related to age at death [15], that is the additional costs of care for people near to death fall as age increases. Although this effect has been demonstrated for acute services, the overall patterns when costs of nursing and social care are taken into account have not previously been reported.

Here we compare the relationship between acute medical care costs (hospital, pharmaceutical and physician), costs of nursing and social care, and age for those who died in British Columbia in 1987–88 and 1994–95 and in a matched sample of people of similar ages who survived. We aim to answer three questions. First, how is the additional cost of medical care and nursing and social care for those near to death related to age at death? Secondly, what are the relationships between total costs of care, age and proximity to death? Thirdly, how did these relationships change in the 7 years between 1987–88 and 1994–95, a period of institutional downsizing in the health sector in British Columbia?

Methods

We took data from the British Columbia Linked Health Data. This data set links records of encounters with physicians and alternative providers, hospital separations, continuing care system use (both in facilities and at home), pharmaceutical expenditures (for the population aged 65 and over) and deaths. Government programmes pay for most of this care, although the total cost estimates include small, means-tested contributions from patients and clients for some domiciliary and residential care. In all years and for all data sets the linkage rate exceeds 95%. Since almost all health and social care interventions can be assigned accurately to specific individuals, the total use of services by each individual can be calculated with a high level of precision. It is not therefore plausible that the observed patterns of cost are due to poor quality data.

The linkage provides a comprehensive coverage of costs (excluding a small portion for custodial care) for the elderly population [16].

We calculated the cost of hospital care by multiplying the data on service use by the average cost for each day of care. We calculated directly reimbursed costs, such as expenditure on physician and other professional services and drugs from actual expenditure. This is in line with costing methods recommended for economic studies in medical journals [17, 18]. All costs are in Canadian dollars uprated to 1995 prices.

We calculated costs of acute and continuing care for the last 6 months of life for all people in British Columbia in the designated age categories who died in the two study periods (1987–88 and 1994–95) for whom we had extracted at least one full year of data prior to death. For the comparison group, we collected data on health services use and costs for an equivalent 6-month period for people of the same ages who were alive at the end of the study. The comparison group included all people in the age categories in British Columbia who did not die. In effect, the decedent and comparison groups together form a complete census of the populations in these age categories in these years. Since the cohorts followed in this study are also being used in a longitudinal study requiring large numbers, wider age bands were used for the older patients. The age categories in this study are those for whom data collection started at ages 65, 75–76, 85–87 and 90–93. Table 1 shows the numbers of survivors and decedents in each age group for each cohort in this study.

Results

Table 2 and Figure 1 show the costs of medical care, social and nursing care, and total costs of health and

Table 1. Numbers of survivors and decedents by age (at the start of data collection) and cohort

Age band	Outcome	Cohort	
		1	2
65	Alive	26577	26778
	Died	913	839
75–76	Alive	25956	32114
	Died	2424	2843
85–87	Alive	9900	13198
	Died	2715	3804
90–93	Alive	4708	5226
	Died	2010	2469
Total		75203	87271

Table 2. Costs of medical and social care by age (at the start of data collection) and cohort, in Canadian dollars (1995 prices)—last 6 months of life and similar period for survivors

Age band	Cohort	Outcome	Cost of care			Difference in costs			Cost ratio died/ survived
			Medical	Social/nursing	Total	Medical	Social/nursing	Total	
65	1986	Survived	979.37	278.21	1259.32	−17863.18	−1801.93	−19668.64	16.6
		Died	18842.56	2080.14	20927.96				
	1993	Survived	913.90	223.94	1139.53	−15456.48	−2449.73	−17913.54	16.7
		Died	16370.38	2673.67	19053.08				
75–76	1986	Survived	1736.25	1248.36	2991.13	−18253.24	−3923.37	−22188.44	8.4
		Died	19989.49	5171.73	25179.58				
	1993	Survived	1542.11	1005.821	2557.76	−14554.93	−4989.17	−19554.44	8.6
		Died	16097.04	5994.99	22112.20				
85–87	1986	Survived	2693.43	5851.25	8560.91	−14031.02	−6525.03	−20555.75	3.4
		Died	16724.45	12376.27	29116.67				
	1993	Survived	2188.86	4752.93	6967.26	−11426.42	−7850.46	−19278.34	3.8
		Died	13615.29	12603.39	26245.60				
90–93	1986	Survived	2506.95	9051.765	11575.55	−10555.55	−7377.96	−17924.48	2.5
		Died	13062.50	16429.722	29500.04				
	1993	Survived	2219.11	8541.799	10779.64	−8283.93	−8089.77	−16373.06	2.5
		Died	10503.04	16631.570	27152.71				

social care for each age group, for decedents and survivors, and for each cohort.

The pattern for medical care shows costs for survivors rising with age, and costs for those who died falling with age, confirming the findings elsewhere that the cost of dying falls with age. The cost per person of medical care fell between the 1986 cohort and the 1993 cohort. The population in each age category is higher in the second cohort.

Social and nursing care costs are shown to rise with age, and in this case the additional costs for those close to death increase with age. This means that the total additional cost of dying still falls with age after 75, but this fall is much smaller when the full costs of care are included. Social and nursing costs at any age fell for survivors over the time period, but have increased for those close to death.

It is interesting to note that the ratio of total costs between those who survived and those who died falls from 16.6 for 66–67-year-olds to 2.5 for those aged between 91 and 95. The ratios are stable between the two cohorts.

Discussion

The data we present here confirm the finding that costs of care increase with age, but that proximity to

death is a better predictor of cost than age. No previous study has reported the patterns of acute, nursing and social care costs based on record linkage data. The additional cost of dying falls with age, even when social and nursing costs are included. In the very elderly group, the additional cost of dying comes almost equally from additional medical costs and additional nursing and social care costs. In the younger groups it is mainly additional acute medical care that is used by those close to death.

The evidence here suggests that the patterns of costs have remained relatively stable, despite the increase of around 15% in the elderly population between the two cohorts. This is surprising in the light of evidence that much of the increase in health care costs is the result of more services being provided for any given pattern of morbidity [7]. This is of particular interest if the opportunities for new and effective health care interventions are of particular value for diseases common in elderly people.

An interesting feature of the data in this study is the similarity between the cohorts entering the study at ages 65 and 75–76. Although there is some increase in care costs for 75–76-year-old survivors, the patterns for those who die are not very different. This contrasts with the fall in the medical costs of dying for those in their eighties and nineties.

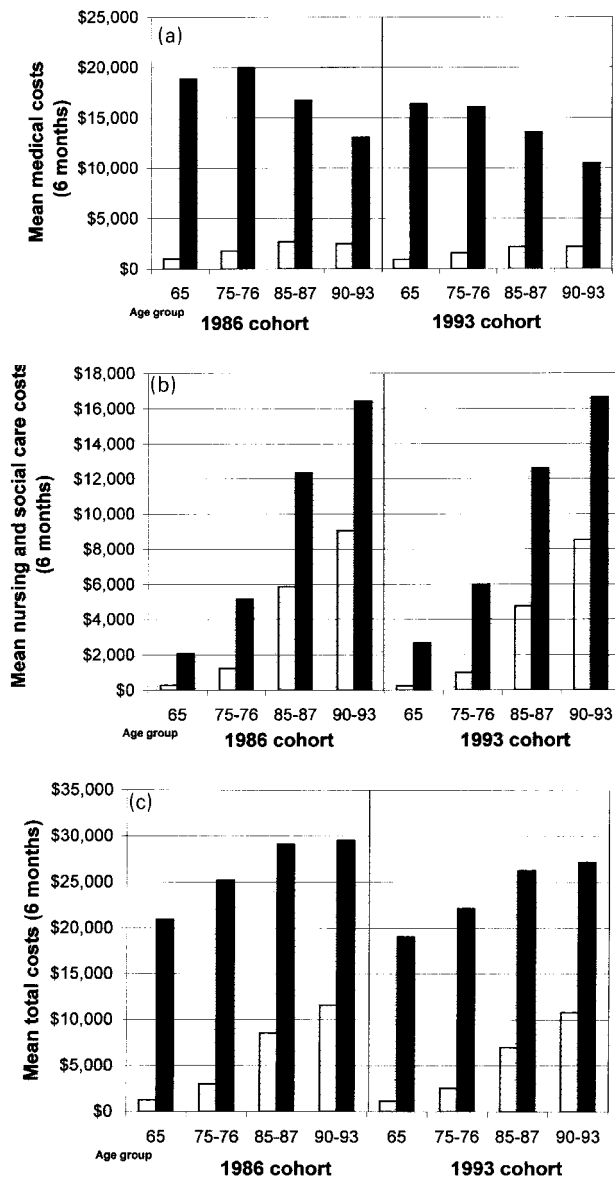In addition to changes in the elderly population in

Figure 1. Costs of **a** medical care, **b** nursing and social care and **c** all care over the last 6 months of life (or an equivalent period for survivors) by cohort and age group for subjects who survived (□) and subjects who died (■).

British Columbia between these two cohorts, there has been a major change in acute care provision, with reductions in bed numbers, shorter hospital stays and more day-case work [19]. It is likely that this is the main explanation of the reduction in medical care costs between the two cohorts (rather than being mainly the result of falling age-specific morbidity). Some of the rise in nursing and social care costs may reflect a need for continuing care for people who would previously have been in acute hospital care. It has been argued locally that the additional support for nursing and social care is inadequate to accommodate the care needs resulting from changes in the

acute sector. It may therefore be doubtful whether the observed reductions in cost at each age will be sustained.

A limitation of studies of this sort is that they reflect what happens (as opposed to what ought to happen). However, the findings support the assertion that the growing costs of care resulting directly from ageing are likely to be relatively modest, with the rise in social care costs being a major part of the overall increase. The falling cost of dying with increasing age may be explained either by more appropriate management of terminal illness or by under-treatment of very elderly people, and more detailed studies would be needed to determine this.

These results could be of interest in other countries that are attempting to predict the effects of ageing on health care costs. Despite the falling cost of dying with increasing age, it is likely the overall care costs will rise, but this change is more likely to be like a glacier than an avalanche.

Key points

- Costs of hospital care rise with age, but proximity to death is a more important determinant of cost.
- The additional costs of hospital care for those close to death fall with age.
- Nursing and social care costs rise with age, and the additional costs for those close to death also rise with age.
- It is important to consider the effects of population ageing not only on the total costs of services, but also on the mixture of services that will be needed.
- Using linked data on service use allows more accurate predictions of the effects of population ageing on costs of care.

Acknowledgements

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