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Regional variations in the use of home care services in Ontario, 1993/95

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Abstract

Background: Although regional variations in the use of many health care services have been reported, little attention has been devoted to home care practices. Given the dramatic shift in care settings from hospitals to private homes, it is important to determine the extent to which home care practices vary by geographic region.

Methods: Data from the Canadian Institute for Health Information and the Ontario Home Care Administration System database were used to assess regional variations in rates of home care use following inpatient care and same-day surgery for the fiscal years 1993, 1994 and 1995. Various measures of regional variation were employed.

Results: Of the 2 870 695 inpatient separations and 1 803 307 same-day surgery separations during the study period, 359 972 and 64 541, respectively, were followed by home care. The rate of home care use per 100 separations was 12.5 for inpatients and 3.6 for same-day surgery patients. There was a a 3.5-fold regional variation in the rates of home care use following inpatient care and a 7-fold variation in rates of use following same-day surgery. Additional home care funding to attain calculated target rates was estimated to be $48.9 million (30% of expenditures for patients recently discharged from hospital over the study period). For a 20% increase in service provision it was estimated that an additional injection of $42.2 million is required.

Interpretation: The wide regional variations in rates of home care use highlight the importance of modifying home care funding to ensure that all residents of Ontario have equal access to services. To achieve this our estimates suggest that a substantial increase in home care funding is warranted.

Expenditures related to home health care services in Canada have increased dramatically in the last 20 years, averaging 20% per annum;[1] it is estimated that total expenditures will reach $3 billion by 2000. In Ontario $998.3 million was budgeted for home care in fiscal year 1998, accounting for 5% of the Ministry of Health's spending.[2] There are many reasons for increased spending, but the key motivating factor is the belief that savings may be realized by redirecting care away from hospitals toward the community.[3–5]

Although emphasis on home care is one of the major social changes of the last 2 decades, there is little compelling evidence that home care is a cost-effective alternative to acute hospital care.[6–8] The authors of 2 recent reviews reported that the provision of home care was associated with a small to moderate reduction in the length of hospital stay,[8,9] but others have shown this relation to be weak.[10,11] A case may still be made for increasing expenditures related to home care, however, because these services may offer benefits that are difficult to measure (e.g., by promoting recovery, slowing the deterioration of health, maintaining patient independence and enhancing patient and family satisfaction).

Home care services in Ontario include nursing, personal care, physiotherapy, occupational therapy, social services and homemaking.[12,13] The availability of these services may facilitate earlier discharge from hospital and same-day surgeries; however, it may also result in patients being discharged "sicker and quicker."[14,15] These patients represent an increasing proportion of all home care recipients; they account for almost 40% of the annual caseload and 30% of total expenditures.[16]

Although wide regional variations in the use of many health care services have

been reported,[17–19] attention has only recently focused on home care services.[10] When variations in home care use are unrelated to health and continuing lifestyle needs, it raises concerns about equal access to services, as well as health system and informal caregiver costs.[20,21] Moreover, such variations would highlight the need to modify home care practices to ensure that everyone, irrespective of where they reside, has equal access to services.

In this study we assessed regional variations in the rates of home care use following inpatient hospital care and same-day surgery in Ontario.

Methods

Inpatient and same-day surgery[22] separation information was acquired from the Canadian Institute for Health Information for patients of Ontario hospitals in fiscal years 1993, 1994 and 1995. Inpatient separations were assigned to 1 of 25 major clinical categories, and day surgery separations were assigned to 1 of 6 day procedure groups.[23,24]

We converted hospital separation data to unique patient-level files using the first hospital stay during the study period after which home care services were received within 30 days of discharge.[4,25] If home care services were not received within the prescribed time, only the first acute care admission was selected.

We identified patients who received home care after an acute hospital stay by linking health care numbers of patients discharged from hospital to numbers in the Ontario Home Care Administration System database. All other information (e.g., location of residence and clinical details) was derived from the hospital database.

Rates of home care use after an acute care hospital stay for each major clinical category and for each same-day procedure group were defined as the number of separations for which home care services were received within 30 days of discharge, divided by the total number of separations. Separate analyses were conducted for the 38 regions in Ontario responsible for publicly funded home care services.

We used direct standardization to adjust the rates of home care use for regional differences in age and sex; the 4 age groups were: less than 45 years, 45–64, 65–74, and over 74 years. Crude age–sex rates were multiplied by the number of provincial separations in each age–sex group and then summed to yield the number of home care patients expected in each region if its population distribution was similar to that of Ontario's. The resulting values were divided by the number of provincial separations to yield standardized rates by region for each major clinical category and same-day procedure group.

We used 4 measures of regional variation in standardized rates of home care use: the range in home care rates, the extremal quotient,[26] the weighted coefficient of variation[26–29] and the systematic component of variation.[29] The extremal quotient in this context is the ratio of the home care rate in the region with the highest rate to that in the region with the lowest rate. The coefficient of variation is the ratio of the standard deviation of home care rates across regions to the mean home care rate (weighted by the number of separations in each region) multiplied by 100; it measures relative variability and does not depend on the unit of measurement. The systematic component of variation is the variation in home care rates between regions after subtracting the within-region variation; it was developed to address the deficiencies in the coefficient of variation, which may overestimate regional variation when rates are low or when the sample is small. We conducted region-specific tests for deviations in the rate of home care use from the rate for the whole province at a level of significance of 0.0013 (0.05/38) for the 38 regions to adjust for multiple comparisons.[28]

To achieve target rates of home care use after an acute care hospital stay and to respond to the increasing demand for home care services in the light of health care system restructuring, we developed home care expenditure estimates that were based on current and target home care rates, cost estimates of an episode of home care, the number of separations and the expected increase in home care services following system restructuring. The cost of an episode of home care was based on the product of the number of distinct home care services received and the unit cost of these services. Unit costs were based on rates paid by the Metropolitan Toronto Home Care Program. Our cost estimates reflect past performance and may therefore underestimate actual costs in a restructured health care system. Since health care system reform may encourage the "sicker and quicker"[14,15] discharge of patients to home, patient home care service needs may increase, thereby increasing the cost of an episode of home care.

To identify target home care rates, we ranked regions in descending order in terms of their current home care rates. For example, with the target defined by the 75th percentile of home care rates, 25% of the regions met or exceeded this rate. Although various target rates were considered, we detail only data pertaining to the rate set by an expert panel.[30] The 75th percentile was selected to err on the side of a larger increase in home care expenditures.[31] Sensitivity analyses were conducted.

We derived estimates of the effect of health care system reform on the cost of home care services as well as estimates of the costs incurred in attaining specific target home care rates for major clinical categories and same-day procedure groups as: $\{[\max(T,H) - H] + TS\} \times NC$, where T represents target home care rates, H represents actual home care rates, S is the proportionate increase in home care service provision associated with health care system restructuring (ranging from 0 [0%] to 0.4 [40%]), N represents the number of separations, and C represents the mean cost of an episode of home care. Aggregation across separations yields our estimate of increased home care expenditures. The first term in the equation measures increased use to attain the target rate, and the second term measures increased use of home care services in the light of health care system reform.

Results

Age- and sex-specific rates of home care use for inpatient and same-day surgery separations over the 3 years are shown in Table 1. There were 2 870 695 inpatient separations and 1 803 307 same-day surgery separations; the number of inpatient and same-day surgery separations that were followed by home care was 359 972 and 64 541 respectively. The rate of home care use per 100 separations was 12.6 for inpatient care and 3.6 for same-day surgery.

For inpatients the home care rate per 100 separations increased from 11.9 in 1993 to 13.1 in 1995. For same-day surgery separations the rate rose from 3.2 to 3.9 over the 3 years. Rates increased with increasing age of the patient, were higher for older women than older men, and were lower for younger women than younger men. Overall,

however, home care rates were similar for men and women.

The measures of regional variation in rates of home care use for inpatient separations and for same-day surgery separations are in Tables 2 and 3 respectively. All indices consistently demonstrated moderate to substantial variation in home care rates. For inpatient separations the extremal quotient was 3.5 (95% confidence interval 3.41–3.54), with Kingston recording the highest rate (29.9) per 100 separations and Peel the lowest (8.6). This implies a 3.5-fold difference in rates, even after standardization. For same-day surgery separations the extremal quotient was higher, at 7.0, with Peterborough recording the highest rate (11.9) per 100 separations and Peel the lowest (1.7).

For each day procedure group and each major clinical category, we derived estimates of the funds required to achieve at least the target rate, defined by the 75th percentile of home care use, for each home care program. The resulting estimates were aggregated and are available from us upon request. Sensitivity analysis measured the effect of variation in home care service provision on the expenditure estimates.

In the absence of an increase in home care service provision, an additional $48.9 million (30% of current expenditures for home care for patients discharged from hospital[16]) would be required to attain the target rates of home care. The expenditure estimates varied widely by region; the largest portion of the increase (30.0%) was alloted for metropolitan Toronto, and the smallest (0.1%) for Muskoka.

For each 20% increase in home care service provision an additional injection of $42.2 million (26% of current home care expenditures for patients recently discharged from hospital[16]) was estimated. Thus, to achieve the regional target home care rates and fund an expected increase in home care service provision of 20%, an increase in home care expenditures of $91.1 million (56% of current home care expenditures for patients recently discharged[16]) is warranted.

Interpretation

Despite growth in the rates of home care provision after an acute hospital stay in Ontario, the rates were low for inpatient and same-day surgery separations. The regional variations in home care rates were considerable; compared with rate variations for other health care procedures and conditions,[19] they were in the moderate to substantial range. The additional expenditure needed to achieve target rates of home care use was estimated to be $48.9 million, and for every 20% increase in home care service provision, an additional injection of $42.2 million was estimated. Compared with current home care expenditures, our estimates of increased funding for home care are substantial in both absolute and relative terms.

The regional variations in home care funding estimates were consistent with the regional variations in home care rates. Metropolitan Toronto was allocated the largest portion of the increased funding (30.0%) to achieve the target rate, and Muskoka was assigned the smallest portion (0.1%). This difference was attributable to the more than 30-fold difference in the number of separations between the regions and to the lower baseline rate of home care use in metropolitan Toronto than in Muskoka.

Our study is limited in 3 respects. First, despite extensive assessment of hospital separation data,[32,33] to our knowledge there is no equivalent examination of the validity and reliability of home care data. Second, coding errors in the linkage of hospital and home care data may have resulted in the failure to identify some patients. Third, the rates of home care provision were based on the use of services captured in the home care database; however, in some regions, equivalent services may be received through other agencies, such as a public health agency, an outpatient de-

Table 1: Age- and sex-specific rates of home care use for inpatient and same-day surgery separations in Ontario, 1993/95

	Inpatient separations			Same-day surgery separations		
Sex; age, yr	No. of patients who received home care	No. of separations	Rate per 100 separations	No. of patients who received home care	No. of separations	Rate per 100 separations
Female						
≤ 44	50 250	1 073 733	4.7	7 774	556 192	1.4
45–64	38 206	243 296	15.7	7 102	245 103	2.9
65–74	47 421	166 403	28.5	7 804	124 705	6.3
≥ 75	77 913	218 368	35.7	12 724	97 511	13.0
All	213 790	1 701 800	12.6	35 404	1 023 511	3.5
Male						
≤ 44	32 186	590 935	5.4	8 497	354 957	2.4
45–64	31 979	244 423	13.1	6 206	211 487	2.9
65–74	36 961	177 200	20.9	6 465	130 916	4.9
≥ 75	45 056	156 337	28.8	7 969	82 436	9.7
All	146 182	1 168 895	12.5	29 137	779 796	3.7
Total	359 972	2 870 695	12.5	64 541	1 803 307	3.6

partment of a hospital or a community support groups. In the case of metropolitan Toronto, which reported one of the lowest home care rates in the province, the low rate may have been due to the greater availability of hospital beds, particularly rehabilitation beds, and other forms of community care. Thus, regional variations in the use of community care may have been overestimated. Nevertheless, the measures of regional variation reported herein are the most current data. Further studies to assess the multiple determinants of home care use are needed but were beyond the scope of this study.

There are several caveats to our estimates of increased home care expenditures.

- The expenditures we calculated were contingent on current and target rates of home care use, expected increase in home care provision, number of separations and cost of an episode of home care; any deficiency in any of these factors reduces the validity of our estimates.
- Because our estimates were based on historic utilization data, continuing modification to patterns of practice may invalidate the estimates.
- Implicit in our estimates is the assumption that each region will have the human resources to provide a similar spectrum of services, and this may be an unrealistic assumption for many isolated rural communities and for some specialized services.
- Resistance to change may retard the restructuring process since differences of opinion about continuing care options may drive the use of services.[17–19]
- Estimates of the mean cost of home care services were based on the number of services received and the unit cost of each service. These costs were skewed and included data for some patients who were treated for an extended period. The use of median costs reduced our expenditure estimates by about 50%.
- Our estimates did not include the costs incurred by home care programs for patient-specific case management, travel, and equipment and supplies. The Ministry of Health suggests that such costs represent 21% of expenditures.[30]

Wide variations in rates of home care use after an acute care hospital stay highlight the importance of modifying home care funding to ensure that all residents of Ontario have equal access to services. To achieve this our estimates suggest that a substantial increase in funding may be warranted, with increased expenditures averaging 56% ($91.1 million) of current spending allocated to patients recently discharged from hospital. Given the regional variation in use, the size of the increase in estimated expenditures and the lack of data supporting service cost-effectiveness, a health research program aimed at evaluating alternative methods of organizing, financing and delivering home care services is warranted.

Table 2: Regional variations in age- and sex-standardized rates of home care use for inpatient separations, by clinical category

Clinical category	Range*	Extremal quotient†	Coefficient of variation‡	Systematic component of variation§
Nervous system	10.3	1.7	13.0	13.8
Eye	20.9	3.7	34.3	93.0
Ear, nose and throat	5.2	2.6	22.2	30.6
Respiratory	16.5	2.3	18.5	35.0
Circulatory	24.4	3.1	23.3	62.4
Digestive	13.1	2.2	16.3	26.8
Hepatobiliary	10.8	2.4	16.6	17.3
Musculoskeletal	27.7	2.9	28.6	65.7
Skin	30.3	2.8	23.0	58.5
Endocrine	14.6	1.9	15.9	16.1
Kidney	14.0	2.3	17.8	30.5
Male reproductive	18.0	13.3	40.1	58.7
Female reproductive	14.7	4.4	42.5	174.3
Pregnancy	34.2	44.0	150.1	3001.6
Newborn	39.5	223.5	193.1	5191.3
Blood	16.7	2.0	21.0	4.3
Lymphoma	29.7	2.0	17.5	7.2
Multisystemic	25.0	2.8	16.2	15.2
Mental disease	14.7	3.4	27.3	62.6
Injury	14.0	2.3	17.8	15.8
Burn	68.5	6.4	25.5	−44.3
AIDS	100.0	10.3	14.5	−741.7
Trauma	36.0	6.9	33.3	−46.0
Other reason	32.1	3.0	26.9	50.5
Ungroupable	30.9	6.1	35.4	−320.1

*The difference between the highest and the lowest rate of home care use.
†The ratio of the rate of home care use in the region with the highest rate to the region with the lowest rate.
‡The ratio of the standard deviation of rates of home care use across regions to the mean home care rate weighted by the number of separations in each region, multiplied by 100.
§The variation in rates of home care use between regions after subtracting the within-region variation.

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Table 3: Regional variations in age- and sex-standardized rates of home care use for various same-day surgery procedures

Surgical procedure	Range	Extremal quotient	Coefficient of variation	Systematic component of variation
Lens	75.9	33.4	149.3	3006.4
Tonsil/adenoid	67.8	455.7	196.5	5163.2
Gastrointestinal	3.9	3.4	26.7	73.7
Bladder and urethral	6.3	4.4	35.3	191.1
Skin	9.7	6.5	45.1	265.4
All other	4.4	4.3	42.3	192.7

opinions expressed are those of the authors and do not necessarily reflect the opinion of any funding agency or institution.

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