Home-based intermediate care program vs hospitalization

Cost comparison study

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ABSTRACT

OBJECTIVE To explore whether a home-based intermediate care program in a large Canadian city lowers the cost of care and to look at whether such home-based programs could be a solution to the increasing demands on Canadian hospitals.

DESIGN Single-arm study with historical controls.

SETTING Department of Family Medicine at the Ottawa Hospital (Civic campus) in Ontario.

PARTICIPANTS Patients requiring hospitalization for acute care. Participants were matched with historical controls based on case-mix, most responsible diagnosis, and level of complexity.

INTERVENTIONS Placement in the home-based intermediate care program. Daily home visits from the nurse practitioner and 24-hour access to care by telephone.

MAIN OUTCOME MEASURES Multivariate regression models were used to estimate the effect of the program on 5 outcomes: length of stay in hospital, cost of care substituted for hospitalization (Canadian dollars), readmission for a related diagnosis, readmission for any diagnosis, and costs incurred by community home-care services for patients following discharge from hospital.

RESULTS The outcomes of 43 hospital admissions were matched with those of 363 controls. Patients enrolled in the program stayed longer in hospital (coefficient 3.3 days, $P<.001$), used more community care services following discharge (coefficient $729, $P=.007$), and were more likely to be readmitted to hospital within 3 months of discharge (coefficient 17%, $P=.012$) than patients treated in hospital. Total substituted costs of home-based care were not significantly different from the costs of hospitalization (coefficient -$501, $P=.11$).

CONCLUSION While estimated cost savings were not statistically significant, the limitations of our study suggest that we underestimated these savings. In particular, the economic inefficiencies of a small immature program and the inability to control for certain factors when selecting historical controls affected our results. Further research is needed to determine the economic effect of mature home-based programs.

EDITOR'S KEY POINTS

- Much of the literature on hospital-to-home programs focuses on clinical outcomes and patient and caregiver acceptance, rather than on economic effects. The economic effects of such programs are unclear.
- This paper describes a single-arm study with historical controls that examined the economic effects of a hospital-in-the-home (HTH) intervention associated with a large hospital in Ottawa, Ont.
- The results show that patients in the HTH program stayed significantly longer in hospital and that the total cost of caring for patients in the HTH program was not significantly different from the cost of caring for them in hospital. Community care costs were higher for HTH patients during the 3 months after discharge from hospital.

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Programme de soins intermédiaires à domicile vs hospitalisation

Étude comparant les coûts

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RÉSUMÉ

OBJECTIF Vérifier si un programme de soins intermédiaires à domicile dans une grande ville canadienne réduit le coût des soins et si un tel programme pourrait constituer une solution aux demandes croissantes auxquelles les hôpitaux canadiens doivent faire face.

TYPE D'ÉTUDE Étude à une seule branche avec témoins historiques.

CONTEXTE Département de médecine familiale de l'Hôpital d'Ottawa (campus Civic), Ontario.

PARTICIPANTS Patients requérant des soins hospitaliers actifs. Ces patients ont été jumelés à des contrôles historiques en fonction de la casuistique, du diagnostic le plus probable et du degré de complexité.

INTERVENTIONS Placement dans le programme de soins intermédiaires à domicile, visites à domicile quotidiennes par l'infirmière clinicienne et accès aux soins sur appel, 24 heures sur 24.

PRINCIPAUX PARAMÈTRES À L'ÉTUDE On a utilisé des analyse de régression multivariées pour évaluer les effets du programme sur 5 résultats: durée du séjour hospitalier, coût des soins en remplacement de l'hospitalisation (en devises canadiennes), réadmission pour un diagnostic relié, réadmission pour un autre diagnostic et coûts assumés par les services communautaires de soins à domicile suivant le congé hospitalier.

RÉSULTATS Les résultats de 43 patients admis à l'hôpital ont été jumelés à ceux de 363 témoins. Par rapport aux patients traités à l'hôpital, ceux du programme à domicile sont restés plus longtemps à l'hôpital (coefficient de 3,3 jours, $P<0,001$), ont davantage utilisé les services de santé communautaires après leur congé (coefficient de 729$, $P=0,007$) et ont été plus susceptibles d'être réhospitalisés dans les 3 mois suivant le congé (coefficient de 17%, $P=0,012$) . Le coût total des soins alternatifs à domicile ne différait pas significativement de celui de l'hospitalisation (coefficient de -$501, $P=0,11$).

CONCLUSION Même s'il n'y avait pas de différence significative entre les sommes épargnées, les limitations de notre étude laissent croire que nous avons sous-estimé ces montants . En effet, l'inefficacité économique d'un petit programme non mature et l'incapacité de contrôler certains facteurs dans le choix des témoins historiques ont affecté nos résultats. Il faudra davantage de recherche pour déterminer les effets économiques de programmes de soins à domicile matures.

POINTS DE REPÈRE DU RÉDACTEUR

- La littérature comparant les programmes de soins à l'hôpital ou à domicile porte principalement sur les résultats cliniques, et sur leur acceptation par les patients et les soignants, plutôt que sur les aspects économiques. Les conséquences économiques de ces programmes sont peu connues.
- Cet article décrit une étude à une seule branche avec témoins historiques, qui examine les effets économiques d'une intervention hôpital-à-domicile (HAD) sous l'égide d'un grand hôpital d'Ottawa, Ont.
- Les résultats montrent que les patients du programme HAD avaient un séjour hospitalier significativement plus long et que le coût total des soins de ces patients ne différait pas significativement du coût des soins à l'hôpital. Durant les 3 mois suivant le congé de l'hôpital, le coût des soins communautaires aux patients du programme HAD était plus élevé.

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Increases in the cost of providing health care and the aging of the population pose a substantial challenge to the sustainability of the Canadian health care system. As the hospital sector is the most expensive part of the current system,[1] alternatives to hospitalization should be sought and carefully studied. In programs referred to as hospital in the home, hospital at home, hospital without borders, or home hospital, patients who would otherwise be admitted to acute care hospitals receive care at home instead. We refer to all such programs generally as hospital in the home (HTH).

These programs might improve a community's ability to deal with surge capacity in the event of a serious influenza epidemic or other large-scale disaster and could aid in shortening wait times, in general, by freeing up hospital beds. Much of the literature on HTH programs focuses on clinical outcomes and patients' and caregivers' acceptance of the programs. The overwhelming finding in this body of work is that HTH programs provide adequate care and are well accepted by users.[2,3] The economic effects of these programs are more contentious. Studies have reported that these programs are associated with higher costs,[4-6] cost savings,[7-12] and no cost difference.[13,14] A Cochrane meta-analysis by Shepperd and Iliffe[2] did not find sufficient evidence to draw a conclusion about the economic effects of HTH programs. The reason for such varied results is likely the large differences in target age, diagnoses, treatment intent, program design, and approaches to economic evaluation in these studies.[11]

This paper presents a single-arm study with historical controls that examined the economic effects of an HTH intervention associated with a large urban hospital in a major Canadian city, Ottawa, Ont. Its strengths lie in the fact that hospital costs are derived from actual daily use of resources rather than average daily costs and that it attempts to evaluate all societal costs associated with the program, not just those of the hospitalization itself.

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METHOD

Patient selection

Candidates for our home-based intermediate care (HBIC) program were selected from patients who required hospitalization for intermediate-level care in the University of Ottawa's Department of Family Medicine at the Ottawa Hospital (Civic Campus). Patients requiring critical care with 24-hour surveillance were excluded. Patients could be admitted either directly from the emergency department (a complete hospital substitution) or from the wards (a partial hospital substitution) once the critical phase of their illnesses had been managed. To be included, patients had to require acute but not critical hospital care, to live in safe physical and social environments (to limit risk to patients and care providers), to be medically and psychiatrically stable, to have medical conditions that were manageable within the service limits of the HBIC program and unlikely to need management at night, and to have informal caregivers or caregiver networks available. Patients' consent to participate was also required. The Ottawa Hospital Research Ethics Board approved the study.

The HBIC program recruited patients during an 18-month period beginning in November 2003. We selected 44 admissions to hospital from a total of 104 evaluated. Of those excluded, 12 had refused, 11 did not require acute care or hospital admission, 20 were not medically or psychiatrically stable, and 17 were excluded for other reasons. The 44 admissions represented 37 unique patients; 4 were admitted to the HBIC program directly from the emergency room. During the same period approximately 1000 patients were admitted to the family medicine ward and received care in hospital for an average of 8.4 days. Most of these patients were not considered eligible for the HBIC program for obvious reasons, usually because they were evidently too well or too ill. The time available for reviewing potential HBIC candidates was limited as the nurse practitioner (NP) began managing home admissions for patients admitted to the program.

Average age of patients in the study was 71 years. The most common diagnoses were chronic obstructive pulmonary disease (32%), cellulitis (11%), diabetes (9%), and congestive heart failure (9%). Other diagnoses included nephritis, alcoholic cirrhosis of the liver, duodenal ulcer with hemorrhage, suspected *Clostridium difficile* enterocolitis, epilepsy, skull fracture, and pneumonia.

Patient care

When a patient was admitted to the HBIC program, a care plan was developed by the medical team. Nurse

practitioners made daily visits to the homes and maintained telephone contact until patients were discharged from the program. Nurse practitioners were available for 9 hours a day on weekdays and 4 hours a day on weekends. The family medicine call group provided after-hours coverage. On 1 occasion, a physician had to make a home visit.

Sample-size calculation

Sample-size calculations were based on the ability to detect a reduction in the number of adverse events among patients in the HBIC program compared with the number of adverse events among historical controls. The required sample size was estimated to be 50.

Selection of control patients

The historical controls were selected from patients admitted to the General Campus of the Ottawa Hospital because case costing is performed only at that campus. The Civic and General Campuses are about 9 km apart; serve the same catchment area; provide similar services; have comparable case-mix populations; have similar teaching activities; and use common filing, documentation, and coding procedures.

The selection process for control patients involved 3 steps. First, HBIC patients' separation information documents (clinical charts and Civic Campus hospital charts, where applicable) were coded by the Ottawa Hospital's information specialists for patients' case-mix group (CMG); diagnoses, including the most responsible diagnosis (MRD) for the entire hospitalization (HBIC and inpatient, where applicable), were determined using the *International Classification of Diseases* coding system. An indicator of the level of complexity was applied to each case. Complexity levels ranged from 1 to 4 and were based on the CMG and the extent of comorbidity. Second, the coded separation information for HBIC patients was used to identify all hospital separations during the previous 5 years with the same CMG, MRD, and complexity from the General Campus. At this stage we had sufficient information to do the matches, but no outcome information, including length of stay or costs. Third, we chose up to 10 matches from among the potential controls for each HBIC patient. As selection of controls was based on a limited number of observable characteristics recorded in the administrative data, multiple controls were selected for each HBIC patient to enrich the analysis. To make our analysis manageable, we chose an upper limit of 10 matches. The main results remained unchanged if we limited the number of matches to 5.

Controls were required to have the same CMG, MRD (97% of controls were matched exactly on the entire 6-character MRD, and 3% were matched exactly on the first 3 digits), and complexity level. When possible, we restricted the set by selecting those nearest in age (to a maximum difference of 10 years), of the same sex, and with the most recent date of admission. Patients not discharged home (eg, those discharged to another facility) and those retained in hospital for reasons other than acute care were excluded because they would not have been eligible for the HBIC program. This exercise provided us with 363 controls for our 44 HBIC admissions. In 70% of cases, we could find 10 matched controls (**Table 1**). In 1 case, we could not identify any controls that met our criteria, so this case was excluded from our analysis.

Table 1. Number of controls used per patient receiving home-based intermediate care

NO. OF CONTROLS	FREQUENCY	% PATIENTS
0	1	2
1	2	5
2	2	5
3	1	2
4	2	5
5	1	2
6	1	2
7	1	2
9	2	5
10	31	70

Comparing cost data

We obtained itemized daily cost information for the control patients and calculated the costs for the HBIC patients using actual program costs. Only substituted components could be included, as no costing information was available for admissions to the Civic Campus. We assumed, therefore, that costs incurred before transfer into the HBIC were comparable in both arms. For example, for an HBIC patient who was hospitalized for 3 days and then transferred to HBIC for another 5 days, costs for the latter 5 days were compared to the hospital costs for day 4 onward for the matched control patients. For full substitutions, the entire hospitalization cost was included. Control patients who stayed in hospital for shorter periods than those of their matched HBIC patients were assigned substituted hospital costs of $0. This was the case for 143 controls (39%).

Calculating costs for HBIC patients

Data were collected throughout the substituted portion of care, from referral to HBIC to discharge from HBIC. Direct and indirect costs considered are shown in **Tables 2** and **3**, respectively. Direct costs are costs directly attributable to individual patients (eg, patient-specific medical supplies and NP time). Indirect costs are incurred for common or joint activities and thus cannot be attributed to particular patients (eg, administration, general equipment, and supplies). Indirect costs were allocated across the 44 admissions based on length of

stay in the program. Allocating these costs either by resource intensity weights or evenly across admissions did not significantly alter the results.

Drug costs were excluded from both arms. These were estimated to represent <3% of the total costs and were expected to be similar in both groups. Medication

Table 2. Direct costs

COST	SOURCE	DESCRIPTION
Hand-held blood analyzer (i-STAT), cartridges	Charts plus cost information from i-STAT	Includes the cost of the cartridges used by patients and the cost of the analyzer itself
Nursing costs	Nursing time logs	Includes interviews with patients; coordinating care at admission; home visits (including time spent caring for patients, travel time, and gas costs); telephone calls to patients; care planning; communication with families, pharmacists, and residents at time of discharge; and documentation
Physiotherapy, consultants	Charts plus HBIC budget	
Pharmacist's time	Pharmacist's time log	
Laboratory tests*	Charts (2005), fee schedule	Tests were costed using a current fee schedule
CCAC (home services)†	CCAC	Services included physiotherapy, nursing visits, and personal support services
Patient-specific costs, medical supplies	Charts plus HBIC budget	Includes wheelchair transportation to patient's residence, ambulance or taxi transportation for appointments and tests, and rental costs for intravenous pumps, when necessary

CCAC—Community Care Access Centre.

*Laboratory tests ordered in hospital are included in the cost of hospitalization. For comparison, we also included the cost of tests ordered using a current Ontario Fee Schedule, even though the costs were not paid for out of our budget.

†Because equivalent costs if administered in hospital would be included in hospitalization costs, we included the costs of CCAC services in HBIC costs. Seventeen of our 44 patients used CCAC services, including physiotherapy, nursing visits, and personal support services. Average CCAC costs (when used) were $186 and reflected about 18% of total direct costs.

Table 3. Indirect costs: *Depreciated values for all assets and training were used in our cost calculations using a straight-line method for a period of 45 weeks out of the estimated value of the life of the asset. The program had at least 1 patient for at least 1 day during 45 weeks.*

COST	SOURCE	DESCRIPTION
Computer	HBIC budget	For administrator's use
Office furniture and supplies	HBIC budget	Two desks, a printer table, a cabinet, painting the office, pager, cell phone, and supplies
Nurse practitoner in-service	HBIC budget	Professional training (travel, registration, and incidentals) for an extensive introduction to hand-held blood analyzer technology (and perhaps 1 other conference)
Medical education (weekly luncheons)	HBIC budget	Lunches were provided to residents on the Family Medicine Floor to promote and inform them about HBIC
Physical plant	Approximation	No rent was charged to HBIC. If HBIC is implemented, rent for office and administration space might be charged. Our approximation ($6000/y) is based on the office rental cost for a similar program
Administration, financial services, human resources	HBIC budget	Median of the salary range for a program administrator responsible for administration, the HBIC budget, and human resources
Physician Director	Approximation	No physician was compensated in our program. If HBIC is implemented, a stipend for such a position might be required. Our approximation ($5200/y) is based on the annual stipend for a medical director in a comparable program in Australia
Nurse practitioner administration	Time logs	Time spent training new NPs, administration, materiel management (ordering medical supplies), communication with other NPs, and vacation time
Equipment	HBIC budget	Digital thermometer, opthalmoscope, diagnostics set, scale
Hand-held blood analyzer (i- STAT), cartridges	i-STAT	
Medical supplies	HBIC budget	Clinical bag (carried by NPs) and the band-aids, gauze, and other supplies in it

for home-hospitalized patients was supplied in part by the hospital and in part through the project budget. Physicians' time was also omitted from the cost analysis because of the complexity of measuring it. Hospital staff physicians' and residents' salaries are not covered by the hospital budget, but by various agencies of the Ontario government. The HBIC patients required very little time from the hospital physicians and would likely have cost the system less.

Empirical strategy

We compared the HBIC and control groups with respect to 2 main outcomes:

- total length of stay; and,
- cost of the substituted components of hospitalization.

To capture any additional societal costs or savings associated with the HBIC program, we considered the following 3 additional outcomes that could have been affected by HBIC admission:

- the likelihood of readmission within 3 months of discharge for any diagnosis;
- the likelihood of readmission within 3 months of discharge for any related diagnoses; and,
- costs incurred by community home care services during the 3 months after discharge.

The latter outcome was considered to assess the possibility that some of the care burden for home-hospitalized patients had been shifted to the community. The Community Care Access Centre (CCAC) provides health professional care (eg, nursing and physiotherapy) in the home, meal preparation, housekeeping, and other home support for patients in the community.

We used multivariate regression models to estimate the effect of the HBIC on each outcome after adjusting for potential confounding variables: age, sex, complexity level, number of diagnoses, and an indicator for substituted length of stay (>4 days, ie, 75th percentile). All regressions were estimated using linear probability and weighted by the number of controls. Probit estimates for the readmission regressions yielded quantitatively and qualitatively similar results.

RESULTS

Summary statistics

Table 4 shows estimates of the unadjusted means for HBIC and matched control patients separately. The observations were weighted by the number of matched controls for each HBIC patient. Controls were less likely to have a long substituted length of stay.

Table 5 summarizes the unadjusted differences in the 5 outcomes between the 2 groups. Total length of stay was significantly longer for HBIC patients by an average of 2.6 days. Total substituted costs were similar in both arms, but CCAC expenditures were significantly higher for HBIC patients. There was no significant difference in readmission rates for related conditions, but HBIC patients were more likely to be readmitted for any condition.

Regression results

Table 6 reports regression results controlling for other factors. The HBIC patients had significantly longer lengths of stay by 3.3 days. Despite this, total costs for the substituted component of the hospitalization were not significantly different between the 2 arms. The CCAC costs were higher for HBIC patients during the 3 months after discharge by $729. The increased likelihood of HBIC patients being readmitted to hospital for any condition remained.

DISCUSSION

We did not find that the costs of substituted hospitalization services for HBIC patients were significantly lower than the costs for hospitalized patients. This study measured the actual costs of a newly formed program, and we propose 4 reasons why the costs estimated are higher than would be anticipated in a mature program: set-up costs, the steep learning curve, a small program, and the lack of pressure to discharge patients.

We included costs associated with program set-up, such as weekly lunches to promote and inform the continually rotating residents of the HBIC program ($3000) and training in blood-analyzer technology for 1 NP ($2000). Costs for NPs were high as HBIC presented a new role for them with a steep learning curve. Considerable time was devoted to recruiting and training new NPs. The program was small, as it was limited to those requiring admission to a 14-bed unit and those who were eligible for HBIC. As a result, the numbers were very small, averaging less than 1 patient per week, and indirect costs were distributed over very few patients. Also, because the program was new and there was no established referral culture among physicians, recruitment activities were usually suspended when the NP was managing patients.

Table 4. Summary statistics

CHARACTERISTIC	HBIC PATIENTS UNADJUSTED MEAN	CONTROLS UNADJUSTED MEAN
Age (y)	71.1	68.2
Complexity level (1-4)	1.95	1.95
No. of diagnoses	4.4	5.9
Male patients (%)	55.8	52.0
Patients who had a long substituted length of stay (%)	53.5	30.7

HBIC—home-based intermediate care.

Table 5. Summary statistics on outcomes: *All means are weighted using the number of controls as weights.*

OUTCOMES	HBIC PATIENTS	CONTROLS	Δ	*F*	*P*
Mean length of stay (d)	9.7	7.1	2.6	8.84	.003
Total substituted cost ($)	2050	2263	-213	0.48	.49
CCAC expenditure ($)*	1226	561	665	4.15	.042
No. readmitted for a related condition	19	11	8	1.6	.21
No. readmitted for any reason	37	21	16	4.68	.031

CCAC—Community Care Access Centre, HBIC—home-based intermediate care.
*We were unable to obtain CCAC information on 21 control patients who were either out-of-province patients or whose health information regarding the hospitalization was no longer valid.

Table 6. Results of regression analysis (N = 406): *All regressions include controls for case-mix group and a constant term, are estimated using linear probability models, and are weighted using the number of controls as weights.*

CHARACTERISTIC	LENGTH OF STAY (DAYS) COEFF (*P* VALUE)	TOTAL SUBSTITUTED COST ($) COEFF (*P* VALUE)	TOTAL CCAC COST ($) COEFF (*P* VALUE)	READMISSION FOR A RELATED CONDITION (%) COEFF (*P* VALUE)	ANY READMISSION (%) COEFF (*P* VALUE)
HBIC	3.3 (<.001)	-501 (.11)	729 (.007)	6 (.28)	17 (.012)
Age	0.02 (.39)	26 (.13)	17 (.15)	0 (.43)	-1 (.007)
Male	-0.3 (.722)	-607 (.066)	352 (.25)	-3 (.69)	-3 (.68)
Complexity level 2	0.2 (.815)	-857 (.078)	120 (.8)	0 (.97)	-4 (.75)
Complexity level 3	1.9 (.199)	284 (.78)	781 (.051)	24 (.23)	2 (.92)
Complexity level 4	5.3 (.001)	583 (.43)	376 (.62)	9 (.56)	-9 (.62)
No. of diagnoses	0.6 (<.001)	333 (.023)	53 (.084)	-1 (.15)	1 (.48)
Long substituted length of stay		3166 (<.001)	-150 (.6)	5 (.32)	13 (.061)
r^2	0.5	0.301	0.297	0.246	0.25

CCAC—Community Care Access Centre, COEFF—coefficient, HBIC—home-based intermediate care.

The success of HTH programs is contingent on the economies of scale achieved by mature services with larger numbers of patients. As there were few patients in the program at any given time, staff did not have the pressure to discharge that would be in effect in institutions. Efficiency and cost-saving innovations are expected to be gained as the program matures and with economies of scale. We suggest that the direct costs of patient care and length of stay would be substantially lower in a more mature HTH program than in our new program. In other programs, nursing staff manage between 3 and 5 home-hospital patients daily (Gideon Caplan, MBBS, written communication, February 2006).

Patients participating in the HBIC program used significantly more CCAC services. We were unable to determine whether HBIC patients were more likely to have their needs identified and be referred to such services as a result of the program, or whether the matching process failed to obtain 2 populations that were sufficiently homogeneous. The possibility of the former explanation is supported by findings from other studies. Jones et al[9] found that patients randomized to HTH used significantly more physiotherapy, occupational therapy, and domiciliary care services compared with a control group during a 3-month period following the episode of care. Others studying home-based versus hospital-based stroke rehabilitation in a randomized study found community services costs were higher in the home-based arm.[15]

The likelihood that the selection of patients for the HBIC arm yielded "sicker" patients is supported by the observed increased risk of readmission in those patients and their prolonged stays in hospital. Although we matched patients on observable factors, there were intangible factors that could not be controlled for in this design.

Limitations

There are 3 main limitations to our study. First, owing to cost restrictions, control patients were selected from a different campus of the same hospital. Although the campuses are similar in many ways, we cannot rule out the potential for differences to have affected our ability to match. Second, because HBIC patients were recruited from a hospital that does not do case costing, we were able to compare only substituted hospitalization costs. This assumed that pretransfer costs were similar in the 2 groups, and this assumption was used when comparing mixed HTH episodes with matched in-hospital

episodes.[11] Third, while we aimed to have a societal perspective in our economic analysis, the costs incurred by patients and their unpaid caregivers could not be captured, as these were not measured in the control group. It is likely, however, that inpatient caregivers incur nontrivial expenses, such as transportation, parking, and eating out. A randomized controlled trial demonstrated that there was no increase in privately borne costs for a HTH scheme for pediatric patients compared with costs for pediatric inpatients.[16]

Conclusion

The HBIC model links hospital, primary health care, and home care in a new way. Hospital-at-home programs have been shown to be a safe alternative to hospitalization for a number of conditions.[2] By demonstrating that there are no cost disadvantages and emphasizing the benefits such programs would have on surge capacity and wait times, in general, by opening up hospital beds, we hope and anticipate that policy makers will take interest in HTH programs. The outstanding question in the research literature and in policy analysis is arguably not whether home-based acute hospital substitution programs work, but how to implement safe and effective home-based programs that are efficient and sustainable as health care renewal evolves. Evidence of this is likely best obtained from evaluations of mature programs rather than from research studies. Full-scale mature programs have the advantage of having implemented economies of scale and maximized capacity.[11,12]

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Competing interests

None declared

Contributors

All the authors contributed to drafting the manuscript and critically assessing its content. **Dr Hogg** *and* **Dr Lemelin** *conceived the study, secured the funding, assisted in the design of data collection instruments, and assisted with data analysis and interpretation.* **Dr Saginur** *and* **Dr Viner** *assisted with the ongoing conception and implementation of the intervention.* **Dr Deri Armstrong** *and* **Ms Dahrouge** *assisted with ongoing conception and design, drafting the data-collection instruments and other materials, and data analysis and interpretation.* **Dr Martin** *assisted with study design and played a key role in the selection of data-collection instruments.*

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