

A System of Integrated Care for Older Persons With Disabilities in Canada: Results From a Randomized Controlled Trial

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Background. Care for elderly persons with disabilities is usually characterized by fragmentation, often leading to more intrusive and expensive forms of care such as hospitalization and institutionalization. There has been increasing interest in the ability of integrated models to improve health, satisfaction, and service utilization outcomes.

Methods. A program of integrated care for vulnerable community-dwelling elderly persons (SIPA [French acronym for System of Integrated Care for Older Persons]) was compared to usual care with a randomized control trial. SIPA offered community-based care with local agencies responsible for the full range and coordination of community and institutional (acute and long-term) health and social services. Primary outcomes were utilization and public costs of institutional and community care. Secondary outcomes included health status, satisfaction with care, caregiver burden, and out-of-pocket expenses.

Results. Accessibility was increased for health and social home care with increased intensification of home health care. There was a 50% reduction in hospital alternate level inpatient stays (“bed blockers”) but no significant differences in utilization and costs of emergency department, hospital acute inpatient, and nursing home stays. For all study participants, average community costs per person were C\$3390 higher in the SIPA group but institutional costs were C\$3770 lower with, as hypothesized, no difference in total overall costs per person in the two groups. Satisfaction was increased for SIPA caregivers with no increase in caregiver burden or out-of-pocket costs. As expected, there was no difference in health outcomes.

Conclusions. Integrated systems appear to be feasible and have the potential to reduce hospital and nursing home utilization without increasing costs.

DEVELOPED countries face the challenge of efficiently meeting the needs of a growing vulnerable elderly population. Those persons with significant functional disabilities are typically older than 75 years, suffer from complex acute and chronic medical problems, and often have overextended social support (1,2). Comprising approximately 20% of the older population (3,4), they utilize a disproportionate amount of both acute hospital and nursing home (NH) care with frequent transitions between them (5).

Care for frail elderly persons is characterized by fragmentation and weak accountability (6,7) leading to higher levels of hospital and NH utilization (8,9). There has been increasing interest in the ability of integrated systems to improve health, satisfaction, and utilization outcomes (10–13). Yet there have been few published studies with control groups utilizing either a randomized controlled trial (RCT) or quasi experimental methodology.

We conducted an RCT designed to assess a transformation of the organization and delivery of health and social services with intensified community-based interventions for frail elderly persons. We hypothesized that this model would

change service configuration by decreasing hospital and NH stays. (In Canada, NH signifies long-term institutional care). The intervention was not designed to reduce costs but to demonstrate that the transformation of the service configuration (increasing community intervention with decreased reliance on the hospital and NH) could be achieved and be cost neutral. Increased satisfaction with care without increased burden or out-of-pocket costs was expected. We did not hypothesize clinically significant differences in health status because of the patients’ compromised health status and the short intervention period.

METHODS

Intervention and Study Sites

The SIPA (French acronym for System of Integrated Care for Older Persons) program has been described previously (8). Its distinguishing features are community-based multidisciplinary teams with full clinical responsibility for delivering integrated care through the provision of community health and social services and the coordination of

Table 1. Multidisciplinary Team Composition

4	Case managers (nurse or social worker)
2	Community nurses
0.5	Social workers
0.5	Occupational therapists
0.5	Physiotherapists
15	Homemakers
0.5	Staff family physicians
0.5	Consultant pharmacists (1 site only)
0.2	Community organizers (1 site only)

hospital and NH care; all within a publicly managed and funded system.

The SIPA project was carried out in two Montréal CLSCs, public community organizations responsible for home care in the province of Québec (14). Although SIPA teams were based in the CLSCs, they were distinct, with their own budget, personnel, and governance. Each of the two teams (Table 1) per site was responsible for 160 patients, assessing their needs and organizing and delivering most community services. With the objective of integrating care, a comprehensive geriatric assessment was carried out on admission to SIPA. A series of evidence-based interdisciplinary protocols (nutrition, falls, congestive heart failure, dementia, depression, medication, vaccination) were developed and applied in collaboration with the patient's family physician. With the aim of rapidly meeting needs and avoiding inappropriate hospital and NH utilization, the teams readily mobilized resources, including intensive home care, group homes, and a 24-hour on-call service. Case managers intervened on medical and social issues with patients and caregivers, liaised with family physicians, and actively followed patients throughout the care trajectory, assuring continuity and easing transitions between hospital and community.

Patients were encouraged to continue to see their own physician. The 606 SIPA patients were distributed among 245 family physicians with each physician caring for between 1 and 10 patients. In addition to their usual fee-for-service payments, the sites offered the family physicians \$400 per SIPA patient annually to compensate for their time communicating with the team. With limited availability, the SIPA staff physicians followed a small number of participants and served as backup and resource to the team and family physician.

Agreements concerning service provision were negotiated with other providers, particularly hospitals. The SIPA teams maintained clinical responsibility and accountability for utilization, in hospitals as well as in the community, and monitored the application of protocols. They also controlled their own budgets, allowing intensive and flexible utilization of home services, group homes, and additional services. In a subsequent phase of the project the goal was to move toward full financial responsibility with a per capita budget.

The controls were offered the usual CLSC home care services including nursing, rehabilitation, physician, personal, and social services but with limited time and availability, and essentially no case management. The home

care services had little control over the budget, and could not pay for attendance in group homes. There was no responsibility for clinical or utilization outcomes except for CLSC-provided services.

Design and Participants

The evaluation was designed as an RCT over a 22-month period (June 1999 to March 2001). Eligibility criteria were: being older than 64 years, community-dwelling, residing within the two CLSC territories, being competent in French or English (either the participant or caregiver), and having a participating caregiver (if a caregiver existed). Disability was assessed with the Functional Autonomy Measurement System (SMAF) scale (15) which includes activities of daily living (ADL), instrumental ADL (IADL), communication, and cognition. Only those persons with at least moderate disability (score of -10 or less) were eligible. Those persons with a pending NH admission or move out of CLSC territory were excluded.

The total sample size of 1270 was calculated ($\alpha = 0.05$ and $\beta = 0.90$) to detect hospital and NH outcome differences (admissions, utilization, and costs) of 25% and 50%, respectively, based on a previous study of resource use in frail elderly persons, and taking into consideration expected attrition rates (16). In fact, 1230 elderly persons received their allocated intervention (Figure 1).

Participants were recruited mainly from CLSC community programs, with a small proportion from other sources. Informed consent was obtained from patients (or proxies) and caregivers. Participants were randomly allocated to either SIPA or control according to the allocation sequence (block size of 6–8) generated by the SAS Plan procedure (17). The research ethics committees of the Jewish General Hospital and the two CLSCs approved the protocol. The intention-to-treat principle was applied. The average length of enrollment was 572 days over the 669-day trial; 57.1% of the participants were enrolled for the whole period.

Primary outcomes were differences between SIPA and control for admissions, service utilization (total hours or days over the study period) and public costs of inpatient acute care, alternate level of care (ALC; patients who, following their acute hospital episode, remain in hospital awaiting NH placement, otherwise known as “bed-blockers”), NH, home health, and social care. Total institutional and community costs (whose components are shown in Table 2), and overall total costs were also compared. Secondary outcomes included health status, satisfaction with care, out-of-pocket expenses, and caregiver burden for the first 12-month period.

Data

Utilization and cost data were obtained from provincial government, regional health board, and CLSC databases. Additional data were manually extracted from hospital, CLSC, NH, and rehabilitation center patient records by trained assistants blinded to the participants' trial status.

Socioeconomic, demographic, health status, satisfaction with care, and out-of-pocket expense data (Table 3) were collected during home interviews. Questionnaires were administered to study participants by trained interviewers

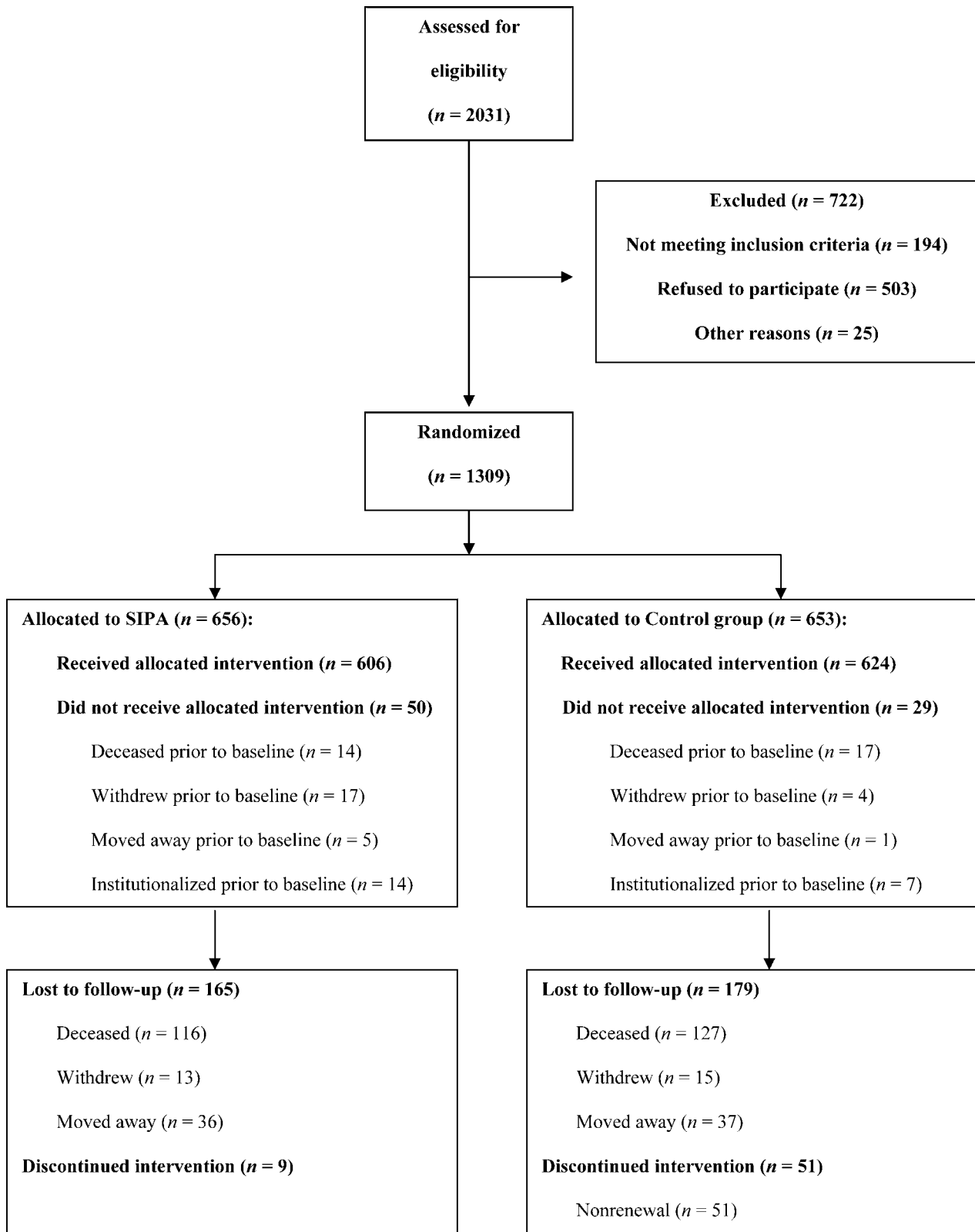


Figure 1. Flow diagram of recruitment and randomization.

Table 2. Components of Institutional and Community Care

Institutional Care	Community Care
Emergency department (ED)	Home health care
Inpatient acute care	Nursing
Alternate level of care (ALC)	Physical therapy
Nursing home (NH)	Occupational therapy
Day hospital	Nutritional services
Inpatient rehabilitation	Home social care
Palliative care	Homemaking
Ambulance transportation	Social work
	Psychosocial services
	Geriatric day hospital and centers
	Technical aids
	Physician visits
	Prescribed drugs
	Group homes

at baseline (t0) and 1 year later (t1); caregivers were interviewed only at t1. Interviewers were blinded to the experimental status of the interviewees.

Statistical Analysis

Differences between SIPA and control groups were tested using multivariate response models. These models allow for correlated dependent variables, which is necessary as admission to services, and utilization and costs of the different care components may be highly correlated with each other.

Admissions to services were entered as dependent variables in the models along with utilization, or costs. Statistical tests for these analyses were run on users only as the high proportions of non-users of some services may drive the comparisons of utilization and costs. All cost and utilization

Table 3. Content of Patient and Caregiver Questionnaires

Variable	Measurement (Instrument)
Study Participants (t0 and t1)	
Age	Continuous variable
Education	Six achievement levels
Income	5-point scale of subjective sufficiency of household income
Self-declared chronic diseases	EPESE scale (18)
Depression	GDS (19)
Cognition	SPMSQ (20)
Functional limitations	Nagi scale (21)
Instrumental Activities of Daily Living (IADL)	OARS (22)
Activities of Daily Living (ADL)	Items from the Barthel scale (23)
Client satisfaction	CSQ-8 (24)
Out-of-pocket expenses (*)	Self-report previous 2 weeks
Caregivers (t1 only)	
Caregiver satisfaction	CSQ-8
Caregiver burden	Zarit scale (25)

Notes: *Out-of-pocket expenses included nursing, homemaker, over-the-counter medication, technical aids, and transport to access health and social services.

EPESE = Established Populations Epidemiologic Study of the Elderly; GDS = Geriatric Depression Scale; SPMSQ = Short Portable Mental State Questionnaire; OARS = Older Americans Resources and Services; CSQ-8 = Client Satisfaction Questionnaire-8.

Table 4. Baseline Status of Trial Participants

Baseline Characteristic	Control Average or %	SIPA Average or %	p Value
Age, years (range 64–104)	82	82	.52
Sex, % males	28%	29%	.61
Education, % high school and over	70%	68%	.61
Income sufficiency, % with sufficient income	34%	35%	.70
Live alone, %	40%	44%	.20
No. of chronic diseases (range 0–16)	5.0	4.9	.49
Functional limitations: No. performed with difficulty	3.3	4.0	.07
ADL disabilities: No. not performed or with help	3.1	3.1	.70
IADL disabilities: No. not performed or with help	4.4	4.4	.95
Incontinence, %	46%	41%	.12
Cognitive problems, % with 3+ on SPMSQ	32%	31%	.59
Depressive symptoms, % with 10+ on GDS	14%	12%	.41
Perceived health, % with good to excellent	51%	53%	.51

Note: SIPA = French acronym for System of Integrated Care for Older Persons; ADL = activities of daily living; IADL = Instrumental Activities of Daily Living; SPMSQ = Short Portable Mental Health Status; GDS = Geriatric Depression Scale.

variables were log-transformed as they were skewed. The regression coefficients for experimental effects on utilization and costs can therefore be interpreted as percentages of change due to SIPA (26). Data on the deceased were included in the analysis of utilization and costs of services up to their death. Costs are reported in Canadian dollars.

Changes between t0 and t1 in out-of-pocket expenses and participants' satisfaction were compared in the SIPA and control groups using a repeated-measures procedure which allowed use of all data at both time points (27). Caregivers' burden and satisfaction were compared at t1 only.

In all of the analyses, socioeconomic characteristics, health indicators, and study site were controlled for. Supplemental cost analyses were performed to assess the impact of SIPA for subgroups, testing for interactions of trial status (SIPA or control) with socioeconomic characteristics and health status.

RESULTS

The control and SIPA groups did not differ significantly on socioeconomic characteristics or health status at baseline (Table 4). SIPA had no effect on change of health status or mortality, as expected.

Multivariate analyses showed that significantly more SIPA participants compared to controls received both home health and home social care (Table 5). SIPA participants who received home health care also had 62% more hours of care at 64% greater cost than did the controls receiving home health care. There was no difference in hours or costs of home social care.

There was also a highly significant 50% reduction in the number of acute hospital patients in the SIPA group that became ALC (Table 5). After transfer to ALC, there were no significant differences in utilization or costs, although there was a trend for SIPA participants to have longer stays.

Table 5. Effects of SIPA on Care Accessed, Utilization and Costs[†]

Type of Care	Care Accessed		Utilization [‡]		Costs of Care [‡]	
	Odds Ratio	(95% CI)	% Increase	(95% CI)	% Increase	(95% CI)
Home health care	1.72 *	(1.20, 2.46)	62%*	(46, 79)	64%*	(46, 83)
Home social care	2.16 *	(1.60, 2.91)	-17%	(-45, 10)	-22%	(-50, 7)
Inpatient care	0.93	(0.71, 1.18)	-5%	(-21, 11)	-5%	(-23, 13)
ED visits	0.92	(0.73, 1.20)	-11%	(-24, 2)	-10%	(-26, 7)
Alternate level of care	0.52*	(0.33, 0.82)	37%	(-4, 78)	17%	(-28, 71)
Skilled nursing homes	1.09	(0.78, 1.52)	11%	(-14, 42)	3%	(-24, 47)

Note: *Significant at the .05 level.

[†]In all models, socioeconomic characteristics, health status, and site were controlled.

[‡]Utilization and costs are for service users only. Dependent variables were log-transformed for a better fit with the normal distribution.

SIPA = French acronym for System of Integrated Care for Older Persons; CI = confidence interval; ED = emergency department.

There were no significant differences in admissions, utilization, or costs for the other components of institutional care: emergency department (ED), acute hospital, and NH. For ED, there was a trend for 10% lower utilization and costs for SIPA, but this did not reach significance.

In the multivariate analysis, total community costs were 44% higher for SIPA compared to control group users, whereas total institutional costs were 22% lower. The increase in mean community costs per study participant in the SIPA group (\$3,390) was compensated by a decrease in mean institutional costs (\$3,770) (Figure 2). Overall SIPA was cost neutral.

There was an insignificant increase in satisfaction for SIPA participants over 12 months. Caregivers' satisfaction

after 1 year was significantly higher for SIPA than for controls. There were no differences in caregiver burden or out-of-pocket costs.

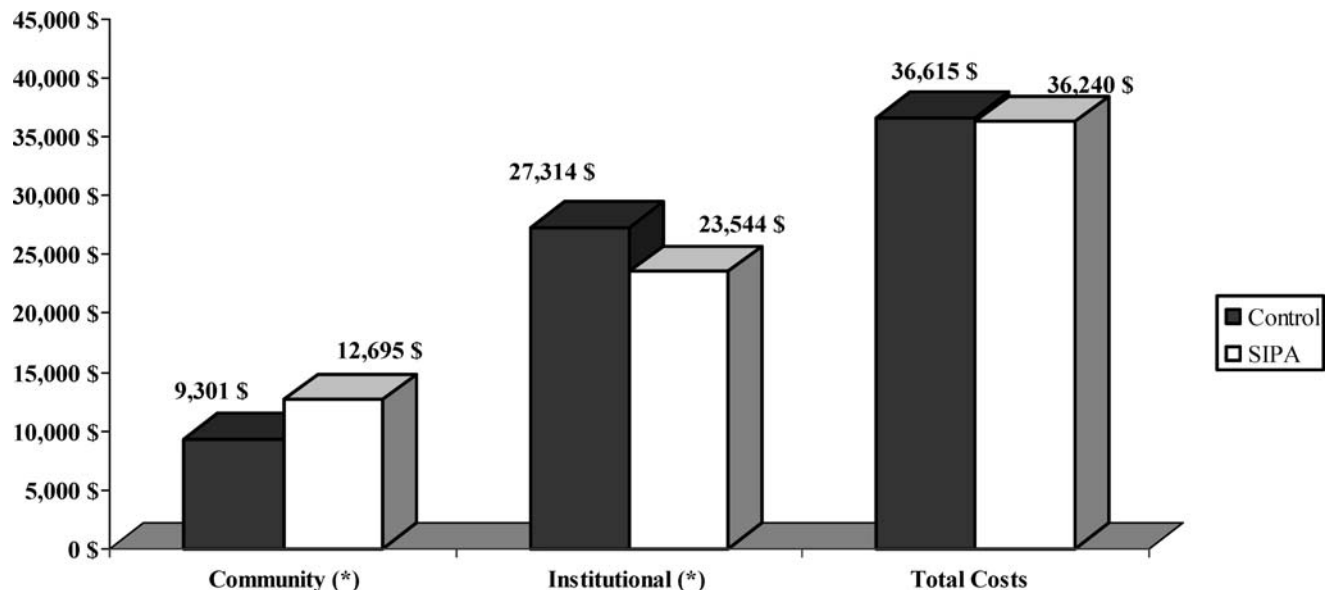
Supplemental Analyses

Four interaction terms for trial group status with socioeconomic and health status proved significant. The costs of home health care for SIPA compared with control users increased with the number of chronic diseases, and cost savings for NH were greatest (\$9,600) for those patients with fewer than four chronic diseases. NH costs for SIPA users living alone were \$14,500 less than for similar controls. Finally, compared to those for controls, costs of acute care hospitalizations were \$4,000 less for SIPA participants with low levels of ADL disability and more than \$5,000 lower for those participants with moderate to severe ADL disability.

DISCUSSION

This is the first North American RCT of an integrated system for disabled elderly persons. This trial followed the CONSORT guidelines (28) and is, to our knowledge, the largest of its kind with the longest experimentation period (22 months). Results indicate that SIPA, although cost neutral, succeeded in changing the configuration of care with a reduction in the overall acute hospital and NH utilization associated with a concomitant increase in community care.

The reduction in ALC and the pattern of reduction in acute hospitalizations and in NH costs suggest that SIPA's most important impact was in reducing hospital utilization for those participants with increased ADL disability, reducing use of the hospital as a "conduit" for NH placement, while apparently delaying NH placement for



(*) For components of community and institutional care see Table 2

Figure 2. Average costs per study participant of total community and institutional services.

those with few chronic diseases (lesser risk) and for those living alone (higher risk).

These results are relevant in many jurisdictions (29,30). In Canada, patients who cannot return home remain in hospital waiting for a place in a NH. This problem of ALC patients is particularly important in Montreal, where a recent government document (31) identified “bed-blockers” and long acute hospital stays of older persons as a threat to hospital and ED accessibility. It has also been demonstrated that caring for “bed-blockers” in an acute hospital is significantly more costly than caring for the same persons in a NH (32). SIPA therefore has important implications in helping to preserve access to acute hospital specialist functions.

The trial results are likely explained by several factors. Case managers spent a significant amount of time dealing with issues of hospitalization and discharge. They were able to efficiently mobilize additional professional, homemaker, and group home resources. Timely follow-up, together with the ability to problem solve, instilled confidence in hospital professionals and caregivers that discharge to the community would be safe and successful.

Several factors explain the inability of the intervention to demonstrate significant reductions in hospital days, ED visits, and NH utilization. Poor incentives for family physician engagement in the care of frail elderly persons, a problem being addressed in Canadian policy statements, limited their involvement and the SIPA teams’ ability to mobilize timely community medical intervention (33). Also, the number of study patients per family physician (1–10) was too small for SIPA to have much impact on their practice. Although SIPA staff received preparatory training, there was no lead time before the evaluation began to allow staff to adapt to the significant paradigm change that the SIPA model represents. Uncertainty about funding beyond 12 months resulted in certain key staff leaving the project. Per capita funding was not implemented as planned as it proved too complex within the Canadian health system, where global budgets are usual. It was therefore not possible to implement financial accountability, limiting incentives to reduce inappropriate utilization. Although SIPA and control teams were distinct, they did work in the same agency and building, so contamination and emulation are possible factors. Concurrent with the trial there were also significant increases in the home care budget in Montreal, including that of the control group. The study was powered to test for large differences of between 25% and 50%, and this may explain our inability to demonstrate statistical significance for some of the trends observed. Arguably even a 10% difference in the utilization and costs of services is clinically and financially meaningful, particularly for acute hospitalization.

Our results are consistent with those reported for similar models developed in the United States. Although the results of Social/Health Maintenance Organization trials were disappointing (34), the Program of All-Inclusive Care for the Elderly (PACE) attracted considerable interest, and is now a Medicare provider. Although not evaluated with an RCT or quasi experimental methodology, PACE does appear to reduce hospitalization and institutionalization with no increase, and possibly a reduction, in costs in

comparison with the general Medicare population (35–37). Two smaller Italian studies, one of which was an RCT, reported similar reductions in hospitalizations and costs (38,39).

Our study indicates the feasibility of rigorously assessing a major change in the delivery and organization of care for disabled older persons. In spite of some limitations, this trial and others point to the potential for integrated systems to reduce acute hospital and NH utilization without increasing costs or caregiver burden, while increasing satisfaction among caregivers.

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