Impact on hospital admissions of an integrated primary care model for very frail elderly patients

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A B S T R A C T

Very frail elderly patients living in the community, present complex needs and have a higher rate of hospital admissions with emergency department (ED) visits. Here, we evaluated the impact on hospital admissions of the COPA model (CO-ordination Personnes Âgées), which provides integrated primary care with intensive case management for community-dwelling, very frail elderly patients. We used a quasi-experimental study in an urban district of Paris with four hundred twenty-eight very frail patients (105 in the intervention group and 323 in the control group) with one-year follow-up. The primary outcome measures were the presence of any unplanned hospitalization (via the ED), any planned hospitalizations (direct admission, no ED visit) and any hospitalization overall. Secondary outcome measures included health parameters assessed with the RAI-HC (Resident Assessment Instrument-Home Care). Comparing the intervention group with the control group, the risk of having at least one unplanned hospital admission decreased at one year and the planned hospital admissions rate increased, without a significant change in total hospital admissions. Among patients in the intervention group, there was less risk of depression and dyspea. The COPA model improves the quality of care provided to very frail elderly patients by reducing unplanned hospitalizations and improving some health parameters.

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1. Introduction

Very frail elderly patients present a complex mix of medical, psychological and social needs along with disabilities (Campbell, Seymour, & Primrose, 2004; Lechowski et al., 2005) and a high risk of death (Landi et al., 2010). Health systems are fragmented and geared toward treating acute illnesses rather than managing chronic health conditions (Coleman & Berenson, 2004; Friedman and Kalant, 1998). As a result, the complex needs of elderly patients living in the community are not adequately met due to a discrepancy between their needs and the services provided (Asch, Sloss, Hogan, Brook, & Kravitz, 2000; Kennedy, 2001). This older population living with unmet needs therefore has a higher rate of hospital admissions (Sands et al., 2006). Among such hospitalizations, there are more unplanned admissions via ED visits (Hunt, Walsh, Voegeli, & Roberts, 2013; Walsh, Roberts, Nicholls, & Lattimer, 2008), which may lead to poor quality of care (Samaras, Chevalley, & Samaras, 2010) and the overcrowding of EDs (Ackroyd-Stolarz, Read Guernsey, Mackinson, & Kovacs, 2011).

Integrated primary care models with intensive case management for frail elderly patients have yielded promising results including better accessibility and use of community services (Beland et al., 2006; Low, Yap, & Brodaty, 2011). The impact on hospital admissions is still mixed, sometimes with no effect found on population care trajectories (Gravelle et al., 2007). Reinforcing a health system’s capacity to provide planned hospitalizations, which are not associated with an ED visit, would improve the quality of care for patients and prevent overcrowding in ED (Coleman, 2007).
addition, planned hospitalizations are recommended in some cases, in particular for patients with cognitive disorders (AGS, 2003). But planned hospitalizations have rarely been studied as one of the potential impacts of integrated care models.

Therefore, we developed and implemented the COPA model (COPA is a French acronym for **coordination of care for the elderly**) in order to improve care trajectories between primary and hospital care for very frail older patients, and this model has been implemented since 2006 in an urban district of Paris. It focuses on optimizing patient care trajectories and in particular, to decrease unplanned hospitalizations in order to avoid use of the ED as patients’ main entry point for hospital care. A quasi-experimental study was conducted to assess the impact of this model on hospital admissions and health parameters among community-dwelling very frail elderly patients. We hypothesized that the implementation of this integrated care model would reduce unplanned hospital admissions.

2. Materials and methods

2.1. Intervention

As previously described (Vedel, de Stampa, Bergman, Ankri, Cassou, Mauriat, et al., 2009; Vedel, de Stampa, Bergman, Ankri, Cassou, Blanchard, et al., 2009), the COPA model was built over a 2-year period through a “bottom-up” approach that featured collective action through the participation of health care and social service professionals (Vedel, de Stampa, Bergman, Ankri, Cassou, Mauriat, et al., 2009). The model was then implemented in an urban district of Paris (the 16th borough of Paris, with 150,000 inhabitants). The French system is publicly funded and is considered fragmented between health and social services, community-based and hospital-based services and long-term care and acute care (Somme & de Stampa, 2011).

Under this model, a two-person team – consisting of a nominated case manager and the patient’s primary care physician – were responsible for the patient’s care trajectory. A single entry point was used to refer community-dwelling, very frail patients with complex needs to case managers. Only nurses were recruited to be a case manager and each case manager had a case load of 40 very frail patients with complex needs. The case manager performed a home-based comprehensive geriatric assessment using the RAI-HC (Morris et al., 1997), developed an individualized care plan using evidence-based interdisciplinary protocols (Carpenter, 2006), coordinated all the required services during the follow-up. The ongoing role of the primary care physician was to collaborate with the case manager in the case management process and to share information on their very frail patients included in the program. Case management was provided until the patient is moved to a nursing home or until death. The two-person team received support as needed from geriatricians participating in COPA. The COPA geriatricians spent half their time working in the community and the other half working in hospitals in the same borough. They provided in-home specialized needs assessments and implemented interdisciplinary evidence-based protocols. In addition, the geriatricians also organized planned hospital admissions (direct admission to hospital, without an ED visit). Overall, initial care plans were discussed between the primary care physician and case manager for 1/4 of COPA patients. Half of COPA patients were evaluated at home by the geriatrician, 1/3 received at home intervention by a psychologist and 1/3 of hospitalized patients were seen by the case manager prior to discharge. On average, there were approximately 3 follow-up visits by the case managers during the 12-month period (Vedel, de Stampa, Bergman, Ankri, Cassou, Blanchard, et al., 2009).

The model’s governance is provided by a non-profit consortium that includes managers from the community-based services and hospital settings (public funding from France’s Medicare program).

2.2. Study design

The study was designed as a pre-test post-test quasi-experimental study with control group (Shadish & Campbell, 2002). The study was conducted over a one-year period in 2008 using an intervention site and a control site. The 16th borough of Paris, where COPA was implemented, was compared to two other nearby urban sites as a control group. The control group was recruited in the urban districts of Paris, namely, the 17th borough and in Boulgne–Billancourt. These regions were comparable to the intervention area in terms of size, demographic profile of the population, socio-economic status and services offered.

The control group was given the usual care, including medical primary care, in-home visits from their primary care physician, nursing, rehabilitation, and social and personal services. There was no integration, and there were no care managers to coordinate all services or community-based geriatricians in the control region. The study was approved by the Ambroise Paré Hospital research review board. Informed written consent was obtained from each patient or the family caregiver.

2.3. Participants

Patients were recruited either from hospitals in the area or from community-based care health services centers. For both the intervention and control groups, the eligibility criteria were: being a senior over 64 years old, living in the community, having a primary care physician, and being very frail with complex health and social needs. The Contact Assessment (CA) tool – derived from the interRAI set of tools (Resident Assessment Instrument) – is used to assess complex needs (Hirdes, 2006). This CA tool consists of nine separate items with yes/no binary responses (yes = 1; no = 0): four items for difficulties performing activities of daily living (dressing, personal hygiene, bathing and moving around indoors), one item on cognitive deficiency, one item on perceived poor health, one item on shortness of breath, and two social items (lack of a natural caregiver, living alone). Persons with a score of 6 or more were defined as having complex needs with a mix of medical, psychological, social conditions and functional impairments. Patients with a planned institutionalization within the next three months and patients with a probable life expectancy of less than one month were excluded.

A sample size of 100 participants in the intervention group and 300 in the control group (3 controls for each case) was determined in order to detect a 20% increase in the risk of hospitalization with 80% power at a 5% level of significance. Patients were recruited consecutively until the desired sample sizes were achieved.

2.4. Measures

The primary outcome measures were the presence of any unplanned hospitalization (via the ED), any planned hospitalizations (direct admission, no ED visit) and any hospitalization overall (planned or unplanned) during the follow-up period. Unplanned hospital admissions included acute clinical presentations such as falls with serious injury, abdominal surgical pain, acute respiratory failure and acute heart failure. Planned hospital admissions included malnutrition, neuropsychiatric disorders, falls without serious injury, congestive heart failure and infection. ED visits alone were excluded. The data were recorded in a central database maintained by the case managers. Prior hospitalization was assessed with the RAI-HC (Morris et al., 1997).
Secondary outcomes were the patient health parameters. Each patient in the intervention and control groups was assessed at their home by trained nurses using the RAI-HC at baseline (t0), at six months and at one year (t1). For this study, we included the following categories of variables: demographics, physical functioning, cognitive function, communication, mood and behavior, continence, and health conditions. The RAI-HC has 6 validated scales: the Instrumental Activity of Daily Living (IADL) Scale, the Activity of Daily Living (ADL) Hierarchical Scale, the Activity of Daily Living (ADL) Hierarchical Scale (Morris, Fries, & Mehr, 1999), the Cognitive Performance Scale (CPS) (Morris et al., 1994), the Depression Rating Scale (DRS) (Burrows, Morris, Simon, Hirdes, & Phillips, 2000), the Aggressive Behavior Scale (ABS) (Perlman & Hirdes, 2008), and the Pain Scale (Fries, Simon, Morris, Flodstrom, & Bookstein, 2001).

2.5. Analyses

Baseline patient characteristics in the intervention and control group were reported as means and standard deviations for continuous measures and as percentages (%) for categorical measures. Analyses of variance (for continuous measures) and chi-square tests (for categorical measures) were used to compare the two groups at t0.

Logistic regression was used to compare the risk of hospitalization (unplanned, planned and overall) at t1 between the intervention and control group. Models were run unadjusted and adjusted for baseline age, sex, ADL, CPS and prior hospitalization. Changes in other health parameters at t1 were examined using linear regression for continuous parameters and logistic regression for binary parameters. For all these analyses, models were adjusted for age, sex, ADL level, CPS score and the baseline health parameter’s value at t0. Values of P less than 0.05 were considered statistically significant. All the analyses were performed using SPSS (version 12.0) and SAS (version 9.2) software.

3. Results

3.1. Flow of participants

Out of a total of 1597 patients, 544 very frail patients were eligible, and a total of 428 (78.6%) participated in the study (105 in the intervention group and 323 in the control group) (Fig. 1). The eligible patients who were not included in the study (n = 116) were those who were deceased before inclusion (17.3%), had moved away (12.9%) or refused to participate (69.8%). Of the 105 intervention participants and 323 control participants at t0, 43 (40.9%) and 129 (39.9%), respectively, were deceased or in a institution; 4 (3.8%) and 16 (4.9%), respectively, had moved away; and 4 (3.8%) and 13 (4.0%), respectively, refused to participate at t1. At 1 year (t1), 54 (51.4%) patients of the intervention group and 165 (51.1%) patients in the control group were still living at home.

3.2. Impact of COPA on hospital admissions (unplanned, planned, overall)

Patients at baseline in the intervention group and the control group were similar in terms of their socio-demographic profiles, most health conditions (IADL, CPS, depression, aggressive behavior,
Table 1
Characteristics of the study population at baseline.

<table>
<thead>
<tr>
<th></th>
<th>Intervention group (n = 105)</th>
<th>Control group (n = 323)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean, years (SD)</td>
<td>85.9 (6.2)</td>
<td>87.3 (7.3)</td>
<td>.07</td>
</tr>
<tr>
<td>Gender, women, n (%)</td>
<td>78 (74.3)</td>
<td>233 (72.1)</td>
<td>.7</td>
</tr>
<tr>
<td>Living alone</td>
<td>69 (65.7)</td>
<td>232 (71.8)</td>
<td>.1</td>
</tr>
<tr>
<td>yes, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IADL Scale [0–42], mean (SD)</td>
<td>16.7 (4.7)</td>
<td>16.7 (4.3)</td>
<td>.99</td>
</tr>
<tr>
<td>ADL Scale [0–6], mean (SD)</td>
<td>1.5 (1.6)</td>
<td>2.6 (2.0)</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Cognitive Performance Scale (CPS) [0–6], mean (SD)</td>
<td>2.6 (1.7)</td>
<td>2.4 (2.0)</td>
<td>.3</td>
</tr>
<tr>
<td>Depression Rating Scale (DRS), yes, n (%)</td>
<td>45 (42.8)</td>
<td>142 (43.9)</td>
<td>.8</td>
</tr>
<tr>
<td>Aggressive Behavior Scale (ABS), yes, n (%)</td>
<td>21 (20.0)</td>
<td>50 (15.5)</td>
<td>.5</td>
</tr>
<tr>
<td>Pain Scale, yes, n (%)</td>
<td>62 (59.0)</td>
<td>188 (58.2)</td>
<td>.8</td>
</tr>
<tr>
<td>Prior hospitalizations in last 3 months, yes, n (%)</td>
<td>43 (40.9)</td>
<td>162 (50.1)</td>
<td>.08</td>
</tr>
</tbody>
</table>

3.3. Impact of COPA on health parameters

In addition to the hospitalization data, the effect of the intervention on other health parameters was assessed between t0 and t1. Functional disabilities (IADL and ADL) and decline in cognitive status at one year were similar in the two groups after adjustments (Table 3). Some health parameters were better in the intervention group compared to the control group at one year: lower risks of depression (OR = 0.42, 95% CI = 0.20–0.90) and dyspnea (OR = 0.26, 95% CI = 0.09–0.77). No changes were found in the other health parameters (aggressive behavioral disorders, pain, fall, continence) (Table 4). No differences were found in 1-year mortality rates in the two groups (results not shown).

4. Discussion

The results of this study show that the COPA model had a positive impact on hospital admissions, reducing unplanned hospitalizations in a community-dwelling very frail population with complex needs. In addition, the results suggest that the model improves some health parameters, such as depression and dyspnea.

Our results suggest that the COPA model improves patients' care trajectories. Thus, it is possible to optimize the very frail patient care trajectory from primary care to hospital care and to decrease visits to ED. The case manager and the primary care physician are two key healthcare professionals for very frail community-dwelling older persons with complex needs. Indeed, on the one hand, study results show that the case manager is responsible for achieving a better fit between needs and services for a limited number of patients, reinforcing follow-up by monitoring the care plan (Challis, Darton, Hughes, Stewart, & Weiner, 2001) and decreasing the unmet needs of these very frail patients (Hebert et al., 2009). On the other hand, the role of primary care physicians is strengthened since they participate actively in comprehensive patient needs assessments and their role is alleviated through the case managers' management of time-consuming non-medical activities (de Stampa, Vedel, Bergman, Novella, & Lapointe, 2009). In line with the recent recognition of the positive impacts of strong collaboration between case managers and primary care physicians on patients' mortality and service use (Parsons et al., 2012), the innovative component of the COPA model was the creation of synergy between the role of the case manager and the role of the primary care physician in a two-person team. This two-person team can identify worsening patient conditions earlier in the home and anticipate the need for hospitalization.

In addition, it is recognized that close coordination is necessary between primary and secondary care (Challis & Hughes, 2002). Thus, under the COPA model, the role of geriatricians is key to fostering collaboration and the sharing of information between primary care and hospital settings, which improves continuity of care. Moreover, the geriatricians were able to plan hospitalizations and facilitate patients' transitions from home to the hospital (and vice versa). It has been shown that when geriatricians are given the right to control admissions, adverse health parameters are avoided (Hastings, Whitson, Purser, Sloane, & Johnson, 2009). The role of hospitalizations in a community-dwelling very frail population with complex needs.
the geriatrician in the intervention group was also to accompany the change in practices at hospitals and to respond to the primary care physicians’ needs.

This study found no significant reduction in total hospitalizations. This result could be explained by the patients’ complex needs, including a mix of multiple chronic health and psychosocial conditions. In contrast to other integrated care models that included patients based on their functional disability alone, patients included in the COPA model have much more complex problems and are at higher risk for institutionalization or death. This is probably why the COPA model led to a shift from unplanned to planned hospital admission, avoiding ED visits but without any decrease in total hospital admissions. Despite no change in total hospitalizations, this shift from unplanned to planned admissions suggests an improvement in the quality of care received and a reduction in cost since ER visits are avoided.

The COPA model also had a positive impact on depression among these very frail patients. This supports findings that patients in integrated models of care are in better spirits and are more satisfied (Challis, Darton, Johnson, Stone, & Traske, 1991). The presence of a case manager to coordinate professionals in the delivery of long-term care reassures the person as well as their loved ones. The reduced rate of dyspnea suggests that the combination of comprehensive health assessments, care planning and systematic follow-up by case managers and primary care physicians may improve the prevention and the management of acute exacerbation of chronic diseases. However, the COPA model had no impact on functional status, much like other integrated care models (Berneli et al., 1998; Kane, Homyak, Bershadsky, 2002).

Some integrated care models have been successful in reducing functional disabilities but they targeted patients who were in better condition (Landi et al., 1999; Yordi & Waldman, 1985).

This study presents some limitations. We did not use a randomized controlled trial design for two reasons: The clinicians in the intervention area asked to have all their patients benefit from the intervention, rather than just certain randomly selected patients; and, the risk of contamination was important, given that the same professionals were caring for many elderly persons. Thus, as in many other intervention studies, a quasi-experimental design was used to compare two geographic regions (Eccles, Grimshaw, Campbell, & Ramsay, 2003). The risk in any quasi-experimental study is that the groups may not be comparable at t0, but the use of adjustment factors allowed us to control for known differences. Unfortunately, the length of stay at hospital was not available. The length of the follow-up period of this cohort was limited to one year because the selected population was very frail with a high attrition rate due to institutionalization and deaths in the short term.

5. Conclusions

These results suggest that integrated primary care based on a two-person team (a case manager and a primary care physician) and the support provided by geriatricians practicing in the community and in hospital, improve the quality of interventions for the very frail elderly patients. The patient care trajectory from primary care to hospital settings can be optimized in order to ensure a smooth transition to a suitable destination. As a specific objective, integrated care models should include the reduction of unplanned hospitalizations in order to avoid the use of EDs as the main entry point of patients for hospital care.

Authors’ contribution

MS – concept and design, data acquisition and analysis, drafting of the manuscript and approval of the final version. IV – concept and design, data acquisition, revision of the manuscript and approval of the final version. JFB – data analysis, revision of the manuscript. LL – concept and design, revision of the manuscript and approval of the final version. HB – concept and design, revision of the manuscript and approval of the final version. FB – concept and design, revision of the manuscript and approval of the final version. JA – concept and design, data analysis, drafting of the manuscript and approval of the final version.

Conflict of interest statement

None.

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