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Community Studies

# Safe Discharge of Seniors from the Emergency Department to the Community

## Final Report

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## **SAFE DISCHARGE OF SENIORS FROM THE EMERGENCY DEPARTMENT TO THE COMMUNITY**

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## **FINAL REPORT**

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# **SAFE DISCHARGE OF SENIORS FROM THE EMERGENCY DEPARTMENT TO THE COMMUNITY**

## **ABSTRACT**

### **OBJECTIVES**

This project investigates the safety of discharge of seniors (aged 65 and over) from Quebec emergency departments (EDs) to the community. Specific objectives are to describe: 1) ED staffing and services for seniors discharged home; 2) characteristics of patients served; and 3) outcomes and measures of the process of care within 30 days after the visit.

### **METHODS**

Data from a 2006 survey of key informants at 103 Quebec adult non-psychiatric EDs on staff and services conducted were linked to data on a sample of 172,927 seniors who were discharged home from one of the EDs during the study period (February, 2004 – January, 2005).

### **RESULTS**

During the 30 days after the ED visit, 1.0% of patients died, 5.0% returned to the ED and were admitted to hospital, 16.0% returned to the ED but were not admitted, 31.5% visited their primary physician, and 29.2% were prescribed a potentially inappropriate medication. Larger, urban EDs serve a higher risk patient population (older, greater comorbidity) with worse outcomes. A minority of EDs, regardless of their size and the characteristics of patients they serve, systematically provide services that can reduce adverse outcomes after an ED visit.

### **CONCLUSIONS**

A comprehensive approach is needed to improve the safety of discharge of high-risk seniors from EDs to the community. Resources and services need to be improved in EDs, particularly those that serve higher-risk populations (e.g., systematic approaches to the identification and management of high-risk seniors, with appropriate referrals to community services), in the hospital (increased accessibility to acute-care beds), and in the community (increased accessibility to homecare, outpatient geriatric assessment, and primary medical care).

# **SAFE DISCHARGE OF SENIORS FROM THE EMERGENCY DEPARTMENT TO THE COMMUNITY**

## **EXECUTIVE SUMMARY**

### **BACKGROUND**

Although there have been numerous studies of patient safety in the hospital setting, little research has focused on the emergency department (ED). The ED, a critical interface between the hospital and community, presents two major challenges to patient safety. First, the busy ED environment promotes a focus on rapid treatment and disposition of patients. A failure to detect underlying patient problems that require assessment or services may result in premature discharge and increased rates of return visits and other adverse outcomes. Possibly, limited access to patient information (from the primary physician, homecare services, previous hospitalization or ED visits) may lead to inappropriate treatment and disposition. Similarly, failure of ED staff to transmit information about the visit to the primary physician and to community services (e.g., homecare) may result in delays before the patient is assessed and treated, or services provided. These challenges to safety are of critical importance in seniors (defined here as ages 65 and over), whose higher levels of comorbidity, physical and cognitive impairment, and polypharmacy make them particularly vulnerable.

Controlled trials conducted in several countries (Canada, the U.S., U.K., and Australia) have reported that the adverse outcomes which frequently occur following an ED visit in an older patient (functional decline, mortality, return ED visits) may be prevented or ameliorated by ED-based geriatric interventions (e.g., nurse liaison and discharge planning). However, it is not known whether EDs offer these interventions, or whether the types of services offered are related to the characteristics of patients treated, in particular their level of risk for adverse outcomes.

### **OBJECTIVES**

This project investigates the safety of discharge of seniors (aged 65 and over) from Quebec emergency departments (EDs) to the community. Specific objectives are to describe: 1) ED staffing and services for seniors discharged home; 2) characteristics of patients served; 3) outcomes and measures of the process of care within 30 days after the visit.

### **METHODS**

A survey of key informants at 103 Quebec adult non-psychiatric EDs was conducted during the summer of 2006, to collect data on staff and services available for seniors discharged to the community. Response rates were: 71% for physicians, 90% for nurses, and 88% (22/25) for geriatric team leaders. These data were linked to those derived from provincial administrative databases on a sample of 172,927 community-dwelling seniors who were discharged home from one of the EDs during the study period (February, 2004 – January, 2005). Outcomes and measures of the process of care during the 30 days after the index ED visit included: death, return ED visit with hospital admission, return ED visit without hospital admission, primary physician visit, and prescription of a potentially inappropriate medication.

### **RESULTS**

Overall, during the 30 days after the ED visit, 1.0% of patients died, 5.0% returned to the ED and were admitted to hospital, 16.0% returned to the ED but were not admitted, 31.5% visited their

primary physician, and 29.2% were prescribed a potentially inappropriate medication. Larger, urban EDs serve a higher risk patient population (older, greater comorbidity and prior health services utilization) with worse outcomes (higher rates of death and hospital admission during the 30 days after the index visit). Small, rural EDs serve a less severely ill population, but one that makes more frequent visits to the ED both before and after the index visit. These small EDs appear to be providing a significant amount of primary care, in addition to urgent care. A minority of EDs, regardless of their size and the characteristics of patients they serve, systematically provide services that have been shown to reduce adverse outcomes after an ED visit (e.g., systematic and standardized screening, geriatric assessment, and discharge planning).

## **CONCLUSIONS AND RECOMMENDATIONS**

A comprehensive approach is needed to improve the safety of discharge of high-risk seniors from EDs to the community. Resources and services need to be improved particularly in larger, urban EDs that serve higher-risk populations (e.g., geriatric liaison nurses and social workers to implement systematic approaches to the identification, brief assessment, and community referrals of high-risk seniors, and pharmacist to assist with the review of medications), in the hospital (increased accessibility to acute-care beds, to reduce length of stay in the ED), and in the community (increased accessibility to homecare, outpatient geriatric assessment, and primary medical care, and improved information transfer).

# SAFE DISCHARGE OF SENIORS FROM THE EMERGENCY DEPARTMENT TO THE COMMUNITY

## TECHNICAL REPORT

### 1. BACKGROUND

Although there have been numerous studies of patient safety in the hospital setting, little research has focused on the emergency department (ED). The ED, a critical interface between the hospital and community, presents two major challenges to patient safety. First, the busy ED environment promotes a focus on rapid treatment and disposition of patients. A failure to detect underlying patient problems that require assessment or services may result in premature discharge and increased rates of return visits and other adverse outcomes.<sup>1-5</sup> Limited access to patient information (from the primary physician, homecare services, previous hospitalization or ED visits) may lead to inappropriate treatment and disposition.<sup>6</sup> Similarly, failure of ED staff to transmit information about the visit to the primary physician and to community services (e.g., homecare) may result in delays before the patient is assessed and treated, or services provided.<sup>7</sup> These challenges to safety are of critical importance in seniors (defined here as ages 65 and over), whose higher levels of comorbidity, physical and cognitive impairment, and polypharmacy make them particularly vulnerable.

A systematic review of trials conducted in several countries (Canada,<sup>8</sup> the U.S.,<sup>9</sup> U.K.,<sup>10</sup> and Australia<sup>11</sup>) concluded that the adverse outcomes which frequently occur following an ED visit in an older patient (functional decline, mortality, return ED visits) may be prevented or ameliorated by ED-based geriatric interventions (e.g., nurse liaison and discharge planning).<sup>12</sup> However, little is known about whether EDs actually offer these interventions, or whether the types of services offered are related to the characteristics of patients treated, in particular their level of risk for adverse outcomes.

In Quebec, and particularly in the Montreal area, ED stays of over 24 hours or even several days are not unusual. The resultant crowding and staff burden pose a potential safety issue that is the subject of corrective measures recently implemented in Montreal EDs.

An earlier study by our group linked data from a survey on screening tools in Quebec EDs<sup>13</sup> to data on return ED visits, with and without hospitalization.<sup>14</sup> In the current study, we collected and analyzed more comprehensive data both on ED services and on patient outcomes to profile safety issues for older ED patients who are discharged home.

### 2. OBJECTIVES

The primary objectives of this study of Quebec general adult EDs were:

1. To describe ED structural and organizational characteristics related to care of seniors who are discharged home after an ED visit;
2. To describe the demographic characteristics of seniors who are discharged home (e.g., demographics, comorbidity, prior use of health services);

3. To describe the process of care and patient outcomes during the 30 days after the ED visit (death, return ED visits with and without hospital admission, prescriptions of potentially inappropriate medications, and visits to the primary physician).
4. To explore the relationships between ED characteristics and patient outcomes.

### 3. METHODOLOGY

This study used the following databases, linked at the level of the individual patient, the ED, or the community.

- Provincial administrative databases: 3 administrative databases for the Quebec population, for the 2-year period April 1, 2003 to March 31, 2005, were linked using the individual's Medicare number: hospital discharge database (MedEcho), physician billing, and medication prescription databases (RAMQ). ED visits were identified in the RAMQ database using a validated method.<sup>15</sup>
- The ED registry (*Registre de la salle d'urgence*), linked at the ED level.
- Survey of key ED informants: A survey was conducted during the summer of 2006 using questionnaires directed to the chief physician, head nurse, and person responsible for the care of seniors (if applicable) at each ED, and provided measures of hospital and ED resources, and of organizational characteristics of each ED. Response rates were: 71% for physicians, 90% for nurses, and 88% for geriatric team leaders (22 out of 25).
- Other data on ED characteristics were obtained from the Quebec Ministry of Health (location, university affiliation, number of beds, and comprehensive of resources). The severity of illness of patients presenting to each ED was determined using an unvalidated severity scoring system developed for Quebec EDs (NIRRU Index: niveau d'intensité relative des ressources utilisées, incorporating ED diagnosis and resource utilization).<sup>16,17</sup>

The study protocol was approved by the *Commission d'accès à l'information* and the Research Ethics Committee of St. Mary's Hospital.

The study sample comprised 172,927 non-institutionalized patients aged 65 or over who made an index visit during a 12-month period (February 1, 2004 to January 31, 2005) to one of 103 Quebec adult, non-psychiatric EDs and were discharged home (Figure 1).

The following data were available for analysis:

- Outcomes: A 30-day time frame was used for the measures of outcome and process of care: death, emergency hospital admission, return ED visit without hospitalization, visit to the primary physician, and prescription of a potentially inappropriate medication (based on the modified Beers criteria, but excluding estrogens<sup>18</sup>).
- Patient characteristics: The following variables were derived from administrative databases: age, sex, socioeconomic status (based on the patient's postal code),<sup>19</sup> 2 measures of multimorbidity (derived from chronic disease diagnoses<sup>20</sup> and medication prescriptions,<sup>21</sup> respectively), diagnosis at index visit, utilization of healthcare services during the previous 12 months (hospital days, ED visits, physician office visits), and identification of the primary physician (classified as a family physician, other generalist, specialist, or none, as not all patients have a family physician).<sup>22</sup>
- Context of visit variables: This group of patient-level variables, derived from the administrative databases, measures the following at the time of the index visit: day of visit

(weekday vs weekend), month of visit, ratio of hospital admissions to ED visits for age 65+, and ratio of patients to beds.

- Head nurse questionnaire: The questionnaire included closed- and open-ended questions on the following: staffing (number of nurses and nurses aides per working during each shift, use of auxiliary nurses, other non-medical professionals in ED and their involvement in screening, assessment or discharge planning for seniors; availability of an on-call pharmacist); relationship with community health centres (including type of collaboration and satisfaction with services); geriatric ED services (use of standardized screening and assessment tools, discharge planning protocol, post-ED telephone follow-up); and attitudes (rating of ED services for older patients discharged from ED, availability of outpatient geriatric services, ED staffing adequacy for geriatric care, and perceived role of the ED in care of seniors).
- Chief physician questionnaire: The questionnaire included closed- and open-ended questions on the following: staffing (number of physicians per weekday shift, proportion of physicians working 50% of their professional time or more, proportion of physicians specialized in emergency medicine, residents and medical students in ED; availability of geriatric and psychogeriatric consultation: pharmacist and/or pharmacy technician in the ED); computerization and communication (software currently used, administrative, clinical, pharmaceutical software, transfer of information to and from family physicians); medical care (use of standardized protocols); availability of alternatives to hospitalization [home and rehabilitation services, in-hospital services (medical day center/pre-op evaluation unit), outpatient services (geriatric outpatient clinic, day hospital)]; arrangements with institutions for direct hospitalization (not through the ED); attitudes (rating of ED services for older patients discharged from ED, availability of outpatient geriatric services, ED staffing adequacy for geriatric care, and vision for role of ED in care of seniors).
- Geriatric team leader questionnaire: If the head nurse indicated that there was a staff member (usually a nurse) responsible for ED services for older patients, this person was asked to complete the section of the nurse questionnaire that covered geriatric ED services.

## 4. RESULTS

### Classification of EDs

An ED classification was developed based on the following correlated ED characteristics: location, university affiliation, number of beds, and comprehensiveness of resources. Three ED types were identified: 1) large EDs, mostly with 21 or more beds and located in the Montreal area (n=30); 2) medium-size EDs, mostly with 14-20 beds and located in urban areas outside Montreal (n=29); 3) small EDs, often based in health centres rather than hospitals, most with fewer than 14 beds and located in rural areas (n=44). Figure 2 shows the location of the 3 types of ED. Table 1 shows selected characteristics of the 3 ED types. In addition to the factors described above, there were significant differences by ED size in the severity of illness of patients treated and in the ED length of stay of patients on beds. (Note that the latter two measures could not be computed for a substantial subset of the small, rural EDs because the data were either not available, or not applicable.) As the table shows, larger EDs serve a more severely ill population with longer average ED stay.

## Patient populations and services provided in the 3 ED types

There were significant differences by ED type in many patient characteristics, most of which showed a gradient across type of ED. Seniors discharged home from larger EDs were more likely to be older, female, have greater comorbidity, greater numbers of prior hospital days and of physician visits in the previous year (Table 2). Notably, patients visiting small EDs had significantly more prior ED visits than those at large and medium EDs. Patients visiting larger EDs were more likely to have an ED diagnosis of: cardiovascular disease; cancer; a mental or nervous condition; or symptoms, signs and ill-defined conditions, but less likely to have a diagnosis of a respiratory or skin problem. These findings suggest that seniors discharged home from larger EDs are not only more severely ill but include a higher proportion of high risk or frail elderly patients who are likely to require substantially more medical and support services in the community.

Selected services provided in the 3 types of ED are shown in Table 3. From the head nurse questionnaire, types of staff and services that were available significantly more frequently in larger EDs included: liaison nurses, clinical nurse specialists, and systematic screening. However, head nurses in smaller EDs were more satisfied with community services and rated homecare services as more available than those in larger EDs. From the chief physician questionnaire, physician staffing differed significantly by ED type: at larger EDs, the ratio of physicians to beds was lower and each physician saw more patients. Physicians in larger EDs were more likely to be full-time, and specialists vs family physicians. Geriatric and psychogeriatric consultation was more available in larger EDs. Although pharmacists were reported by head nurses to be available in most EDs (including those on-call), data from the physicians indicated that a pharmacist was much more likely to be located in the ED in large vs medium and small EDs. Interestingly, head nurses at large EDs perceived the ED to have an important role in the screening, assessment, and community referral of high-risk seniors, suggesting their readiness to improve ED services for this population.

## Patient outcomes

Table 4 shows the frequency of 30-day outcomes and measures of the process of care among seniors discharged home from the 3 types of ED. Our rates of death, total return ED visits with and without hospital admission are within the range of those reported in the literature among seniors.<sup>9,11,23,24</sup> Our rates of potentially inappropriate prescribing, however, appear to be higher than previous reports (one study found that 12.6% of ED patients aged 65+ were prescribed inappropriate medications).<sup>25</sup> Overall, 42.7% of patients had one or more of these adverse outcomes or process measures, and 31.5% visited their primary physician.

After controlling statistically for patient characteristics, there were significant differences in outcomes among the 3 types of ED: patients at large and medium EDs were significantly more likely to die or be admitted to hospital but less likely to make a return ED visit without hospitalization than were patients at small EDs. In contrast, ED type was not related to visits to the primary physician or to prescription of a potentially inappropriate medication, even after controlling for patient characteristics.

Only three specific services were significantly associated with a reduced rate of serious adverse outcomes (death or emergency hospitalization), after statistical adjustment for ED type, patient characteristics and context of visit: a social worker involved in ED care of seniors, availability of an on-call pharmacist, and physician perception that homecare was more available. Only two specific

services were significantly associated with a reduced rate of return ED visits without hospitalization, after statistical adjustment for ED type, patient characteristics and context of visit: availability of an on-call pharmacist, and greater availability of inpatient alternatives to hospitalization (a medical day centre or pre-operative evaluation unit).

ED services were not related to the other outcome and process measures (primary physician visits and prescription of a potentially inappropriate medication).

## 5. STUDY LIMITATIONS

This study is among the first to explore the safety of seniors discharged home from EDs located in hospitals and other healthcare settings. The strengths of the study include the representative sample of different types of EDs in the province of Quebec. However, several limitations should be noted.

- Data on patient characteristics and outcomes were derived from administrative databases, which contain limited data of uncertain validity. For example, the primary ED diagnosis is not standardized; diagnostic and coding practices may vary among EDs.
- The cross-sectional study design means that associations found between specific services and patient outcomes should not be interpreted as causal.
- The survey data on availability of specific services at each ED do not indicate which of these services were actually used, nor whether they were used for high-risk patients.
- No direct measures of frailty or functional status (physical or cognitive) were available.
- It was not possible to identify planned return ED visits.
- It was not possible to determine which medication prescriptions were given to patients at the ED visit. Further research could focus on changes in prescriptions from before to after the ED visit (to identify which medications were discontinued and which were initiated).

## 6. CONCLUSIONS

The main conclusions from this population-based study of seniors discharged home after an ED visit are summarized below.

- Serious adverse outcomes among seniors in the 30 days after discharge home from the ED included death (1%) and emergency hospitalization (5%). The main risk factors for these outcomes include characteristics of the patients who visit the ED, such as their age, primary medical diagnosis, comorbidity (number and severity of other medical problems), prior frequency of physician visits, and hospitalization history. These outcomes occurred more frequently in large, urban EDs, indicating that the latter serve a high-risk population, with greater challenges to safety of patients after discharge.
- Return to the ED without being hospitalized during the 30 days after the index visit (16% of patients in this study) may reflect inadequate treatment at the initial visit, or a planned visit to follow-up on treatment given. This outcome was more frequent in small, rural EDs, in keeping with research suggesting that rural EDs play a larger role in providing primary medical care.<sup>26</sup>

- Prescription of a potentially inappropriate medication: 29% of patients received a prescription of a medication that is potentially inappropriate among seniors<sup>18</sup> and may have harmful side-effects. Most of these patients were also receiving these medications before their ED visit.
- Primary physician visits: Only 32% of patients visited their primary physician during the 30 days after being released home from the ED. This low proportion may reflect a lack of accessibility to primary medical care, and may have a negative effect on the continuity of care between the ED and the community.<sup>22</sup>
- Staffing: Staffing at larger EDs more often includes nurses and physicians who are specialized in the care of seniors. However, despite the higher risk profile of patients seen at larger EDs, the ratio of staff to ED beds or to patient visits among seniors is no different for nurses, and is actually worse for physicians.
- Services provided: The types of ED services that can improve patient outcomes are not systematically provided for seniors discharged home. For example, most EDs (even large EDs with high-risk populations) do not conduct systematic screening to identify seniors and risk, and most do not have a standard discharge protocol for high-risk seniors. Furthermore, EDs that involve social workers in the care of seniors who are discharged, and those that have access to pharmacists (either in the ED or on call), tend to have fewer serious outcomes (death or hospitalization).
- Homecare services: Homecare services are perceived to be less available to larger EDs with the highest risk populations.
- Context of visit: Circumstances at the time of the ED visit that are associated with an increased risk of serious adverse outcomes include: season of visit (highest risk in winter months), increased ED crowding, and a lower ratio of admissions to ED visits (possibly indicating a reduced capacity to admit patients from the ED).

## 7. IMPLICATIONS FOR DECISION-MAKERS

The results of this study have implications for improving services delivered in Quebec EDs that can improve the safety of seniors discharged home from the ED. The generalizability of these results to other parts of Canada requires further investigation.

- Evidence-based services that could be implemented by a liaison nurse or social worker include standardized, systematic, ED-based screening, assessment, and discharge planning with referrals as needed for community services.<sup>12,27,28</sup> Because the identification of seniors at risk requires follow-up in the community, priority must be to assure the availability of essential community services (e.g., homecare, geriatric assessment, primary medical care).<sup>29</sup>
- Increased involvement of pharmacists, in the ED and in the community, may help to reduce medication-related adverse events after discharge.<sup>30</sup>
- Increased ED staffing during the winter months and more acute care beds in large urban hospitals may help to accommodate the increased need, and reduce the adverse outcomes associated with overcrowding.<sup>31</sup>

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**Figure 1: Study flowchart**

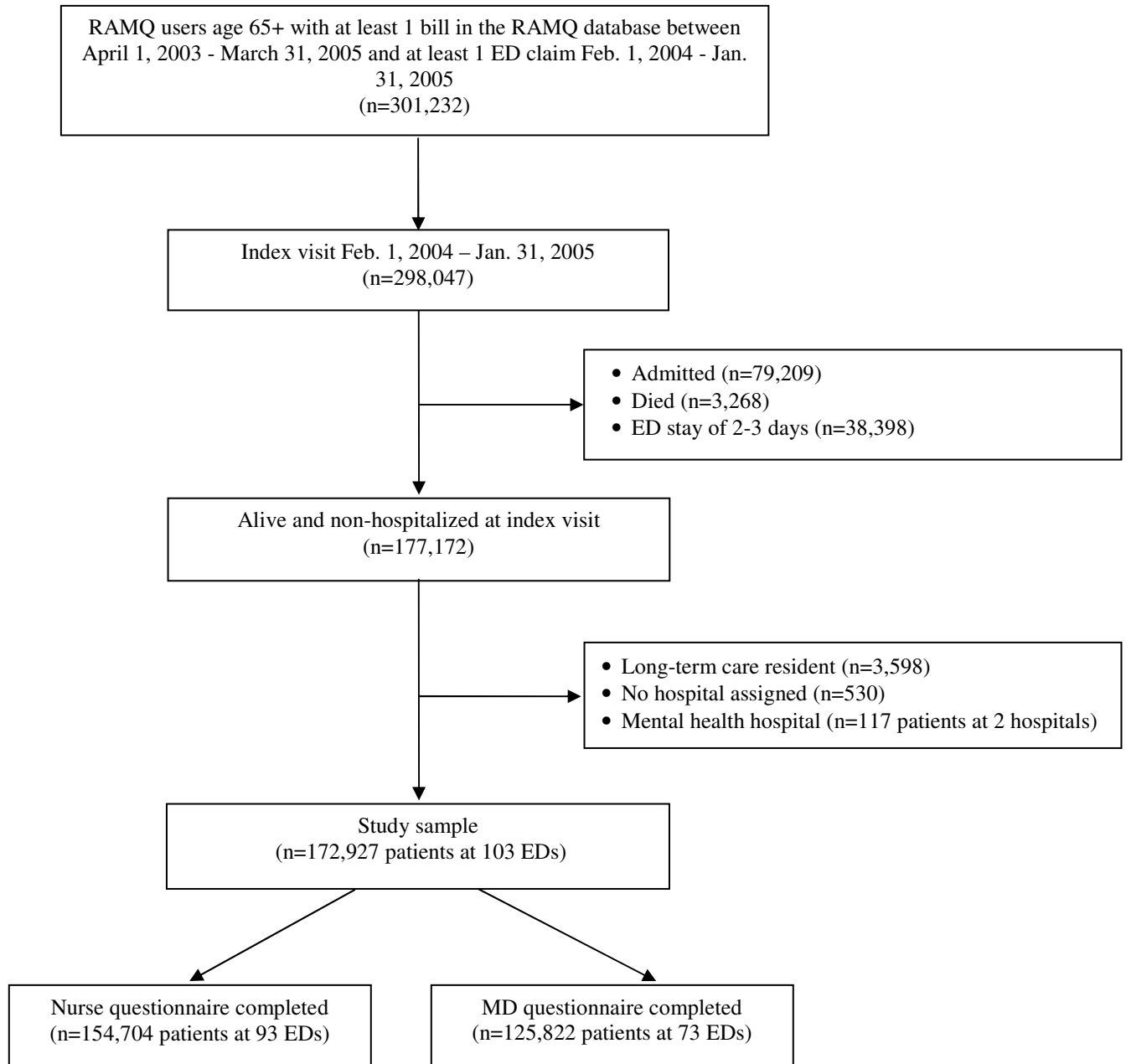
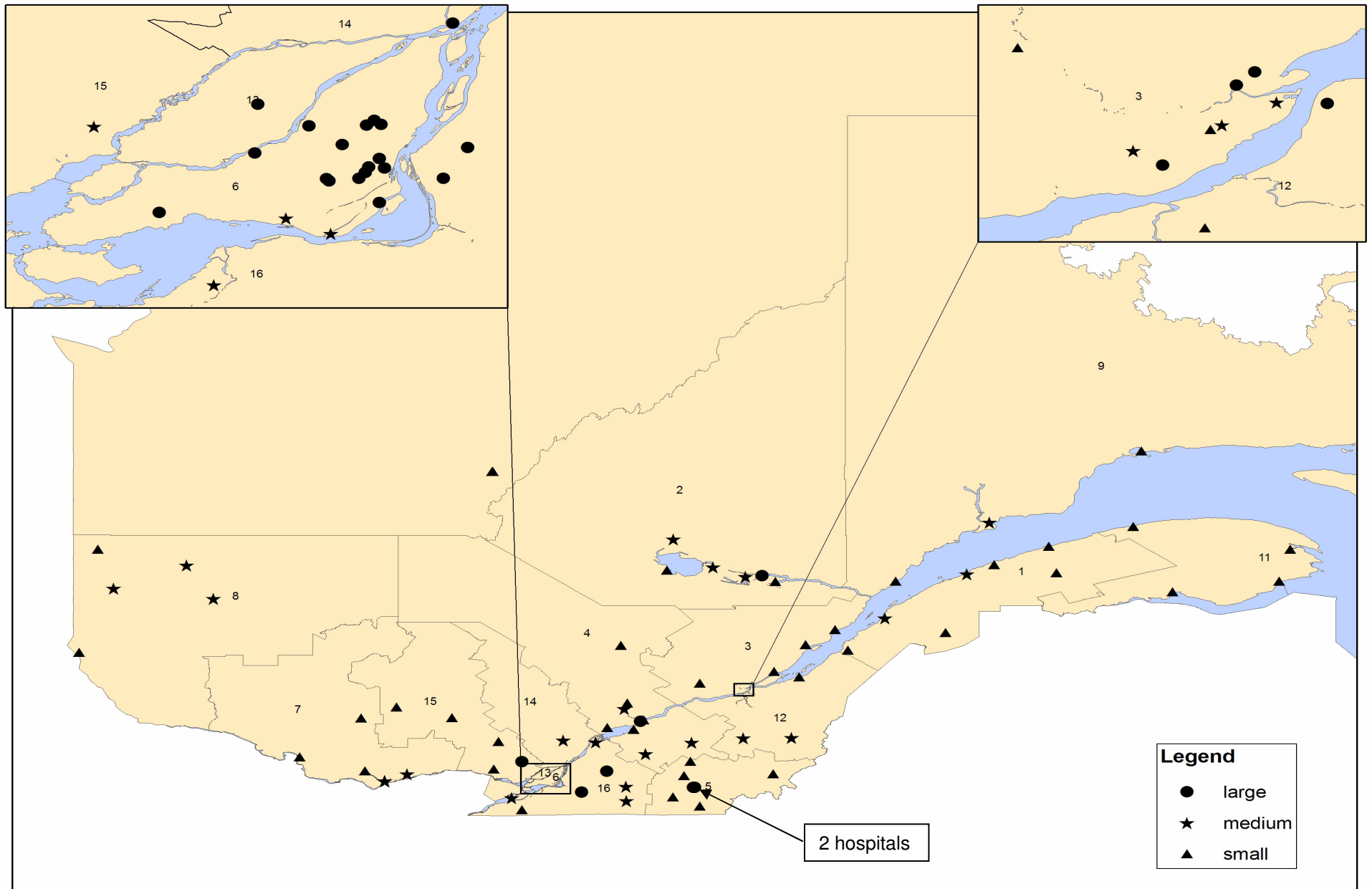


Figure 2: Geographic location of emergency departments in Quebec by type



**Table 1: Description of ED types**

| Variable                                        | Large<br>(n=30)<br>% | Medium<br>(n=29)<br>% | Small<br>(n=44)<br>% | Total<br>(n=103)<br>% |
|-------------------------------------------------|----------------------|-----------------------|----------------------|-----------------------|
| Level of care                                   |                      |                       |                      |                       |
| Tertiary or specialized                         | 60                   | 7                     | 0                    | 20                    |
| Secondary                                       | 40                   | 86                    | 2                    | 36                    |
| Primary                                         | 0                    | 7                     | 50                   | 24                    |
| Not classified                                  | 0                    | 0                     | 48                   | 21                    |
| University affiliated                           | 73                   | 52                    | 7                    | 39                    |
| # of ED beds                                    |                      |                       |                      |                       |
| 1-6                                             | 0                    | 0                     | 56                   | 22                    |
| 7-13                                            | 0                    | 38                    | 39                   | 27                    |
| 14-20                                           | 13                   | 52                    | 5                    | 21                    |
| 21-56                                           | 87                   | 10                    | 0                    | 30                    |
| Geographic location                             |                      |                       |                      |                       |
| Montreal/Laval                                  | 53                   | 7                     | 0                    | 17                    |
| Other urban                                     | 47                   | 93                    | 23                   | 50                    |
| Rural                                           | 0                    | 0                     | 77                   | 33                    |
| Severity of illness*                            |                      |                       |                      |                       |
| 0.67 to 0.80                                    | 0                    | 11                    | 69                   | 25                    |
| 0.80 to 0.98                                    | 3                    | 43                    | 27                   | 24                    |
| 0.98 to 1.08                                    | 37                   | 39                    | 4                    | 27                    |
| 1.08+(highest)                                  | 60                   | 7                     | 0                    | 24                    |
| ED length of stay (hours) for patients on beds* |                      |                       |                      |                       |
| 0-11                                            | 51                   | 59                    | 68                   | 59                    |
| 12-23                                           | 24                   | 21                    | 20                   | 22                    |
| 24-47                                           | 18                   | 15                    | 9                    | 14                    |
| 48+                                             | 7                    | 6                     | 3                    | 5                     |

\*Missing data for 16 to 20 EDs, mostly small EDs

ED : emergency department

**Table 2: Characteristics of patients aged 65 and over by ED type**

| <b>Variables</b>                                       | <b>Large<br/>(n=79,880)</b> | <b>Medium<br/>(n=49,540)</b> | <b>Small<br/>(n=43,507)</b> | <b>Total<br/>(n=172,927)</b> |
|--------------------------------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|
| Age (years, mean)                                      | 76.7                        | 76.4                         | 75.9                        | 76.4                         |
| Female (%)                                             | 59.5                        | 58.0                         | 56.5                        | 58.3                         |
| Charlson Comorbidity score (mean)*                     | 1.4                         | 1.3                          | 1.1                         | 1.3                          |
| Hospital days in previous year (mean)                  | 2.7                         | 2.6                          | 1.9                         | 2.5                          |
| Physician ambulatory visits in<br>previous year (mean) | 10.8                        | 8.7                          | 7.0                         | 9.2                          |
| Diagnosis at ED visit (%)                              |                             |                              |                             |                              |
| Cardiovascular                                         | 10.8                        | 10.1                         | 7.9                         | 9.9                          |
| Respiratory                                            | 5.2                         | 8.8                          | 13.5                        | 8.3                          |
| Digestive                                              | 5.3                         | 6.0                          | 5.1                         | 5.4                          |
| Cancer                                                 | 1.6                         | 1.7                          | 1.0                         | 1.5                          |
| Skin                                                   | 2.8                         | 3.4                          | 4.6                         | 3.4                          |
| Mental or nervous                                      | 7.6                         | 6.2                          | 6.0                         | 6.8                          |
| Symptoms, signs, ill-defined conditions                | 25.4                        | 21.1                         | 16.6                        | 22.0                         |
| Injury                                                 | 17.7                        | 17.7                         | 17.9                        | 17.7                         |
| Other                                                  | 20.6                        | 22.3                         | 23.4                        | 21.9                         |
| Missing                                                | 3.0                         | 2.7                          | 4.0                         | 3.1                          |

\* Higher score indicates more serious chronic conditions

ED : emergency department

**Table 3: Staff and services by ED type**

| <b>Variable</b>                                                      | <b>Large<br/>(n=30)</b> | <b>Medium<br/>(n=29)</b> | <b>Small<br/>(n=44)</b> | <b>Total<br/>(n=103)</b> |
|----------------------------------------------------------------------|-------------------------|--------------------------|-------------------------|--------------------------|
| <b><u>From head nurse questionnaire</u></b>                          | (n=26)                  | (n=26)                   | (n=41)                  | (n=93)                   |
| Ratio of daily ED visits (65+) to nurses on weekday shift (mean)     | 2.6                     | 2.4                      | 2.8                     | 2.7                      |
| Ratio of nurses on weekday shift to # of ED beds (mean)              | 0.5                     | 0.5                      | 0.6                     | 0.5                      |
| Staff involved in care of seniors discharged home                    |                         |                          |                         |                          |
| Liaison nurse                                                        | 58%                     | 46%                      | 34%                     | 44%                      |
| Geriatric clinical nurse                                             | 15%                     | 8%                       | 5%                      | 9%                       |
| Social worker                                                        | 50%                     | 46%                      | 34%                     | 42%                      |
| Pharmacist available or on call                                      | 81%                     | 73%                      | 83%                     | 80%                      |
| Satisfaction with homecare services (mean, range 1-5)                | 3.1                     | 3.6                      | 3.9                     | 3.6                      |
| Systematic screening of seniors                                      | 46%                     | 39%                      | 15%                     | 30%                      |
| Discharge planning protocol                                          | 12%                     | 19%                      | 10%                     | 13%                      |
| Team leader for geriatric care                                       | 54%                     | 23%                      | 12%                     | 27%                      |
| Geriatric team availability                                          |                         |                          |                         |                          |
| No team                                                              | 42%                     | 64%                      | 71%                     | 61%                      |
| Not available                                                        | 12%                     | 8%                       | 5%                      | 8%                       |
| Available                                                            | 46%                     | 28%                      | 24%                     | 32%                      |
| Perceived role of ED (mean)                                          | 3.1                     | 2.7                      | 2.6                     | 2.8                      |
| <b><u>From chief physician questionnaire</u></b>                     | (n=20)                  | (n=23)                   | (n=30)                  | (n=73)                   |
| Ratio of daily ED visits (65+) to physicians on weekday shift (mean) | 11.1                    | 9.1                      | 7.6                     | 9.0                      |
| Ratio of physicians on weekday shift to # of ED beds (mean)          | 0.1                     | 0.2                      | 0.3                     | 0.2                      |
| Geriatric/psychogeriatric consultation available                     | 60%                     | 22%                      | 27%                     | 34%                      |
| Pharmacist in ED                                                     | 70%                     | 17%                      | 17%                     | 32%                      |

ED : emergency department

**Table 4: Patient 30-day outcomes and process of care by ED type (N=172,927)**

| <b>Outcome</b>                                       | <b>Large</b><br>(n=79,880)<br>% | <b>Medium</b><br>(n=49,540)<br>% | <b>Small</b><br>(n=43,507)<br>% | <b>Total</b><br>(n=172,927)<br>% |
|------------------------------------------------------|---------------------------------|----------------------------------|---------------------------------|----------------------------------|
| a) Death                                             | 1.2                             | 1.2                              | 0.6                             | 1.0                              |
| b) Return to ED with hospital admission              | 5.5                             | 5.0                              | 4.0                             | 5.0                              |
| c) Return to ED without hospital admission           | 14.5                            | 15.0                             | 20.0                            | 16.0                             |
| d) Potentially inappropriate medication prescription | 29.2                            | 30.1                             | 28.0                            | 29.2                             |
| Death or hospital admission (a or b)                 | 6.2                             | 5.7                              | 4.3                             | 5.6                              |
| Death, admission, or return ED visit (a, b or c)     | 19.5                            | 19.8                             | 23.2                            | 20.5                             |
| Any of the above (a, b, c, or, d)                    | 41.9                            | 43.0                             | 43.6                            | 42.7                             |
| Primary physician visit                              | 32.7                            | 31.3                             | 29.6                            | 31.5                             |

ED : emergency department