# Rapid Two-stage Emergency Department Intervention for Seniors: Impact on Continuity of Care

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## Abstract

Objectives: A two-stage intervention comprising screening and a brief standardized nursing assessment and referral, for emergency department (ED) patients aged 65 years and over, reduced the rate of functional decline four months after the visit, without increasing societal costs. In this study, the authors investigated the effects of the intervention on the process of care at, and during the month after, the ED visit. Methods: Patients at four Montreal hospital EDs were randomized by day of visit to the intervention or to usual care. Patients admitted to the hospital were excluded. Measures of process of care included: referrals and visits to the primary physician and to the local community health center, for home care or other services, and return ED visits. Data sources included hospital charts, patient questionnaires, and provincial administrative databases. Results: The study sample included 166 intervention and 179 control group patients ready for discharge from the ED. Intervention group patients were more likely to have a chart-documented referral to their local community health center [adjusted odds ratio (OR) 4.0, 95% confidence interval (95% CI) = 1.7 to 9.5] and their primary physician [adjusted OR 1.9, 95% CI = 1.0 to 3.4], and to have received home care services one month after the ED visit [adjusted OR 2.3, 95% CI = 1.1 to 5.1]. Unexpectedly, they were also more likely to make a return visit to the ED [adjusted OR 1.6, 95% CI = 1.0 to 2.6]. Conclusions: The beneficial outcomes of the intervention appear to result primarily from the early provision of home care rather than early contact with the primary physician. Key words: elders; geriatrics; screening; continuity of care; intervention; outcomes. ACADEMIC EMERGENCY MEDICINE 2003; 10:233–243.

Older patients who visit hospital emergency departments (EDs) are at high risk of functional decline and other adverse outcomes.[1–5] Moreover, deficiencies in the care of this high-risk population in the ED setting include failure to recognize problems that could benefit from more careful assessment (either in the ED or in another setting), failure to refer to appropriate community services, and failure to communicate to the primary physician in a timely fashion the problems identified and interventions implemented at the ED visit.[1,6–9]

A small number of controlled trials have evaluated ED interventions for older patients that address these problems. A quasi-experimental trial of a nursing case-finding and liaison intervention in an American ED failed to demonstrate beneficial health effects at three-month follow-up;[10] possible reasons for this apparent lack of effectiveness included failure to adhere to recommendations made by the intervention nurse, failure to target those at greatest need, and contamination of the control group.[11] In a randomized trial from the United Kingdom, a nurse assessed patients aged 75 years and over at home, usually within 24 hours of release from the ED, and provided advice and/or referral to a wide range of services.[12] At four-week follow-up, the intervention group had used more services and was significantly more independent than the control group. A third randomized trial from Australia reported a beneficial effect on functional decline of a multidisciplinary assessment and referral intervention conducted the day after return home from the ED.[13] None of these previous studies used screening to identify high-risk patients to receive the intervention.

We conducted a multisite randomized trial to evaluate a short, two-stage nursing intervention to address the service needs of this high-risk population.[14] In the first step, we used a screening tool

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A related commentary appears on page 271.

previously developed by members of our group to target the intervention to those in greatest need.[5] High-risk patients were referred to an intervention nurse experienced in the care of older patients, who performed a brief evaluation of patient problems and needs, and prepared a discharge plan that attempted to optimize the use of appropriate community services. The results of the trial indicate that this brief, two-stage ED intervention significantly reduced the rate of functional decline four months after the ED visit, from 30.9% to 21.1%,[14] without any concomitant increase in societal costs over the four-month period following the ED visit.[15]

The purpose of the current study was to investigate the process of care during the ED visit and the following month, in order to understand better those care processes that were responsible for the cost–effectiveness of the intervention. The results of this study could then be used to strengthen the intervention and improve its effectiveness. Care processes of particular interest were referrals of patients to the primary physician and the local community health center—both specifically targeted by the intervention. Our purpose in measuring utilization in this study was to document adherence to ED referrals. We hypothesized that early intervention (in the month after the ED visit), through diagnosis and treatment of problems identified in the ED, would result in better long-term health and functional outcomes.

## METHODS

Study Design. The study design was a multisite randomized controlled trial. The study was approved by the research ethics committees of the four participating hospitals.

Study Setting and Population. The target population was patients aged 65 years and over who were ready for discharge from the ED without further intervention. The study population was enrolled in the EDs of four university-affiliated Montreal hospitals between September 14, 1998, and April 1, 1999. Recruitment was conducted by one research assistant (RA) in each ED, primarily on weekdays during the day shift. Patients were excluded if they were transferred to the ED from a nursing home or long-term care hospital; expected by ED staff to require admission; unable to communicate in French or English; or non-residents of Montreal. Patients were also excluded if they were medically unstable or cognitively impaired (one or more errors on three questions on orientation to time and place) and there was no family member to act as proxy. Finally, patients were excluded if, at the time of enrollment, they had already received a consultation from a member of the hospital's geriatric staff (geriatrician, geriatric nurse, physiotherapist, occupational therapist, or social worker), because inclusion of these patients might dilute the effect of the experimental intervention. Patients who received such a consultation *after* study enrollment were not excluded, because of the intention-to-treat design.

Although at the time of study enrollment, all patients were expected by ED staff to be released, some were admitted. These patients were included in the original intention-to-treat analysis but excluded from this study because: 1) there was a shorter period ''at risk'' for visits to the primary physician or community health center; and 2) discharge planning interventions received in the hospital would have diluted the effects of referrals made in the ED.

Study Protocol. After verbal consent by eligible patients or proxies to participate in the screening, the RA administered the Identification of Seniors At Risk (ISAR) questionnaire. This screening tool, developed by our group to identify older ED patients at increased risk of adverse health and functional outcomes during the six months after the ED visit, comprises six self-report questions on functional dependence (premorbid function and acute change), recent hospitalization, impaired memory and vision, and multiple medications, with a possible score ranging from 0 to 6 (Table 1).[5] In our earlier study, the tool performed well in the total cohort aged 65 years and over, and in subgroups defined by disposition (admitted or released from ED), language of questionnaire (French or English), and information source (patient or other). The ISAR tool also helped to identify patients who returned to the ED early (during the 30 days after the index visit) or frequently (3 or more return visits during the six months after the index visit),[16] and those who had high rates of acute care hospital utilization during the six months after the index visit.[17] A score of 2 or more (out of 6) was defined as a positive result; a negative result was a score of 0–1. ISAR-positive patients were invited to

TABLE 1. Identification of Seniors At Risk (ISAR) Questionnaire

1. Before the illness or injury that brought you to the emergency department, did you need someone to help you on a regular basis? (yes = 1, no = 0)
2. Since the illness or injury that brought you to the emergency department, have you needed more help that usual to take care of yourself? (yes = 1, no = 0)
3. Have you been hospitalized for one or more nights during the past 6 months (excluding a stay in the emergency department)? (yes = 1, no = 0)
4. In general, do you see well? (yes = 0, no = 1)
5. In general, do you have serious problems with your memory? (yes = 1, no = 0)
6. Do you take more than three different medications every day? (yes = 1, no = 0)

The score is the sum of the individual question scores (range = 0–6).

participate in the current study, and written consent to participate was obtained, either from the patient or from a family member of cognitively impaired patients.

Patients were randomized to the intervention or control (usual care) group by day of recruitment. One of two intervention nurses hired for the study was assigned to two hospitals, and rotated between them on a schedule assigned by the statistician, using blocked randomization. High-risk patients recruited on intervention days were referred to the intervention nurse immediately after enrollment and completion of the baseline questionnaire. Patients recruited on control days received usual care. If an intervention nurse was absent on a particular day, due to illness or other unplanned circumstances, patients were recruited into the control group.

Interventions. The experimental intervention consisted of a brief, standardized geriatric nursing assessment, using a checklist of physical, mental, medical, and social problems. The focus was on unresolved problems, new or pre-existing, that required medical intervention, new or different home care or other services, or comprehensive geriatric assessment. After completing the assessment, the intervention nurses consulted with hospital ED and geriatric staff as needed, and made referrals to the community health center, the primary physician, or other community services. The patient's primary physician and community health center (if the patient was already known to the community health center) were routinely notified that the patient had been found to be high-risk, and of the results of the assessment, even if no specific follow-up was requested. The nurses conducted limited follow-up after the ED visit to help ensure that appointments and services were provided. The results of the ISAR screening and the intervention nurse assessment and referrals were filed in the patient chart.

Patients recruited on control days received the usual ED services and consultations. They were not referred to the intervention nurse, the screening results were not filed in the patient chart, and ED staff were not informed of the results of screening.

Before beginning patient enrollment, two steps were taken to ensure that the 29 Montreal area community health centers were prepared for the project. First, one of the intervention nurses surveyed the directors or home-care coordinators of all the community health centers by telephone to determine the services available. This information was provided as a reference for the intervention nurses. Second, a meeting was held with community health center representatives to discuss the project and to prepare the community health centers for a potential increase in the number of patients referred to them from the project.

Measurements. The RAs conducted baseline interviews with patients in the ED. Follow-up interviews were conducted by telephone one month after the index ED visit by RAs who were blinded to study group. If the patient was cognitively impaired, data were collected from a family member. Other sources of data included hospital charts, intervention nurse records, and health insurance and service utilization databases.

Questionnaires. Data collected by interview at the time of enrollment included demographic information (age, sex, marital status, residence). Chief complaint was recorded in the patient's own words and coded with the National Ambulatory Medical Care Survey system.[18] The duration of the complaint was also recorded in three categories: $<$ 1 week, 1 week–1 month, $>$ 1 month. Subjects completed a comorbidity checklist that has been validated against a chart-based comorbidity index.[19] We used the six-question Blessed Orientation-Memory-Concentration (BOMC) to measure cognitive impairment.[20,21] The weighted error score ranges from 0 to 26; we used the recommended cut-point for cognitive impairment, a score of 7 or more.[20] The first three questions of this scale, on orientation to time and place, were used to screen for cognitive impairment to decide whether to interview the patient or a proxy. Disability in activities of daily living (ADLs) at baseline was a four-category variable: no disability, mild disability (only in instrumental ADLs), moderate disability (1–3 basic ADLs), or severe disability (4 or more basic ADLs).[22] At the one-month follow-up, patients were asked whether they had been advised at the ED visit to contact their primary physician and, if so, whether they had contacted and/or visited the physician.

Intervention Nurse Records. The intervention nurses' records included the assessment checklist, consultations made in the ED, referrals made, and follow-up.

Chart Review. The patient's hospital chart was reviewed by research staff blind to intervention group to abstract information on discharge referrals made at the index visit.

Administrative Databases. We matched patient data using Medicare numbers to two provincial administrative databases. The physicians billings database was used to identify physician and ED visits. Because the identities of physicians were not provided, we used an algorithm to identify the primary physician, based on frequency of visits during the year prior to the ED visit and the speciality of the physician. The community health center utilization database was used to identify services provided at the patient's home, at the community health center or other location, or over the telephone.

Data Analysis. Descriptive statistics were calculated comparing demographic and clinical characteristics of patients in the intervention and control groups at baseline, chart-documented referrals made at the index ED visit, and health services utilization measures during the month after the ED visit. Analyses were also conducted after stratification by use of the service during the month before the ED visit.

Adherence to referrals to the primary physician or community health center was examined in the following three groups: 1) intervention group patients with a referral documented by the intervention nurse; 2) intervention group patients with a chart-documented referral; and 3) control group patients with a chart-documented referral. Adherence rates were computed from the self-reported and administrative measures of utilization.

We used logistic regression to estimate the effects of the intervention on the following: chart-documented referrals to the primary physician or community health center; self-reported contact with and visits to the primary physician as a result of an ED referral; and utilization measures derived from administrative databases during the first month after the index visit (visits to the primary physician, contacts with the community health center, and return visits to the ED). Models were adjusted for patient's age ($<75$ or $\geq 75$), gender, ISAR score (2 or 3–6), cognitive impairment (yes, no, or missing), disability (mild or none vs. moderate or severe), comorbidity, residence (living at home alone or not), whether the patient had a family caregiver, hospital of index ED visit, triage category (ambulatory or stretcher), and previous use of the service. In each model, we evaluated the presence of an interaction between the intervention and previous use of the service. Because no significant interaction was identified, we present results from the logistic regression models without the interaction terms. Despite a lack of significance, we found that the effect of the intervention on primary physician and ED visits appeared to be modified by previous primary physician visits. Therefore, results for these two outcomes are presented within strata defined by previous primary physician visits. All statistical analyses were done using SAS for Windows, version 6.12.[23]

In the interpretation of the results, we considered odds ratios of 1.5 or more (or less than 0.67) as potentially clinically significant. In the original study design, the sample size was determined in order to detect a significant difference in the primary outcomes (functional decline) between the intervention and control groups.

## RESULTS

Enrollment and Follow-up. During the recruitment period, a total of 10,826 patient visits were recorded, of which 7,921 were assessed for study eligibility criteria. A total of 5,766 of those assessed for eligibility (72.8%) were excluded. The main reasons for exclusion were: expectation that patient would be admitted ($n = 2,781$, 35.1%), geriatric consult before enrollment ($n = 698$, 8.9%), non-residence in Montreal ($n = 840$, 10.6%), and residence in a nursing home ($n = 558$, 7.0%). Of 2,155 eligible patients, 63 (2.9%) declined to participate in the screening. Of the 2,092 patients screened, 426 (20.1%) were ISAR-positive (score of 2 or more) (Figure 1). A total of 388 (91.1%) of the 426 ISAR-positive patients consented to participate in the study; 178 were allocated to the intervention group and 210 to the control group. After exclusion of patients who were admitted to hospital at the index ED visit, the study sample comprised 166 intervention and 179 control group patients who were to be discharged from the ED with no further intervention. (The percentages of patients admitted to the hospital at the index visit were 6.7% in the intervention group and 14.8% in the control group, p-value $>0.05$.)

Data on self-reported contact with the primary physician from the one-month follow-up interviews were available for 290 patients, 86.7% of the intervention group and 81.6% of the control group. Records of physician charges were successfully abstracted for all 345 patients; using our algorithm, the primary physician could be identified for 343 patients. Linkage with the community health center administrative data was conducted for 335 patients.

At baseline, the two study groups were similar with regard to most characteristics, except that members of the intervention group were significantly more likely to be male and to have a primary family caregiver than were members of the control group (Table 2).

Intervention Nurse Records. Among the 166 patients allocated to the intervention group, the intervention was delivered to 144 patients (86.8%); five patients had left the ED before the intervention nurse could see them, four could not be seen before the intervention nurse left for the day, two refused the intervention, and no reason was recorded for the other 11. Overall, 87 (60.4%) of those seen by the intervention nurse had one or more unresolved problems, an average of two problems per patient. A total of 45 patients (31.3%) were referred to the community health center and 122 (84.7%) to their primary physician (41 for follow-up of a particular problem and 81 for routine notification of the ED visit and results of the ISAR screen). Intervention nurse activities were limited to the week after the ED visit for 93% of patients seen. Follow-up activities consisted mainly of telephone calls to the patient/family, the community health center, and/or the primary physician.

Chart-documented Referrals. Significantly higher percentages of intervention vs control group patients had chart-documented referrals to the primary phys-

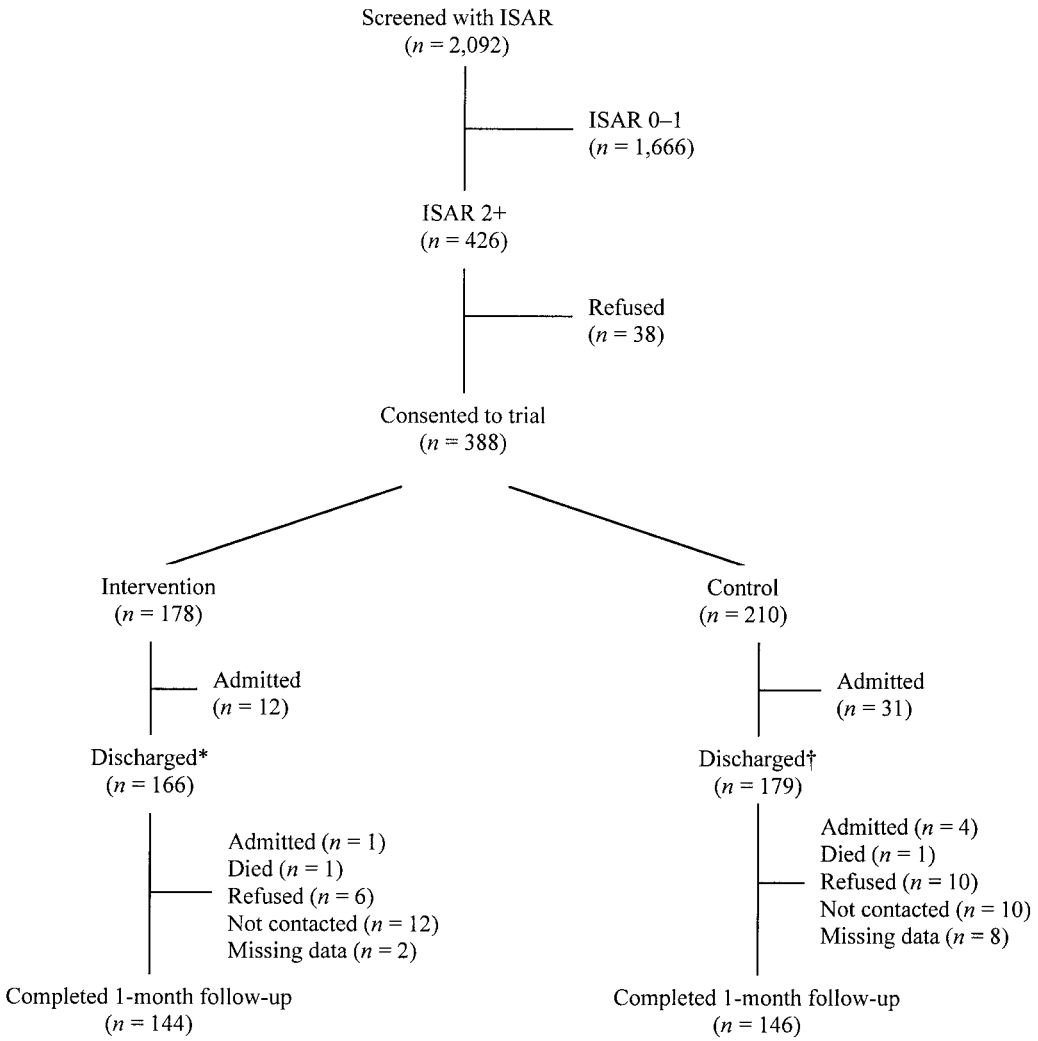


Figure 1. Study flow chart. *Seven not matched to community health center database; 1 missing primary physician code. † Three not matched to community health center database; 1 missing primary physician code. ISAR = Identification of Seniors At Risk questionnaire.

ician and to the community health center, both in unadjusted and adjusted analyses (Table 3). There were discrepancies between intervention nurse records and the hospital chart (data not shown). Among 45 patients with a referral to the community health center documented in the intervention nurse records, 20 (44.4%) were documented in the chart; among 122 patients with a referral to the primary physician, 35 (28.7%) were documented. In comparison, the chart-documented referral rates for patients not seen, or seen and not referred by the intervention nurse, were 3% for community health center referrals and 19% for primary physician referrals.

Contact with Primary Physician. More intervention than control group patients reported that they had been referred to their primary physician at the ED visit and had contacted and/or visited the physician (Table 3). Adherence rates are shown in Table 4. Among 122 members of the intervention group for whom the nurse documented a referral to the primary physician, data on self-reported contacts were available for 104; the adherence rate of 30.8% in this group was similar to those in intervention or control group patients with chart-documented referral to the primary physician (33.3% and 32.0%, respectively). Adherence rates were also similar in the three patient groups using self-reported visits as the measure of adherence (22.1% to 28.0%).

Using our algorithm to identify the primary physician, intervention group patients were only slightly more likely to visit their primary physician during the month after the ED visit (Table 3). Again, among the three patient groups with documented referrals, adherence rates were similar (35.7% to 43.0%). The intervention effect appeared to be limited to patients who had visited their primary physician during the month before the ED visit, although the 95% confidence interval included no effect (Table 5).

Contact with Community Health Center. Intervention group patients were significantly more likely than

TABLE 2. Selected Characteristics by Study Group at Enrollment

| Characteristics | Intervention (n = 166) n | Intervention (n = 166) % | Control (n = 179) n | Control (n = 179) % | p-value (chi-square) |
|---|---|---|---|---|---|
| Categorical variables | | | | | |
| Gender | | | | | 0.035 |
| Female | 90 | 54.2 | 117 | 65.4 | |
| Male | 76 | 45.8 | 62 | 34.6 | |
| Hospital | | | | | 0.244 |
| A | 49 | 29.5 | 42 | 23.5 | |
| B | 48 | 28.9 | 65 | 36.3 | |
| C | 21 | 12.7 | 29 | 16.2 | |
| D | 48 | 28.9 | 43 | 24.0 | |
| Language | | | | | 0.887 |
| English | 72 | 43.4 | 79 | 44.1 | |
| French | 94 | 56.6 | 100 | 55.9 | |
| Country of birth | | | | | 0.387 |
| Canada | 122 | 73.5 | 124 | 69.3 | |
| Other | 44 | 26.5 | 55 | 30.7 | |
| Years of education | | | | | 0.894 |
| 0–6 | 58 | 35.2 | 59 | 33.3 | |
| 7–11 | 64 | 38.8 | 73 | 41.2 | |
| 12+ | 43 | 26.1 | 45 | 25.4 | |
| (Missing) | (1) | | (2) | | |
| Residence | | | | | 0.108 |
| Home alone | 58 | 34.9 | 82 | 45.8 | |
| Home with others | 102 | 61.5 | 90 | 50.3 | |
| Foster home/senior residence | 6 | 3.6 | 7 | 3.9 | |
| ISAR* score | | | | | 0.733 |
| 2 | 94 | 56.6 | 94 | 52.5 | |
| 3 | 49 | 29.5 | 59 | 33.0 | |
| 4–5 | 23 | 13.9 | 26 | 14.5 | |
| Family caregiver | | | | | 0.023 |
| Yes | 127 | 76.5 | 117 | 65.4 | |
| No | 39 | 23.5 | 62 | 34.6 | |
| Information source | | | | | 0.450 |
| Patient | 149 | 89.8 | 156 | 87.2 | |
| Proxy | 17 | 10.2 | 23 | 12.9 | |
| Family physician | | | | | 0.940 |
| No | 21 | 12.7 | 23 | 12.9 | |
| Yes | 145 | 87.4 | 155 | 87.1 | |
| (Missing) | (0) | | (1) | | |
| Functional disability | | | | | 0.253 |
| None | 30 | 18.1 | 44 | 24.6 | |
| Mild | 57 | 34.3 | 52 | 29.1 | |
| Moderate | 55 | 33.1 | 65 | 36.3 | |
| Severe | 24 | 14.5 | 18 | 10.1 | |
| Cognitive impairment | | | | | 0.814 |
| Yes | 59 | 39.1 | 63 | 40.4 | |
| No | 92 | 60.9 | 93 | 59.6 | |
| (Missing) | (15) | | (23) | | |
| Triage category | | | | | 0.436 |
| Ambulatory | 98 | 59.0 | 113 | 63.1 | |
| Stretcher | 68 | 41.0 | 66 | 36.9 | |
| Community health center use (self-reported) | | | | | 0.783 |
| Yes | 46 | 27.7 | 52 | 29.1 | |
| No | 120 | 72.3 | 127 | 70.9 | |
| Chief complaint | | | | | |
| Symptoms | | | | | 0.405 |
| General | 22 | 13.3 | 16 | 8.9 | |

continued

TABLE 2. Selected Characteristics by Study Group at Enrollment (cont.)

| Characteristics | Intervention (n = 166) n | Intervention (n = 166) % | Control (n = 179) n | Control (n = 179) % | p-value (chi-square) |
|---|---|---|---|---|---|
| Mental/nervous | 13 | 7.8 | 17 | 9.5 | |
| Cardiorespiratory | 31 | 18.7 | 29 | 16.2 | |
| Digestive | 25 | 15.1 | 27 | 15.1 | |
| Genitourinary | 8 | 4.8 | 13 | 7.3 | |
| Musculoskeletal | 29 | 17.5 | 27 | 15.1 | |
| Other | 8 | 4.8 | 17 | 9.5 | |
| Diseases | 13 | 7.8 | 9 | 5.0 | |
| Injuries | 13 | 7.8 | 22 | 12.3 | |
| Other | 4 | 2.4 | 2 | 1.1 | |
| Duration of chief complaint | | | | | 0.792 |
| Less than 1 week | 123 | 75.0 | 137 | 76.5 | |
| One week–1 month | 27 | 16.5 | 25 | 14.0 | |
| More than 1 month | 14 | 8.5 | 17 | 9.5 | |
| (Missing) | (2) | | (0) | | |
| Health services utilization during month before emergency department visit (administrative data) | | | | | |
| Primary physician visit | | | | | 0.705 |
| Yes | 71 | 43.0 | 73 | 41.0 | |
| No | 94 | 57.0 | 105 | 59.0 | |
| (Missing) | (1) | | (1) | | |
| Community health center service | | | | | 0.398 |
| Yes | 31 | 19.5 | 41 | 23.3 | |
| No | 128 | 80.5 | 135 | 76.7 | |
| (Missing) | (7) | | (3) | | |
| Emergency department visit | | | | | 0.823 |
| Yes | 51 | 30.7 | 57 | 31.8 | |
| No | 115 | 69.3 | 122 | 68.2 | |
| Continuous variables | | | | | (p-value from t-test) |
| Age | | | | | 0.745 |
| n | 166 | | 179 | | |
| Mean (±SD) | 76.5 (±7.1) | | 76.2 (±6.9) | | |
| Comorbidity score† | | | | | 0.942 |
| n | 166 | | 179 | | |
| Mean (±SD) | 2.3 (±2.2) | | 2.3 (±1.9) | | |

*ISAR = Identification of Seniors At Risk screening tool.
†Higher score indicates greater impairment.

controls to receive home care services during the month after the ED visit in adjusted but not unadjusted analyses (Table 3). Other types of health services given at the center or by telephone were not significantly affected by the intervention. Among the three patient groups with documented community health center referral, adherence rates ranged between 61.9% and 77.8% (Table 4).

Return Visits to the ED. Members of the intervention group were somewhat more likely than the controls to return to the ED during the month after the ED visit (Table 3). To determine whether this was related to access to a primary physician, the analysis was stratified by whether the patients had visited their primary physician during the month before the index ED visit (Table 5). These analyses indicated that the excess ED visits in the intervention group were limited to patients who had not visited their physician before the index ED visit. Among patients who had visited their physician during the previous month, however, intervention group patients were more likely than controls to visit this physician after the ED visit.

## DISCUSSION

This study of the effects of a brief, two-stage ED intervention on the process of care for elder patients found increased rates of referral to the community health center and the primary physician. Rates of adherence to community health center referrals were high (over 60%) and resulted in an increased rate of delivery of home care services during the month after the ED visit. Lower rates of adherence to primary physician referrals (between 22% and 43%, depending on the data source) resulted in only a small and nonsignificant increase in visits to the primary physician. We conclude, therefore, that the beneficial functional outcomes observed at four months in the

TABLE 3. Study Outcomes during the Month after the Index Visit by Study Group

| Data Source and Outcome Measure | Intervention N | Intervention Outcome n (%) | Control N | Control Outcome n (%) | Odds Ratio (95% CI) Unadjusted Model | Odds Ratio (95% CI) Adjusted Model* |
|---|---|---|---|---|---|---|
| Chart review of index visit | | | | | | |
| Referral to primary physician | 165 | 43 (26.1%) | 178 | 29 (16.3%) | 1.8 (1.1, 3.1) | 1.9 (1.0, 3.4) |
| Referral to CHC | 165 | 23 (13.9%) | 178 | 10 (5.6%) | 2.7 (1.3, 5.9) | 4.0 (1.7, 9.5) |
| Patient's self-report at one-month follow-up | | | | | | |
| Contacted primary physician as a result of ED referral | 144 | 40 (27.8%) | 146 | 28 (19.2%) | 1.6 (0.9, 2.8) | 1.5 (0.8, 2.7) |
| Contacted and visited primary physician as a result of ED referral | 144 | 28 (19.4%) | 146 | 24 (16.4%) | 1.2 (0.7, 2.2) | 1.2 (0.7, 2.3) |
| Administrative data (30 days after the index visit) | | | | | | |
| Primary physician visit | 165 | 64 (38.8%) | 178 | 57 (32.0%) | 1.4 (0.9, 2.1) | 1.3 (0.8, 2.1) |
| CHC service at home | 159 | 42 (26.4%) | 176 | 39 (22.2%) | 1.3 (0.8, 2.1) | 2.3 (1.1, 5.1) |
| CHC service at CHC | 159 | 28 (17.6%) | 176 | 35 (19.9%) | 0.9 (0.5, 1.5) | 1.0 (0.5, 1.9) |
| CHC contact by telephone | 159 | 38 (23.9%) | 176 | 32 (18.2%) | 1.4 (0.8, 2.4) | 1.7 (0.9, 3.1) |
| Return ED visit | 166 | 58 (34.9%) | 179 | 48 (26.8%) | 1.5 (0.9, 2.3) | 1.6 (1.0, 2.6) |

CI = confidence interval; CHC = community health center; ED = emergency department.
*All models were adjusted for age, gender, Identification of Seniors At Risk (ISAR) score, cognitive impairment, disability, comorbidity, residence, previous use of service during the month before the index visit, caregiver involvement, hospital of index ED visit, and triage category. For models based on administrative data, previous use refers to use of the particular service in the month before the index visit. For models based on the patient's self-report, it refers to any previous self-reported CHC use.

intervention group were related primarily to the prompt evaluation (or revaluation) of the patient's needs by home care providers and the provision of appropriate services. Although the intervention did not substantially increase the rate of primary physician visits during the month after the visit, the information provided by the intervention nurse and/or the home care nurse may have helped the physician to diagnose and manage these patients more effectively.

Previous controlled trials of ED interventions for older patients have documented various barriers to referrals to community services. In one study, adherence rates to the recommendations of an intervention nurse were 61.6% by ED attending staff but only 36.6% by patients and families. There was no significant difference between the intervention and control groups at follow-up in mean number of physician visits, new dental and social services, or return visits to the ED.[10] A second study found that service refusal was a major reason for non-adherence to service recommendations made by the intervention nurse.[12]

Several explanations should be considered for the greater effectiveness of the intervention in increasing access to home care services than to the primary physician. First, efforts were made to prepare the local community health centers for the study. Second, the majority of patients had not visited their primary physician during the month before the ED visit. This lack of an ongoing relationship with a primary physician may have been a barrier to subsequent contact. Third, both of our methods of measuring

TABLE 4. Adherence Rates to Referrals in the Three Patient Groups, Using Self-reported and Administrative Utilization Measures

| Type of Referral and Adherence Measure (during Month after ED Visit) | Intervention Group: Data from Intervention Nurse Records N* | Intervention Group: Data from Intervention Nurse Records n (%) | Intervention Group: Data from Chart Review N* | Intervention Group: Data from Chart Review n (%) | Control Group: Data from Chart Review N* | Control Group: Data from Chart Review n (%) |
|---|---|---|---|---|---|---|
| Total number | 144 | | 165 | | 178 | |
| Referral to primary physician | 122 | | 43 | | 29 | |
| Self-reported contact | 104 | 32 (30.8%) | 39 | 13 (33.3%) | 25 | 8 (32.0%) |
| Self-reported visit | 104 | 23 (22.1%) | 39 | 10 (25.6%) | 25 | 7 (28.0%) |
| Visit (administrative data) | 121 | 52 (43.0%) | 42 | 15 (35.7%) | 29 | 12 (41.4%) |
| Referral to community health center | 45 | | 23 | | 10 | |
| Face-to-face contact (administrative data) | 42 | 26 (61.9%) | 22 | 14 (63.6%) | 9 | 7 (77.8%) |

*The differences between the total number of patients referred and the denominators for each measure of adherence are due to missing data for each data source.

TABLE 5. Primary Physician and Emergency Department (ED) Visits during the Month after the Index Visit, by Study Group and Prior Primary Physician Visit

| | Intervention | | Control | | Odds Ratio (95% CI) | |
|---|---|---|---|---|---|---|
| | N | Outcome n (%) | N | Outcome n (%) | Unadjusted Model | Adjusted Model* |
| Primary physician visit | | | | | | |
| Primary physician visit in previous month | 71 | 39 (54.9%) | 73 | 30 (41.1%) | 1.7 (0.9, 3.4) | 1.9 (0.9, 4.0) |
| No primary physician visit in previous month | 94 | 25 (26.6%) | 105 | 27 (25.7%) | 1.0 (0.6, 2.0) | 0.9 (0.5, 1.8) |
| ED visit | | | | | | |
| Primary physician visit in previous month | 71 | 21 (29.6%) | 73 | 20 (27.4%) | 1.1 (0.5, 2.3) | 1.1 (0.5, 2.5) |
| No primary physician visit in previous month | 94 | 37 (39.4%) | 105 | 28 (26.7%) | 1.8 (1.0, 3.2) | 1.8 (0.9, 3.4) |

CI = confidence interval.
*All models were adjusted for age, gender, Identification of Seniors At Risk (ISAR) score, cognitive impairment, disability, comorbidity, residence, caregiver involvement, hospital of index ED visit, and triage category. The models for ED visits were adjusted for ED use in the month prior to the index visit.

primary physician contacts, using self-reports and administrative data, have potential flaws. The self-reported information required patients to remember both whether they had been referred at the ED visit and whether they had made the contact or visit. Patients in our study had multiple medical problems and high overall rates of physician utilization, both of which may have limited their ability to recall this information. Our measure based on administrative data is also subject to misclassification.

The unexpected, small increase in ED utilization in the intervention group is intriguing. Although based on small numbers, our results suggested that, among patients with an ongoing relationship with their primary physician (defined as those who had visited their primary physician during the month before the index ED visit), the intervention increased the visits to this physician, while among patients without such a relationship, the intervention increased return visits to the ED. We have conducted a systematic review of the literature on the determinants of ED utilization among elders (McCusker et al., unpublished, 2002). In those studies that both controlled for need for care and measured access to primary medical care, at least one measure of access (e.g., lack of a primary care physician,[24] not having a regular physician,[25] and having more than one source of health care[26]) consistently predicted increased ED utilization. An increase in ED utilization was also observed in the intervention group in a randomized trial of a nursing case-management intervention for high-risk patients discharged from a Montreal hospital ED, but without any beneficial health or functional outcomes.[27] These findings suggest that the increase in ED visits in the intervention group of our study resulted from the lack of access to primary medical care.

## LIMITATIONS

Our study has some limitations. First, it was not possible to deliver the intervention to 17.4% of patients in the intervention group; this may have resulted in a dilution of the intervention effect. Second, patients who had already received an intervention similar to the study intervention before study enrollment were excluded from the study. Although this was necessary to improve the internal validity of the study (by reducing contamination), and because, ethically, these services could not be withheld from patients, this may have resulted in exclusion of a subgroup of patients who might have benefited from the study intervention and a possible dilution of the intervention effect. Third, because it was not possible to blind ED staff as to who received the intervention, some contamination of the control group may have occurred. For example, there was a non-significant decrease in hospitalization at the index visit in the intervention group, perhaps because better follow-up had been arranged. If these services were not provided promptly, or if patients did not adhere to the follow-up, this may have contributed to the increase in ED visits. Fourth, we did not randomize individuals, but instead randomized the day of ED visit. However, this quasi-randomization was the most feasible method and resulted in two study groups that were quite similar at baseline; potentially important differences between the study groups (e.g., higher proportion of intervention group with a family caregiver) were adjusted for in the multivariate analyses. Fifth, because we were not provided with physician identifiers in the administrative database, we were not able to determine directly whether patients contacted their primary physician. Instead, we used an algorithm, based on speciality of physician and frequency of visits, which may have introduced some misclassification and reduced our ability to detect an effect of the intervention. Sixth, our sample size may not have been adequate to detect clinically meaningful effects (odds ratios of 1.5 or more) in some of the secondary outcomes reported in this study. The total sample size in our study was roughly 350 for several analyses and the percentage of control group patients with the outcome ranged roughly from 15% to 30%. This

means we had power as low as 7–10% to detect an odds ratio of 1.2, and power of 68% to 85% to detect an odds ratio of 2.0, assuming a type I error of 0.05. Statistically non-significant relationships should therefore be interpreted with caution. Seventh, use of the hospital chart to document referrals resulted in underestimation of referrals in both study groups, although we were able to document this only in the intervention group.

Future research should address how to improve liaison between the ED and the primary physician and reduce return visits to the ED. Because access to primary medical care may not be adequate in many communities, the impact of a rapid geriatric outpatient intervention should be examined. Case-management interventions that are integrated with primary medical care can reduce ED visits.[28–31] Alternative models of care such as these need to be developed to respond quickly to the needs of frail older people being discharged from hospital EDs.

## CONCLUSIONS

A brief two-stage nursing intervention, using a validated screening tool (ISAR) and a standardized problem checklist, identified unresolved problems requiring further assessment, treatment, or services in about 60% of high-risk patients. These problems (an average of two per patient), which are rarely identified in the ED setting, were brought to the attention of the primary physician in writing, and new or changed home care and other services were requested from the local community health center. The intervention resulted in increased rates of chart-documented referral to the community health center and, to a lesser extent, to the primary physician. During the month after the ED visit, the intervention also increased the rate of home care visits but did not significantly affect the utilization of other community health center services or either contacts or visits to the primary physician.

The results of this project underscore some important principles that can be applied to future programs and services for seniors. Based on our research and those of other investigators, the ED appears to be an important location for implementing geriatric assessment and liaison services.[32] The targeting of interventions to high-risk patients using rapid screening tools, such as ISAR, appears to be a feasible and efficient component of these services. We have reported elsewhere that a sample of ISAR-negative patients (scores of 0–1) assessed by an intervention nurse had a significantly lower rate of unresolved problems than the ISAR-positive patients included in the trial.[14] Currently, in most EDs that have such liaison staff (usually nurses or social workers), referrals to these staff are made on an *ad hoc* basis and are highly dependent on volume. A systematic approach, using tools for the identification of high-risk patients and the rapid assessment of those at high risk, makes more efficient use of limited resources and has the potential to ensure the quality and consistency of liaison interventions even in the face of rising patient volumes. A two-stage approach, using a screening tool followed by a short clinical assessment, is being evaluated in other settings.[33] The prompt transfer of the information obtained from the two-step intervention to primary care and home care providers is of critical importance. Shared information systems should be investigated. Finally, adequate primary medical care and other community services are prerequisites for this intervention to achieve optimal outcomes.

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