

[ORIGINAL ARTICLE]

Factors in Avoidable Emergency Visits for Ambulatory Care-sensitive Conditions among Older Patients Receiving Home Care in Japan: A Retrospective Study

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Abstract:

Objective Older adults have many health conditions that do not require hospitalization, such as cognitive decline and progression of frailty, so it is necessary to prevent avoidable emergency visits for ambulatory care-sensitive conditions (ACSCs) in this population. We therefore examine Freund's classification of reasons for hospitalization owing to ACSCs to identify factors involved in elderly patients visiting emergency departments in Japan.

Methods This retrospective case-control study included patients who received emergency transport for medical treatment at Yushoukai Home Care Clinic Shinagawa in Japan between January 1, 2016, and April 30, 2019. We examined patients' medical records and categorized the reasons for emergency visit by ambulance in accordance with Freund's categories (physician related level, medical causes, patient level, and social level). In addition, we classified and compared patients who lived at home (Group A) with those living in a care facility for older adults (Group B).

Results A total of 365 patients visited the emergency department (298 in Group A and 67 in Group B). Among these, we determined that emergency visits were potentially avoidable in 135 patients from Group A and 28 from Group B. The patient and social level categories accounted for 81% of potentially avoidable emergency visits. Confirmed advanced care planning (ACP) was significantly associated with avoidable emergency visit by ambulance in multivariate analyses.

Conclusion To prevent emergency visits for ACSCs among older people, ACP should be encouraged.

Key words: ambulatory care-sensitive conditions, avoidable hospitalization, primary health care, quality of health care, home health care

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Introduction

The number of elderly people ≥ 75 years old living in Japan is currently estimated to be 18.5 million and projected to increase to 21.8 million by 2025 and to 22.4 million by 2040 (1). In Japan, emergency conveyance of elderly people has increased; however, many such emergency ambulance callouts have not involved severe or urgent medical conditions (2).

Hospitalization in older adults is commonly associated

with a high incidence of multiple adverse outcomes, including functional decline, delirium, and falls (3, 4). The level of functioning in many patients at the time of hospital discharge is worse than their baseline functioning with respect to activities of daily living (ADL). The risk of deterioration in the ADL function increases markedly with age (5).

Hospitalization for ambulatory care-sensitive conditions (ACSCs) is potentially avoidable by preventing the onset of disease, controlling acute episodic illness, and effectively managing chronic conditions. Freund identified five principal categories of reasons for hospitalization (system level,

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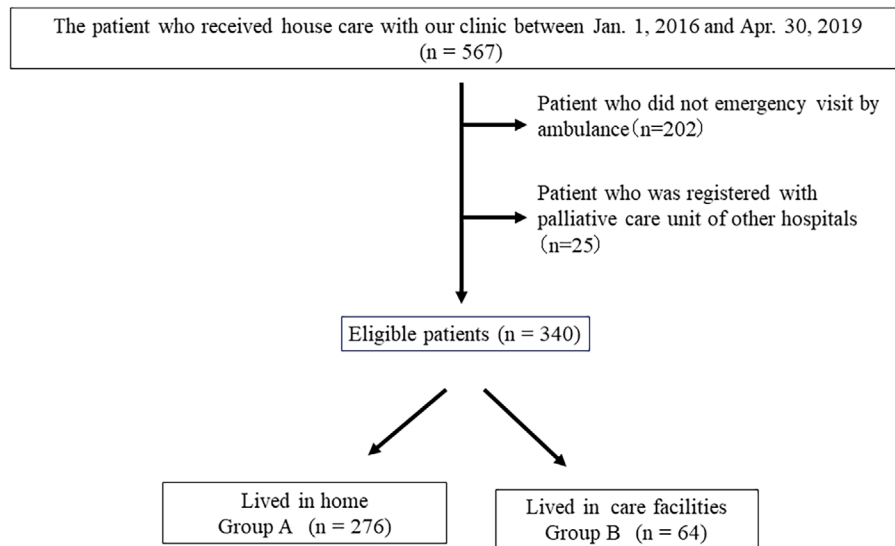


Figure 1. Patient selection. Flow chart outlining selection criteria for patients in content analyses.

physician level, medical causes, patient level, and social level) and reported that 41% of hospitalizations are potentially avoidable (6).

Several previous studies have examined the background characteristics of elderly patients who visit emergency departments and those with hospital admission (7, 8). Some studies reported that home care was a viable alternative to emergency hospitalization (9-11). However, no studies have investigated emergency visits among patients who receive medical care at home in Japan.

Therefore, we evaluated the factors associated with avoidable emergency visits for ACSCs among elderly patients who use home care services in Japan to find out what is needed to reduce emergency transport and avoid hospitalization.

Materials and Methods

Patients

Among the 567 total consecutive patients receiving home care with Yushoukai Home Care Clinic Shinagawa, 365 visited the emergency department for ACSCs between January 1, 2016, and April 30, 2019. Patients who were registered with a palliative care unit of another hospital were excluded from the study. After exclusion, the remaining 340 patients were divided into two groups: patients who lived home (Group A) and those who lived in a care facility, such as a retirement home, assisted living residence, group home, or residence with health and welfare services for elderly adults (Group B) (Fig. 1).

This clinical study was approved by Ethics Committee of Yushoukai Medical Corporation (No. 2), and all study procedures were carried out in accordance with the Declaration of Helsinki. The requirement for written informed consent was waived, as only retrospective data from the hospital records were used in this study, and there were no interven-

tions conducted among study participants.

Definition of ACSCs

Freund divided the causes of hospitalization into five principal categories: 1) system level (e.g., unavailability of ambulatory services), 2) physician level (e.g., suboptimal monitoring), 3) medical causes (e.g., medication side effects), 4) patient level (e.g., delayed health care seeking), and 5) social level (e.g., lack of social support) (7). Because physicians in our clinic attend patients 24 hours a day, 365 days a year, we excluded “system level”.

Data collection

We selected confounding factors based on the previous literature. We recorded patients’ age, sex, chief complaint, disease causing the emergency visit, outcome, length of hospitalization, nursing care level (between 1 and 5, on the basis of assessment of care requirements, 1: little, 5: heavy), whether or not they were living alone, use of home-visit nurse services, confirmed advance care planning, reason for emergency transportation (patients with an urgent and/or severe issue and required emergency medical attention or could be treated by home medical care but the patient’s family wished for emergency transportation), and discharge to the previous residential location. We should also included indicators, such as ADL and instrumental activity of daily living (IADL), the degree of dementia, and medical history, such as delirium. However, we could not analyze ADL and IADL because they were not listed in the medical chart and were difficult to quantify. Therefore, we listed the nursing care level, which comprehensively evaluates the ADL and cognitive function in the table.

We classified patients using Freund’s categories and evaluated whether or not an emergency visit by ambulance could have been avoided for each patient.

Table 1. Patient Characteristics.

| | Group A (n=276) | Group B (n=64) | p value |
|---|-----------------|----------------|---------|
| Age (years) | 82.2±10.7 | 86.8±8.3 | 0.001 |
| Male | 138 (46.3) | 24 (35.8) | 0.07 |
| Lived alone | 44 (14.8) | 0 (0) | 0.001 |
| Used home visiting nurse service | 239 (80.2) | 46 (68.7) | 0.03 |
| Nursing care level (1-5) | 3.3±1.5 | 3.0±1.4 | 0.12 |
| Advance care planning confirmed | 288 (96.6) | 63 (94.0) | 0.24 |
| Length of hospital stay (day) | 15(7, 31) | 11.5(0, 21.3) | 0.023 |
| Discharged to the place where patients lived before | 182 (65.9) | 53(82.8) | 0.005 |
| Died | 71 (23.8) | 7 (10.4) | 0.01 |

Date are presented as number (%) or mean±standard deviation or median and 25%, 75% quartile interval, as appropriate.

Statistical analyses

Continuous variables are expressed as the mean±standard deviation and were compared using Student's *t*-test if the measurement data followed a normal distribution. Otherwise, the median and 25%, 75% quartile interval were used, and comparisons between the groups were conducted using the Mann-Whitney U test with Spearman's nonparametric test. Categorical variables were compared using Fisher's exact test.

A logistic regression model was used to determine the independent factors involved in hospitalization. Clinical characteristics of the two groups were compared in a univariate analysis of emergency transport, and factors that were significantly different between the groups were included in a multivariate analysis to establish whether or not any were independently associated with emergency visit by ambulance.

All statistical analyses were performed using the IBM SPSS software program, version 24.0 for Windows (IBM, Armonk, USA).

Results

A total of 340 patients were enrolled in this study; 276 were allocated to Group A and 64 to Group B (Table 1).

The participant age in Group B (86.3±8.3 years old) was significantly older than that in Group A (82.2±10.7 years old) ($p=0.001$). The percentage of patients who lived alone and used home visiting nurse services was significantly higher in Group A than in Group B. There were no significant differences in the nursing care level between the two groups. The length of hospitalization was significantly shorter in Group B [11 (0, 21.3) days] than in Group A [15 (7, 31) days] ($p=0.023$). There were significantly more patients discharged to the location where they resided prior to hospitalization in Group B ($n=53$, 82.8%) than in Group A ($n=182$, 65.9%) ($p=0.005$).

Regarding the chief complaint, a fever, dyspnea, general malaise, and disturbance of consciousness accounted for 75% of the total. Regarding diseases leading to the emer-

gency visit, infectious diseases accounted for 44%, bone fracture for 13%, and circulatory diseases, such as acute coronary syndrome and congestive heart failure, for 11% of the total (Fig. 2a). Regarding the cause of infectious diseases, bacterial pneumonia and urinary tract infection accounted for 77% of the total (Fig. 2b).

Among a total 340 emergency visits by ambulance, 163 (47.9%) were judged to be potentially avoidable; 135/276 patients (48.9%) in Group A and 28/64 patients (43.8%) in Group B were estimated to have had a potentially avoidable emergency visit by ambulance (Table 2a-c).

The factors included in each Freund's classification were as follows:

- 2) physician level: e.g. no confirmed advance care planning, imaging examination was impossible
- 3) medical causes: e.g. medication side effects, complications of treatment
- 4) patient level: e.g. delayed healthcare seeking, patient-related medication errors
- 5) social level: e.g. lack of social support, monetary limitations, primary caregiver with dementia, primary caregiver with mental illness, correspondence was difficult at nursing homes.

Social factors accounted for the largest proportion in terms of potential avoidance of emergency visits overall, followed by patient level. These two factors accounted for 38.9% of the total and 81% of potentially avoidable cases (Table 2a). The most common factor in potentially avoidable emergency visits was related to the social level in both patients at home and those in a residential facility. However, the second-most common reasons were the patient level in patients at home (Table 2b) and the physician level in those living in a residential facility (Table 2c).

Next, we compared patient background characteristics between the 163 patients in whom an emergency visit was potentially avoidable and the 177 patients in whom an emergency visit was potentially unavoidable. A univariate analysis showed that the rates of living at home, the use of home visiting nurse services, and confirmation of advanced care planning (ACP) were significantly different between the groups (Table 3a). Multivariate analyses including these

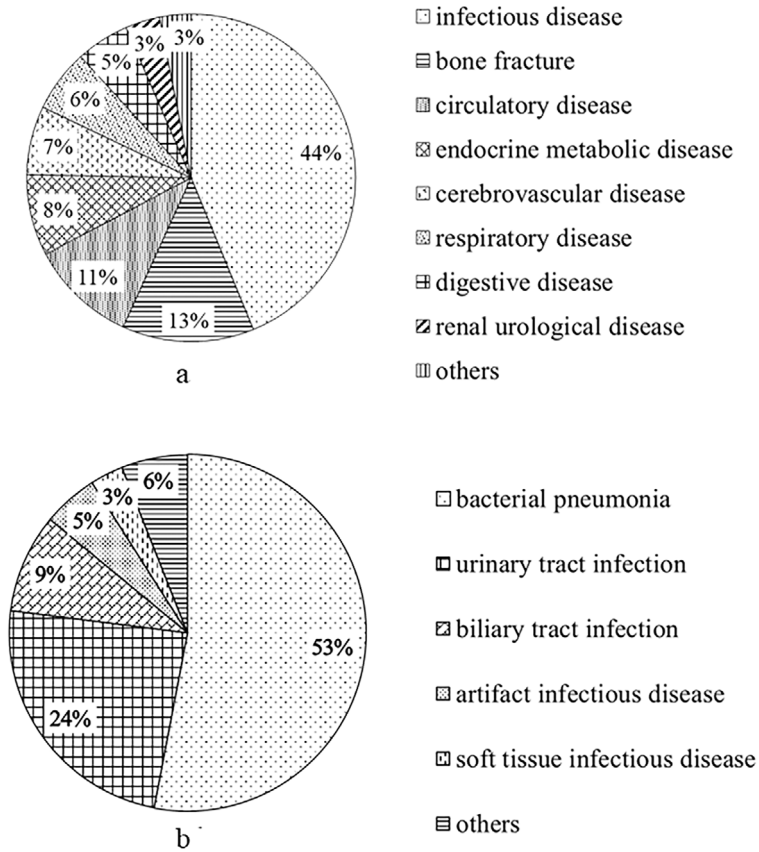


Figure 2. a: Diagnoses in patients visiting the emergency department. Among reasons for an emergency department visit, infectious diseases and bone fractures accounted for the largest proportions. b: Causes of infectious diseases. Bacterial pneumonia and urinary tract infection accounted for approximately 80% of the total.

Table 2a. Categories of Ambulatory Case Sensitive Conditions (ACSCs) for the Whole Target Population.

| The categories of ACSCs | Potentially avoidable | Not avoidable | Total |
|-------------------------|-----------------------|---------------|------------|
| Physician level | 27 (7.9) | 49 (14.4) | 76 (22.4) |
| Medical causes | 4 (1.2) | 128 (37.6) | 132 (38.8) |
| Patient level | 41 (12.1) | 0 | 41 (12.1) |
| Social level | 91 (26.8) | 0 | 91 (26.8) |
| Total | 163 (47.9) | 177(52.1) | 340(100) |

Date are presented as number (%).
 p<0.01 (Fisher’s exact test).

Table 2b. Categories of ACSCs for Patients at Home.

| The categories of ACSCs | Potentially avoidable | Not avoidable | Total |
|-------------------------|-----------------------|---------------|------------|
| Physician level | 18 (6.5) | 39 (14.1) | 57 (20.7) |
| Medical causes | 4 (1.4) | 102 (37.0) | 106 (38.4) |
| Patient level | 40 (14.5) | 0 | 40 (14.5) |
| Social level | 73 (26.5) | 0 | 73 (26.5) |
| Total | 135 (48.9) | 141(51.1) | 276(100) |

Date are presented as number (%).
 p<0.01 (Fisher’s exact test).

Table 2c. Categories of ACSCs for Patients in Care Facilities.

| The categories of ACSCs | Potentially avoidable | Not avoidable | Total |
|-------------------------|-----------------------|---------------|-----------|
| Physician level | 9 (14.1) | 10 (15.6) | 19 (29.7) |
| Medical causes | 0 | 26 (40.6) | 26 (40.6) |
| Patient level | 1 (1.6) | 0 | 1 (1.6) |
| Social level | 18 (28.1) | 0 | 18 (28.1) |
| Total | 28 (43.8) | 36(56.3) | 64(100) |

Data are presented as number (%).

p<0.01 (Fisher's exact test).

Table 3a. Univariate Analysis of Factors in Emergency Visits by Ambulance.

| | Potentially avoidable (n=163) | Potentially not avoidable (n=177) | p value |
|--|----------------------------------|--------------------------------------|---------|
| Age (years) | 83.2±10.9 | 83.1±9.4 | 0.91 |
| Male | 69 (42.3) | 86 (48.6) | 0.15 |
| Nursing care level | 3.4±1.5 | 3.1±1.5 | 0.08 |
| Lived alone | 60 (36.8) | 77 (43.5) | 0.20 |
| Lived home | 139 (85.3) | 136 (76.8) | 0.04 |
| Usage of home visiting nurse service | 125(76.7) | 141 (79.7) | 0.01 |
| Confirmation of advanced care planning | 125 (76.7) | 154 (96.0) | 0.01 |

Data are presented as number (%) or mean±standard deviation.

Table 3b. Multivariate Analyses of Factors in Emergency Visits by Ambulance.

| | Odds ratio | 95% CI | p |
|--|------------|-----------|------|
| Lived home | 0.56 | 0.31-1.00 | 0.05 |
| Usage of home visiting nurse service | 1.05 | 0.61-1.82 | 0.84 |
| Confirmation of advanced care planning | 0.51 | 0.29-0.92 | 0.03 |

CI: confidence interval

three factors revealed that confirmation of ACP was significantly associated with avoidable emergency visits (Table 3b).

Discussion

In this analysis, 44% of patient visits to the emergency room were owing to infectious diseases. About 80% of patients with infectious diseases had lower respiratory tract or urinary tract infections. However, 36% of patients with an infectious disease did not have a fever. In an earlier study, infectious diseases were the most common reason for emergency hospitalization, with pneumonia and urinary tract infection the most common individual diagnoses (12). The causes of infectious diseases in home patients were either cancer or renal disease, readmission within 14 days after discharge, and visiting the hospital on an out-patient basis had been underway for less than 90 days (13, 14). It is necessary for home care staff to assess the medical treatment environment of each patient, not only to collect information about underlying diseases but also to assess the usual social situation, such as whether or not the patient has a caregiver. It is very important for home care staff to continuously per-

form essential measures to assess infection.

In our study, 163 (47.9%) of the 340 emergency visits by ambulance were recognized as potentially avoidable. According to Freund's categories, 81% of patient visits involving the patient or social level were potentially avoidable. In one study, patients over 65 years old who were self-reported as being socially isolated were more likely to have subsequent hospital admission or emergency room visits than others (15). Elderly people who use visiting nurse services and have conducted ACP tend to avoid emergency visits. Coppa et al. reported that care received from home-based nurse practitioners was associated with reduced numbers of rehospitalizations and emergency department visits in a clinically complex patient population (16). Those authors showed that multidisciplinary cooperation was important for clinically complex patients. When the condition of the patient worsens, early recognition by other healthcare team members and early intervention are important. A systematic review regarding the effectiveness of ACP in people with dementia and their caregivers showed that ACP functions as a proxy measure concerning unwanted treatment or overtreatment, the quality of life, mildness of death, and caregiver satisfaction (17).

Improving each factor is important to prevent unnecessary emergency conveyance. Regarding the physician level, it is necessary to unify treatment policies of individual patients and regularly review the procedures for medical record-taking. In our clinic, a part-time service doctor is on call at night and on holidays; therefore, the treatment policy of each patient and the policy at the time of condition aggravation are recorded. Regarding medical causes, it is necessary for physicians to judge the severity and urgency of a patient's illness as a whole in order to suggest the best treatment approach for the patient. With respect to the patient level, physicians must educate patients and their family regarding what to do if the patient's condition worsens, and physicians should encourage ACP. For the social level, physicians must communicate with other healthcare team members (e.g., visiting nurses, care managers, government office staff, facility staff). At the social level, in our study, the proportion of emergency visits by ambulance was highest for patients living in care facilities. There have been issues surrounding labor and human resource shortages in care facilities in Japan. However, the discharge rate of patients living in care facilities was higher than that of patients living at home. These results indicate that care facilities in Japan have difficulty performing medical care, but the general care at these facilities is of a high quality. The mission of home medical care is to restructure the environment for the patient's peace of mind. It is important to ensure high-quality home care by empowering not only patients and their family but also multi-professional home care specialist teams.

Study Limitations

Several limitations associated with the present study warrant mention. First, since some of the study population had several risk factors, we were unable to eliminate the possible effect of underlying diseases and medications used for these diseases on the present findings. Second, this study was conducted at a single home-care clinic. While it should ideally have been conducted by two or more people, but this study was conducted by just one person. Therefore, in this study, the inter-rater or intra-rater reliability of this classification could not be evaluated. Third, there was possible selection bias in this study, in that a home-care service had already been introduced for all of the included patients. The major problem of this study is its descriptive nature, where conclusions are based essentially only on correlations. Therefore, prospective population-based studies are needed in the future to determine the details concerning the causal association between background factors. Therefore, prospective population-based studies are needed in the future to determine the details concerning the causal association between background factors and ACSCs. In addition, the demographics and referral source may limit the ability to make any general conclusions.

In conclusion, our study determined that ACP was the main factors involved in avoiding unnecessary emergency visits due to ACSCs among older people.

This study had been presented at the 3rd Japan Society for Homecare and Emergency Medicine, September 7, 2019, in Tokyo.

The authors state that they have no Conflict of Interest (COI).

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