

Original Article

Factors associated with emergency department length of stay of foreign patients visiting a regional core hospital in Japan

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Aim: This study aims to elucidate the foreign patient-specific factors associated with emergency department length of stay (EDLOS) in a regional core hospital emergency department (ED) in Japan.

Methods: This retrospective observational study included non-Japanese patients who visited the ED in a Japanese regional core hospital between April 1, 2018, and March 31, 2020. The effects on EDLOS were assessed using multivariate linear regression analysis, which included factors such as age, sex, consultation language, interpreter usage, arrival time, day of visit, mode of arrival, underlying disease, triage level, diagnosis of injury/noninjury, diagnostic investigations, consultation with specialists, and treatments or procedures.

Results: Of 65,297 ED patients, there were 777 study patients, with a median age of 37 years (interquartile range [IQR], 24.0–50.0). The median EDLOS was 101 min (IQR, 63.0–153.0). Multivariate linear regression analysis indicated that an extended EDLOS was associated with: language apart from Japanese, Chinese, or English (51.7 min; 95% confidence interval [CI], 17.8–85.6), helicopter arrival (115.6 min; 95% CI, 48.8–182.5), blood testing (60.5 min; 95% CI, 34.6–86.4), computed tomography (23.8 min; 95% CI, 3.7–43.9), consultation with specialists (36.2 min; 95% CI, 11.8–60.6), intravenous fluid/medication (29.7 min; 95% CI, 3.3–56.1), and surgical procedure/reduction/fixation in the ED (38.8 min; 95% CI, 14.2–63.4).

Conclusions: Consultation in a language other than Japanese, English, or Chinese was associated with a longer EDLOS in a regional core hospital in Japan. Devising ways to accommodate patients who speak various languages could be important.

Key words: Communication barrier, emergency treatment, internationality, length of stay, quality of health care

INTRODUCTION

ALTHOUGH THE EMERGENCE of severe acute respiratory syndrome coronavirus 2 has severely restricted international travel, the globalization of health care has continued to develop alongside the globalization of society. Inbound medical care has recently become a major issue all over the world, including dealing with refugees.^{1,2} According to the Japan National Tourism Organization, 31.88 million new non-Japanese individuals came to Japan in 2019.

In addition, the Immigration Services Agency of Japan reported that, as of June 2019, the number of foreign residents in Japan was approximately 2.83 million, accounting for 2.24% of the total population. However, it is difficult to state that all parts of Japan, including rural areas, are fully prepared to provide medical services to foreign patients with sufficient quality.

One of the major obstacles to treating foreigners is the language barrier.^{1,3,4} In the United States, it has been reported that communication with patients who have limited English proficiency has a negative impact on the quality of medical care.⁵ Most patients who visit Japanese hospitals are Japanese, and the hospitals are basically run entirely using the Japanese language. Therefore, not many of the medical staff have been trained to care for non-Japanese patients. Furthermore, foreign patients are not only

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nonproficient at Japanese, but they also speak a variety of languages, not just English. It is important to evaluate the quality of medical care offered to non-Japanese individuals in order to provide better health care for foreign patients. Although emergency department (ED) length of stay (EDLOS) has been used as an indicator of increased patient mortality, patient satisfaction, and quality of care,^{6,7} no study, to our knowledge, has evaluated the EDLOS of foreign patients in a rural area of Japan.

In this study, we examined the factors associated with EDLOS in order to improve the quality of medical care for foreign patients visiting the ED of a regional core hospital in Japan.

METHODS

THE STUDY WAS undertaken in the ED of Aizawa Hospital in Matsumoto, Nagano. Aizawa Hospital covers a population of 420,000, and its ED accepts patients 24 h per day, with an annual volume of approximately 30,000 patients, of which 6,500 are transported by ambulance. Aizawa Hospital has received the Japan Medical Service Accreditation for International Patients (JMIP) from the Japan Medical Education Foundation.

Initial care in the ED was provided by junior residents and emergency physicians. When necessary, consultation with specialists was provided, and the management plan was made by the attending physician in charge. In cases where communication with the patient was difficult due to language barriers, medical interpretation by hospital staff who could speak English or Chinese (face-to-face interpreter), interpretation by family members or companions (ad hoc interpreter), telephone service, and translation applications were used as appropriate. However, no special criteria were established for the use or selection of interpreters, and the necessity and indications for the use of interpreters were determined individually by the medical staff.

All non-Japanese patients who initially visited the ED during a 2-year period, from April 1, 2018, to March 31, 2020, were included. Patients who lacked accurate record of their nationality but could be identified as non-Japanese were included.

Patient information was retrospectively collected from the medical records. Data included patients' age, sex, nationality, status of stay (foreign resident [those who had stayed in Japan for more than 3 consecutive months] or tourist), consultation language (language spoken by the patient in the examination room), communication (without interpreter, hospital translator, ad hoc interpretation by family or an accompanying person, phone interpreter, or application device), mode of arrival (walk-in, ambulance, or helicopter),

arrival time (daytime, 8:30 a.m.–5:29 p.m.; evening, 5:30 p.m.–11:59 p.m.; night, 0:00 a.m.–8:29 a.m.), day of visit (weekdays, weekends, or holidays), underlying diseases, triage level according to the Japan Triage and Acuity Scale⁸ (level 1, resuscitation; 2, emergency; 3, urgency; 4, low urgency; and 5, nonurgency), diagnostic investigations, consultation with specialists, diagnosis by the 10th revision of the International Statistical Classification of Diseases and Related Health Problems, treatments or procedures, prescription, EDLOS, and disposition (discharge to home, hospitalization, emergency operation, emergency transfer to another hospital, or death in the ED). In order to exclude the influence of the availability of inpatient beds, EDLOS was defined as any of “the time from arrival to discharge to home,” “the time from arrival to the decision to admit the patient (contacting the ward),” “the time from arrival to the decision to transfer the patient (contacting the destination),” and “the time from arrival to death in the ED.”

The study cohort consisted of consecutive foreign initial consultations during the study period, from April 1, 2018, to March 31, 2020. The effects on EDLOS were assessed using multivariate linear regression analysis, which comprised factors including age, sex, status of stay, consultation language, interpreter usage, arrival time, day of visit, mode of arrival, underlying disease, triage level, injury/noninjury, blood testing, computed tomography, magnetic resonance imaging, consultation with specialists, intravenous fluid/medication, and surgical procedure/reduction/fixation. Triage level, reflecting patient severity, was defined as: “High”, levels 1, 2, 3 and non-walk-in patients; “No record”, walk-in but no triage record; and “Low”, levels 4 and 5. In our setting, the patients transferred by ambulance and helicopter were not triaged but were treated promptly in principle; therefore, these were classified into the “High” triage level. Regarding diagnostic investigations and treatments, frequently used and time-consuming tests and procedures were incorporated into the analysis. Statistical significance was defined as $p < 0.05$ unless otherwise specified. We used EZR version 1.41 (Saitama Medical Center, Jichi Medical University, Saitama, Japan), which is a graphical user interface for the R package (R Foundation for Statistical Computing, Vienna, Austria).⁹

This study was approved by the Aizawa Hospital Research Ethics Committee (institutional review board number 2020–25).

RESULTS

AMONG 65,297 ED visits during the study period, which included 45,836 patients with initial consultation, there were a total of 777 study patients (Fig. 1), with a

median age of 37 years (interquartile range [IQR], 24.0–50.0); 40.7% of patients were male. The patient background, management in the ED, and disposition are shown in Table 1. In terms of nationality breakdown, Chinese was the most common nationality, with 152 (19.6%) patients, followed by Filipino 104 (13.4%), Brazilian 72 (9.3%), Australian 39 (5.0%), Korean 39 (5.0%), Thai 36 (4.6%), and Vietnamese 32 (4.1%). The most common underlying disease was hypertension, with 52 (6.7%) patients, followed by diabetes 28 (3.6%), neuropsychiatric disorders 28 (3.6%), dyslipidemia 22 (2.8%), asthma 19 (2.4%), cardiac disease 18 (2.3%), liver disease 13 (1.7%), and thyroid disease 11 (1.4%). Regarding diagnosis, injury (263, 33.9%) accounted for the largest number of cases. Among noninjury cases, respiratory diseases, infectious diseases, unclassifiable, gastrointestinal diseases, and urogenital diseases accounted for 114 (14.7%), 65 (8.4%), 56 (7.2%), 52 (6.7%), and 47 (6.0%), respectively, of the total cases. The median EDLOS was 101 min (IQR, 63.0–153.0), with an admission rate of 9.1%, and 26.8% among those who required emergency surgery.

The result of the multivariate linear regression analysis for EDLOS is shown in Table 2. A language apart from Japanese, Chinese, and English was associated with an extra EDLOS of 51.7 min (95% confidence interval [CI], 17.8–85.6). Other factors associated with an extra EDLOS

included helicopter arrival (115.6 min; 95% CI, 48.8–182.5), blood testing (60.5 min; 95% CI, 34.6–86.4), computed tomography (23.8 min; 95% CI, 3.7–43.9), consultation with specialists (36.2 min; 95% CI, 11.8–60.6), intravenous fluid/medication (29.7 min; 95% CI, 3.3–56.1), and surgical procedure/reduction/fixation (38.8 min; 95% CI, 14.2–63.4). Status of stay, interpreter usage, and triage level were not associated with EDLOS.

DISCUSSION

IN THIS STUDY, the independent factors for prolonged EDLOS among foreign patients visiting the ED of a regional core hospital in Japan were other language, helicopter arrival, blood testing, computed tomography, consultation with specialists, intravenous fluid/medication, and surgical procedure/reduction/fixation. Interpreter usage and tourist or resident status were not independent factors associated with EDLOS.

Patients who spoke a language other than Japanese, English, or Chinese in the examination room stayed at ED significantly longer. Interpretation by the hospital staff was in English and Chinese in the current study, suggesting that there are challenges regarding the communication methods with respect to speakers of languages other than English and Chinese. Accordingly, special measures may need to be

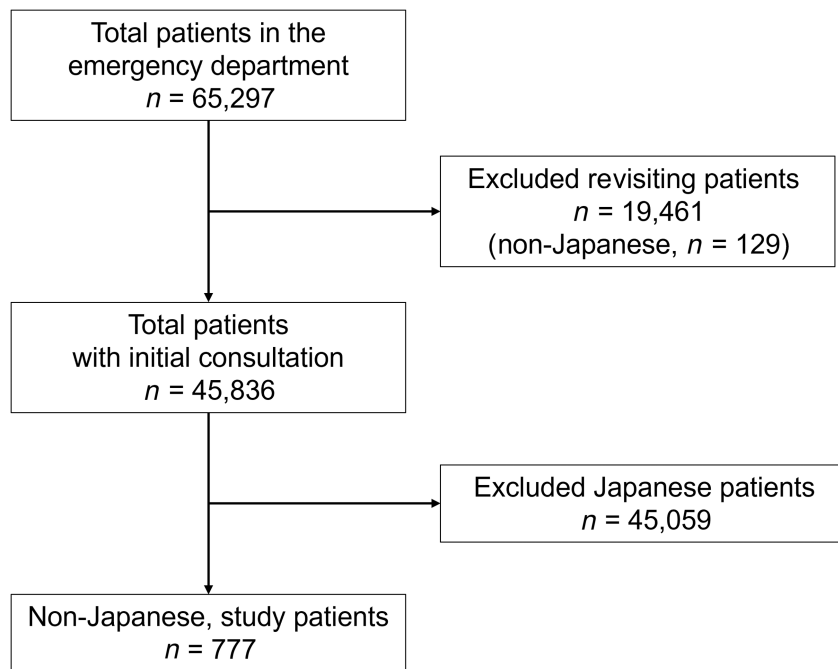


Fig. 1. Flowchart showing the selection of the study population of foreign patients visiting a regional core hospital in Japan.

Table 1. Characteristics, management, and disposition in the emergency department (ED) of foreign patients visiting a regional core hospital in Japan

	All patients (n = 777)
Age (years)	37 (24.0–50.0)
Male gender	316 (40.7)
Tourist	234 (30.1)
Consultation language	
Japanese	381 (49.0)
English	248 (31.9)
Chinese	78 (10.0)
Others	70 (9.0)
Interpreter	
None	428 (55.1)
Hospital translator	161 (20.7)
Family	45 (5.8)
Accompanying persons	137 (17.6)
Phone interpreter	3 (0.4)
Applications	3 (0.4)
Mode of arrival	
Walk-in	660 (84.9)
Ambulance	106 (13.6)
Helicopter	11 (1.4)
Arrival time	
Daytime (8:30 a.m.–5:29 p.m.)	405 (52.1)
Evening (5:30 p.m.–11:59 p.m.)	262 (33.7)
Night (00:00 a.m.–8:29 a.m.)	110 (14.2)
Weekends/holidays	295 (38.0)
Underlying diseases	203 (26.1)
Triage level	
1. Resuscitation	10 (1.3)
2. Emergency	130 (16.7)
3. Urgency	216 (27.8)
4. Low urgency	269 (34.6)
5. Nonurgency	15 (1.9)
0. No record	20 (2.6)
Diagnostic investigations [†]	498 (64.1)
Consultation with specialists in the ED	130 (16.7)
Treatments or procedures [‡]	336 (43.2)
Prescription	568 (73.1)
ED length of stay (min)	101 (63.0–153)
Disposition	
Discharge to home	703 (90.5)
Hospitalization	71 (9.1)
Emergency operation	19 (2.5)
	2 (0.3)

Table 1. (Continued)

	All patients (n = 777)
Emergency transfer to another hospital	
Death in the ED	1 (0.1)

Values are presented as median (interquartile range) or n (%).
[†]Blood test (n = 247), urine analysis (n = 110), rapid antigen tests (n = 44), bacterial cultures (n = 25), ultrasound (n = 76), electrocardiography (n = 117), radiography (n = 264), computed tomography (n = 181), and magnetic resonance imaging (n = 17).

[‡]Oral/suppository medication (n = 37), intravenous fluid/medication (n = 207), oxygen/nebulizer (n = 9), enema (n = 4), urethral catheterization (n = 3), surgical procedure/reduction/fixation (n = 119), physiotherapy (n = 7), intubation (n = 4), gastric lavage (n = 1), and eye irrigation (n = 1).

taken for speakers other than English and Chinese, such as preparing in advance for interpreters and for tools that employ multiple languages.¹⁰ In addition, there have been reports of problems caused by medical treatments that were based on *ad hoc* interpreters compared to trained interpreters,¹¹ and medical institutions that provide multilingual medical treatment need to discuss how to deal with such problems. In the United States, 90% of clinical residents had difficulty communicating with people with limited English proficiency through an interpreter during inpatient care,¹² suggesting that training in “providing medical care through an interpreter” is needed, although the use of an interpreter was not a significant factor in our results.

In our study, EDLOS was prolonged when some types of investigations, treatments, or procedures were performed in the ED or if consultation with a specialist was required. Our hospital accepted a wide range of patients, from mild to severe, and EDLOS, naturally, was strongly influenced by examination and treatment interventions. A systematic review of EDLOS reported that admission, older age, receiving diagnostic tests or consultations, and ambulance arrival were associated with a longer length of stay.¹³ An association with triage level has also been noted.¹⁴ In our study, we defined EDLOS as the time from arrival to disposition decision in the ED, taking into account the effect of ward bed availability and other factors. Age was not found to be associated with EDLOS, but this finding may have been influenced by the fact that our current population was relatively younger than patients in the same setting (as reported in our previous study of patients including Japanese nationality).¹⁵ Furthermore, although we considered that the mode of

Table 2. Multivariate analysis of factors associated with emergency department (ED) length of stay of foreign patients visiting a regional core hospital in Japan

Factor	Coefficient (95% CI)	SE	p value
Age, years			0.68
≤23	Reference		
24–36	−7.66 (−29.21–13.88)	10.97	0.49
37–49	−6.87 (−28.77–15.03)	11.16	0.54
≤50	4.22 (−19.33–27.78)	12.00	0.72
Sex, male	−13.40 (−29.00–2.20)	7.95	0.10
Tourists	16.86 (−7.43–41.15)	12.37	0.17
Language used			0.0024*
Japanese	Reference		
English	−11.13 (−38.16–15.89)	13.77	0.42
Chinese	7.17 (−26.09–40.43)	16.94	0.67
Others	51.72 (17.83–85.60)	17.26	0.0028*
Interpreters	−3.68 (−26.10–18.73)	11.42	0.75
Arrival time			0.92
Daytime (8:30 a.m.–5:29 p.m.)	Reference		
Evening (5:30 p.m.–11.59 p.m.)	2.71 (−14.10–19.52)	8.56	0.75
Night (00:00 a.m.–8:29 a.m.)	3.96 (−19.00–26.92)	11.70	0.73
Weekends and holidays	5.25 (−10.44–20.94)	7.99	0.51
Mode of arrival			0.0028*
Walk-in	Reference		
Ambulance	1.11 (−24.58–26.80)	13.09	0.93
Helicopter	115.63 (48.81–182.45)	34.04	<0.001*
Underlying diseases	10.53 (−8.18–29.25)	9.53	0.27
Triage level			0.66
Low [†]	Reference		
No record	7.98 (−41.02–56.98)	24.96	0.75
High [‡]	7.95 (−9.36–25.26)	8.82	0.37
Injury	−3.29 (−23.08–16.50)	10.08	0.74
Blood testing	60.46 (34.57–86.35)	13.19	<0.001*
Computed tomography	23.84 (3.74–43.93)	10.24	0.020*
Magnetic resonance imaging	42.00 (−10.84–94.83)	26.91	0.12
Consultation with specialist in the ED	36.21 (11.84–60.57)	12.41	0.0036*
Intravenous fluid/medication	29.68 (3.31–56.05)	13.43	0.0270*
Surgical procedure/reduction/fixation	38.80 (14.17–63.44)	12.55	0.0021*

Adjusted R^2 : 0.24.

CI, confidence interval; SE, standard error.

* $p < 0.05$.[†]Level 4, 5.[‡]Level 1, 2, 3, ambulance, and helicopter.

arrival and triage level are associated with illness severity, the association between triage level and EDLOS was not elucidated in this study. However, this may have been due to the fact that cases with ambulance and helicopter arrival were assigned a high triage level in the analysis. The length of stay was prolonged for helicopter arrival, which is

expected to be associated with relatively more critical illness.

Although it is expected that foreign residents and tourists in Japan have different backgrounds in terms of language proficiency and understanding of Japanese culture because of their varied experience in Japan, this study showed that

the difference between residents and tourists was not an independent factor of EDLOS. Foreign tourists may also include those who had visited Japan multiple times and were familiar with the country. Likewise, foreign residents might include those who had lived in Japan for a long time and were proficient in Japanese. The differences in the quality of medical care according to the level of experience in Japan and Japanese language proficiency should be investigated in a future study.

Injury was the most common diagnosis among the foreign patients in our hospital. Although it has been reported that EDLOS is prolonged in elderly patients with injury,¹⁶ those with injury in the current study did not experience prolongation in their EDLOS. This may be because those with injury in our study were simpler to interview and communicate with than those without injury. In terms of frequency, it seems reasonable to promote language support development with emphasis in the field of injury care, but considering that EDLOS was not longer in injury patients in this study, interventions for noninjury patients may be more effective in improving the quality of care in ED. Variation in language support during each phase of ED care has also been reported.⁴ For this reason, it may be helpful to disseminate manuals for dealing with foreign patients not only to ED staff, but also to physicians in various specialties, radiologists, and clinical laboratory technicians, in order to simulate specific patients and create multilingual explanatory documents for patients.

This study is the first retrospective study of EDLOS for foreign patients in a rural ED in Japan, but it has several limitations. First, although we classified and analyzed the data according to the language spoken by the patients in the ED, we lacked information on the patients' comprehension of Japanese and their experience in Japan (length of stay and hospital consultation experience). We were unable to extract detailed information regarding the level of support required by interpreters. Second, this study did not utilize an objective scoring system, such as Sequential Organ Failure Assessment Score and Injury Severity Score, to assess illness/injury severity, because they were not routinely recorded for all patients. Further, it should be noted that this was an observational study including relatively young patients and only a small number of severely ill patients. Third, the communication skills of the doctors may have varied, which may have affected the EDLOS, but we were unable to evaluate these factors. Finally, the external validity of this study may have been somewhat reduced because our hospital has received the JMIP.

In conclusion, the use of languages other than Japanese, English, and Chinese as the language of care was associated with longer EDLOS in a regional core hospital in Japan.

Devising ways to accommodate patients with various languages may improve the quality of emergency care for foreign patients.

DISCLOSURE

APPROVAL OF THE research protocol: This study was approved by the Aizawa Hospital Research Ethics Committee (institutional review board number 2020–25).

Informed Consent: N/A.

Registry and the Registration No. of the study/trial: N/A.

Animal Studies: N/A.

Conflict of interest: The authors have declared no conflicts of interest.

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