Original Article

Language affects length of stay in emergency departments in Queensland public hospitals

Ibrahim Mahmoud¹, Xiang-yu Hou^{1,2}, Kevin Chu^{1,2}, Michele Clark¹

¹ School of Public Health, Queensland University of Technology, Brisbane, Australia

² Department of Emergency Medicine, Royal Brisbane and Women's Hospital, Brisbane, Australia

Corresponding Author: Xiang-yu (Janet) Hou, Email: x.hou@qut.edu.au

BACKGROUND: A long length of stay (LOS) in the emergency department (ED) associated with overcrowding has been found to adversely affect the quality of ED care. The objective of this study is to determine whether patients who speak a language other than English at home have a longer LOS in EDs compared to those whose speak only English at home.

METHODS: A secondary data analysis of a Queensland state-wide hospital EDs dataset (Emergency Department Information System) was conducted for the period, 1 January 2008 to 31 December 2010.

RESULTS: The interpreter requirement was the highest among Vietnamese speakers (23.1%) followed by Chinese (19.8%) and Arabic speakers (18.7%). There were significant differences in the distributions of the departure statuses among the language groups (Chi-squared=3236.88, $P<0.001$). Compared with English speakers, the Beta coefficient for the LOS in the EDs measured in minutes was among Vietnamese, 26.3 (95%CI: 22.1–30.5); Arabic, 10.3 (95%CI: 7.3–13.2); Spanish, 9.4 (95%CI: 7.1–11.7); Chinese, 8.6 (95%CI: 2.6–14.6); Hindi, 4.0 (95%CI: 2.2–5.7); Italian, 3.5 (95%CI: 1.6–5.4); and German, 2.7 (95%CI: 1.0–4.4). The final regression model explained 17% of the variability in LOS.

CONCLUSION: There is a close relationship between the language spoken at home and the LOS at EDs, indicating that language could be an important predictor of prolonged LOS in EDs and improving language services might reduce LOS and ease overcrowding in EDs in Queensland's public hospitals.

KEY WORDS: Emergency department; Language; Length of stay

World J Emerg Med 2013;4(1):5–9

DOI: 10.5847/wjem.j.issn.1920-8642.2013.01.001

INTRODUCTION

Overcrowding in emergency departments (EDs) is a serious and growing crisis confronting Australia's public hospitals and may affect the quality of and access to care.^[1] Length of stay (LOS) is a marker of ED overcrowding and a key component of ED quality assurance monitoring.^[2,3] ED LOS is usually defined as the time from a patient's registration until that patient's departure from the ED.^[4,5] LOS can be associated with ED overcrowding, decreased patient satisfaction with ED care, ambulance diversion and poor clinical outcomes.^[3,4] An association with a long LOS in the ED has also been

found in differences in language between health care providers and patients.^[6,7] In Australia, approximately 15.6% of the population speaks a language other than English at home, with approximately 3% having limited English proficiency.^[8] Some studies have suggested that patients from non-English speaking backgrounds tend to use ED care as their primary source of care.^[9–11] Critical time can be lost in the ED due to a lack of ability to communicate effectively in English, which contributes significantly to increased LOS. However, these studies have been conducted in countries where the health system and patients' characteristics differ from those in

Australia. Currently, a limited body of literature exists describing the effect of language on LOS in Australian EDs.

The aim of this study is to determine if patients who speak a language other than English at home have a longer LOS than those who speak only English at home in public hospital EDs in Queensland (QLD).

METHODS

Study design and setting

An analysis of the QLD public hospitals' ED dataset for the period from January 1, 2008 to December 31, 2010 was undertaken. QLD, located in Australia's northeast, is the second-largest in land mass and third-most populated state in the country.

Data collection

The data were sourced from the Emergency Department Information System (EDIS). EDIS is an electronic information system for public hospital EDs in QLD. It provides data such as arrival time, departure time, triage category, gender, age, language spoken at home, and ED departure status (admission to hospitals, did not wait, died or discharged).

Ethical approval to use unidentified data was obtained from QLD Health Central Ethics Unit (HREC/11/QHC/29).

Study population

Patients were divided into groups according to the language spoken at home. Those who had been admitted to hospital, transferred to another hospital, left without being seen, left after the commencement of treatment, or died in ED were excluded. Only

patients who had completed their ED service and were discharged were included in the analysis. The study was limited to the languages most commonly spoken at home as specified by EDIS: English (1 984 087), Arabic (1 593), Chinese (3 356), Vietnamese (1 478), Spanish (1 285), Italian (976), Hindi (957), and German (762).

Data analysis

Descriptive analysis was performed to test for the proportions of ED departure status (admission to hospital, transferred, discharge, did not wait, or died) and interpreter requirements. Two multiple linear regression models were used. The first model controlled for age, gender, and triage categories, and interpreter requirement was included to form the second model. The triage priority was measured using the Australian Triage Scale (ATS), where resuscitation patients need to be seen immediately, emergency patients within 10 minutes, urgent patients within 30 minutes, semi-urgent patients within 60 minutes, and non-urgent patients within 120 minutes.^[12]

The results were calculated using Statistical Package for the Social Sciences (SPSS) version 19 (IBM SPSS Statistics 19).

RESULTS

Among the total of 2 953 731 patients attending all public hospital EDs in QLD from January 1, 2008 to December 31, 2010, 2 905 204 (98.4%) spoke only English at home and 48 527 (1.6%) spoke another language at home. Table 1 describes the proportions of the patients' departure status, including those whose ED service was completed and were discharged. Table 2 shows the interpreter requirements among

Table 1. The Chi-square test for departure statuses from ED by language spoken at home, QLD 2008–2010

Languages	Departure status				Total
	Admitted/Referred (%)	Discharged (%)	Did not wait (%)	Died (%)	
English	697 169 (24)	1 984 087 (68.3)	221 551 (7.6)	2 397 (0.1)	2 905 204 (100)
Chinese*	1 341 (26.4)	3 356 (66.0)	381 (7.5)	4 (0.1)	5 082 (100)
Vietnamese	893 (35.1)	1 478 (58.0)	173 (6.8)	3 (0.1)	2 547 (100)
Arabic	421 (18.8)	1 593 (71.1)	225 (10.0)	2 (0.1)	2 241 (100)
Spanish	629 (30.7)	1 285 (62.8)	129 (6.3)	4 (0.2)	2 047 (100)
Italian	981 (48.7)	976 (48.5)	55 (2.7)	1 (0.0)	2 013 (100)
Hindi	444 (29.0)	957 (62.5)	128 (8.4)	1 (0.1)	1 530 (100)
German	471 (36.8)	762 (59.5)	47 (3.7)	1 (0.1)	1 281 (100)
Other	10 649 (33.5)	18 962 (59.7)	2 062 (6.5)	113 (0.4)	31 786 (100)
Total	712 998 (24.1)	2 013 456 (68.2)	224 751 (7.6)	2 526 (0.1)	2 953 731 (100)

*: Including Cantonese & Mandarin.

the different language groups. Patients who spoke Chinese, Vietnamese, Arabic, Spanish, Italian, Hindi, and German at home had a significantly ($P<0.05$) longer LOS compared to patients who spoke only English, controlling for gender, age, and triage category (Table 3). Table 4 shows the differences in LOS after adding interpreter requirement to the model.

The r^2 for the first regression model was 0.12 and 0.17 for the final model, suggesting that 12% and 17% of the variance, respectively, could be explained by these two models.

Table 2. Interpreter requirement in ED, QLD 2008–2010

Main languages	Total no.	Interpreter required (%)
English only*	1 984 087	386 (0.0)
Chinese**	3 356	666 (19.8)
Vietnamese	1 478	342 (23.1)
Arabic	1 593	298 (18.7)
Spanish	1 285	208 (16.2)
Italian	976	114 (11.7)
Hindi	957	132 (13.8)
German	762	44 (5.8)

*: Auslan language; **: Including Cantonese & Mandarin.

Table 3. Multiple linear regression (ORs and 95%CI) for LOS in EDs among main languages spoken at home, adjusted for sex, age, and triage categories, QLD 2008–2010

Main languages	OR (95%CI)	P
Reference group: English only		
Chinese*	14.5 (9.3–19.6)	0.000
Vietnamese	28.4 (24.5–32.3)	0.000
Arabic	14.4 (11.9–16.8)	0.000
Spanish	11.4 (9.3–13.5)	0.000
Italian	3.4 (1.5–5.3)	0.001
Hindi	4.1 (2.5–5.7)	0.000
German	2.0 (0.5–3.5)	0.01

*: Including Cantonese & Mandarin.

Table 4. Multiple linear regression (ORs and 95%CI) for LOS in EDs among main languages spoken at home, adjusted for sex, age, triage categories, and interpreter requirement, QLD 2008–2010

Main languages	OR (95%CI)	P
Reference group: English only		
Chinese*	8.6 (2.6–14.6)	0.005
Vietnamese	26.3 (22.1–30.5)	0.000
Arabic	10.3 (7.3–13.2)	0.000
Spanish	9.4 (7.1–11.7)	0.000
Italian	3.5 (1.6–5.4)	0.001
Hindi	4.0 (2.2–5.7)	0.000
German	2.7 (1.0–4.4)	0.001

*: Including Cantonese & Mandarin.

DISCUSSION

This is the first study in Queensland to compare the length of stay (LOS) in public hospital Emergency Departments (EDs) among patients whose primary language is not English to those who speak only English at home. Our study showed that patients who speak Vietnamese had a higher rate of interpreter use and a longer LOS than the other language groups. The patients who speak a language other than English at home had significantly longer LOS in the EDs. More specifically, patients who spoke Vietnamese at home stayed the longest in the EDs (26.3 minutes), followed by Arabic (10.3 minutes), Spanish speakers (9.4 minutes) and Chinese speakers (8.6 minutes), compared to those who spoke only English at home. These findings agree with previous studies in other countries.^[3,13,14]

Public hospital EDs in Queensland see patients who have little or no understanding of English due to a high proportion of immigrants living in the state. Additional time is needed to obtain an interpreter, and even when an interpreter is readily available, the emergency physician requires additional time for this interaction.^[15] Thus, if a patient with limited English proficiency requires an interpreter, this can prolong the LOS. However, our first regression model explained only 12% of the variability in LOS, controlling for language, triage category, gender, and age. That was improved significantly to 17% when the interpreter requirement was added to the final model, which suggests the importance of this factor. This also indicates that there are other influential factors affecting LOS in EDs which were not captured by our study.

The first possible reason is that sometimes ED care providers use whoever bilingual and available at the ED such as a family member or hospital staff to communicate with patients, rather than use a professional interpreter.^[13,16] It was reported that using nonprofessional interpreter might result in serious consequences including breach of patient confidentiality, less understanding of the patient's problems, un-necessary diagnostic tests, wrong diagnosis, wrong treatment, frequent ED visits, and reduced quality of care.^[16–18] This would lead to higher health care costs, add greater burden to already overcrowded EDs, and delay treatment.^[18]

The second possible reason is that some disadvantaged immigrants, such as refugees, might attend EDs with more advanced illnesses or complex conditions which require longer assessment, additional diagnostic tests, and treatment times.^[19] Unfortunately, patients' refugee status is not available for this study, and warrants future

research in this area.

The third possible reason is the clinical situation of these patients such as the number of patients in the ED at that time, the laboratory tests ordered, the use of diagnostic imaging, and specialty consultation.^[2,6]

The fourth possible reason could be the cultural barriers. For example, women from Islamic or Middle Eastern cultures prefer to be seen by a female doctor, which can prolong their LOS or cause them to leave the ED without seeing the doctor.^[20,21]

This specific culture could potentially explain the reason, at least partly, that Arabic speakers had 10% higher than any other group who did not wait for their treatment to be completed at EDs and left the EDs against the doctor's wish. Further research is needed to confirm this assumption. This is important as the immigration data indicate that there are increasing numbers of immigrants, refugees, and foreign students from Arabic speaking countries coming to Australia.^[22]

Several studies have shown that language barriers not only increased the LOS in EDs, but also decreased patients' satisfaction.^[3,13,14] Carrasquillo et al^[13] reported that compared to English speakers, non-English speakers were less satisfied with the care they received in the ED as, were less willing to return to same ED if they had a problem which they felt required emergency care, and reported more problems with emergency care. Therefore, understanding why these patients are staying longer in the ED is an important factor in enhancing the acute care delivered to these patients in the EDs.

The limitations of this study are mainly the limitations of large secondary data analysis such as adequacy, accuracy, completeness, and other measures of the quality of the data.^[23] However, every humanly possible effort has been made to make sure the process of retrieving the data is accurate and consistent.

In conclusion, patients who speak a language other than English at home had a longer length of stay in Queensland public hospital emergency departments which largely cannot be explained by the language itself. Further research is needed to identify reasons behind the longer stay and provide scientific evidence for effective future interventions so that everyone can access acute care in time despite their language spoken at home.

ACKNOWLEDGEMENT

The authors are grateful to the Hospital Access Analysis Team (HAAT) of Queensland Health, the data custodians of

the EDIS data, and particularly Jean Sloan, who extracted and provided the data.

Funding: None.

Ethical approval: Ethical approval to use unidentified data was obtained from QLD Health Central Ethics Unit (HREC/11/QHC/29).

Conflicts of interest: The authors have no financial or other conflicts of interest regarding this article.

Contributors: Mahmoud I proposed and wrote the study. All authors read and approved the final manuscript. Hou XY is the guarantor.

REFERENCES

- 1 Australian Institute of Health and Welfare. Public EDs not coping with growing pressure. *Aust Med* 2009; 21: 3–4.
- 2 Yoon P, Steiner I, Reinhardt G. Analysis of factors influencing length of stay in the emergency department. *CJEM* 2003; 5: 155.
- 3 Herring A, Wilper A, Himmelstein DU, Woolhandler S, Espinola JA, Brown DFM, et al. Increasing length of stay among adult visits to US emergency departments, 2001–2005. *Acad Emerg Med* 2009; 16: 609–616.
- 4 Forster AJ, Stiell I, Wells G, Lee AJ, Van Walraven C. The effect of hospital occupancy on emergency department length of stay and patient disposition. *Acad Emerg Med* 2003; 10: 127–133.
- 5 Gardner RL, Sarkar U, Maselli JH, Gonzales R. Factors associated with longer ED lengths of stay. *Am J Emerg Med* 2007; 25: 643–650.
- 6 Goldman RD, Amin P, Macpherson A. Language and length of stay in the pediatric emergency department. *Pediatr Emerg Care* 2006; 22: 640.
- 7 Yeo S. Language barriers and access to care. *Annu Rev Nurs Res* 2004; 22: 59–73.
- 8 Australian Bureau of Statistics. Language spoken at home (LANP). Canberra: ABS; 2006. Available from: <http://www.abs.gov.au/Ausstats/abs@.nsf/0/2584CFD16AD0821ACA25720A0078F2B1?opendocument>.
- 9 Rué M, Cabré X, Soler-González J, Bosch A, Almirall M, Serna MC. Emergency hospital services utilization in Lleida(Spain): A cross-sectional study of immigrant and Spanish-born populations. *BMC Health Serv Res* 2008; 8: 81.
- 10 Norredam M, Mygind A, Nielsen AS, Bagger J, Krasnik A. Motivation and relevance of emergency room visits among immigrants and patients of Danish origin. *Eur J Public Health* 2007; 17: 497.
- 11 Manson A. Language concordance as a determinant of patient compliance and emergency room use in patients with asthma. *Med Care* 1988; 1119–1128.
- 12 Forero R, Nugus P. Literature review on the Australasian Triage Scale (ATS). Sydney: The Australasian College for Emergency Medicine (ACEM); 2012 [cited 2012 17/06]. Available from: <http://www.acem.org.au/home.aspx?docId=1>.
- 13 Carrasquillo O, Orav EJ, Brennan TA, Burstin HR. Impact of language barriers on patient satisfaction in an emergency department. *J Gen Intern Med* 1999; 14: 82–87.
- 14 Fernandes C, Price A, Christenson JM. Does reduced length

- of stay decrease the number of emergency department patients who leave without seeing a physician? J Emerg Med 1997; 15: 397–399.
- 15 Bernstein J, Bernstein E, Dave A, Hardt E, James T, Linden J, et al. Trained medical interpreters in the emergency department: effects on services, subsequent charges, and follow-up. J Immigr Health 2002; 4: 171–176.
- 16 Jacobs EA, Lauderdale DS, Meltzer D, Shorey JM, Levinson W, Thisted RA. Impact of interpreter services on delivery of health care to limited-English proficient patients. J Gen Intern Med 2001; 16: 468–474.
- 17 Hampers LC, Cha S, Gutglass DJ, Binns HJ, Krug SE. Language barriers and resource utilization in a pediatric emergency department. Pediatrics 1999; 103: 1253–1256.
- 18 Ruger JP, Richter CJ, Spitznagel EL, Lewis LM. Analysis of costs, length of stay, and utilization of emergency department services by frequent users: implications for health policy. Acad Emerg Med 2004; 11: 1311–1317.
- 19 Bener A, Rafie Alwash MD P, Miller CJ, Denic S, Dunn EV. Knowledge, attitudes, and practices related to breast cancer screening: a survey of Arabic women. J Cancer Educ 2001; 16: 215–220.
- 20 Baker DW, Stevens CD, Brook RH. Patients who leave a public hospital emergency department without being seen by a physician. JAMA 1991; 266: 1085–1090.
- 21 Australian Bureau of Statistics. 2006 Census of population and housing. Canberra: ABS; 2006.
- 22 Kwok C, Sullivan G. Health seeking behaviours among Chinese-Australian women: implications for health promotion programmes. Health 2007; 11: 401–415.
- 23 Sanders CM, Saltzstein SL, Schultzel MM, Nguyen DH, Stafford HS, Sadler GR. Understanding the limits of large datasets. J Cancer Educ 2012; 1–6.

Received September 6, 2012

Accepted after revision January 19, 2013