

Language and Trauma: Is Care Equivalent for Those Who do not Speak English?

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ABSTRACT

Aim: Few studies examine the relationship of language and surgical outcomes. Language is not included as a variable in many databases. The aim of this study was to examine the association of language and outcomes in trauma.

Materials and methods: A 5-year retrospective review was performed at a level I trauma center. All adult trauma patients with a non-English primary language were matched to an English-speaking cohort by age, gender, injury mechanism, initial Glasgow coma scale (GCS), and injury severity score (ISS). Analysis included an unpaired two-tailed Student's *t* test for continuous variables and a Fisher's exact test for categorical variables.

Results: Three hundred ninety-five non-English-speaking patients were identified. There was no difference in mortality, intubation rate, number of ventilator days, average hospital length of stay, readmission rates, or rates of nine complications, even when stratified for high (≥ 15) vs low (≤ 14) ISS. Non-English-speaking patients had a shorter average length of intensive care unit (ICU) stay (5.4 vs 6.9 days, $p = 0.03$), were mostly self-pay (236, 59.7% vs 127, 32.2%, $p < 0.01$), and were more likely to be discharged home (340, 86.1% vs 309, 78.2%, $p = 0.01$).

Conclusion: Despite similar outcomes, non-English-speaking trauma patients left the ICU more quickly, were more likely self-pay, and more likely to be discharged home.

Clinical significance: These findings raise concerns about possible disparities in trauma care for non-English speaking patients and highlight the importance of inclusion of language as a variable in patient registries and national databases. Future studies should investigate additional potentially significant socioeconomic factors.

Keywords: Disparities, Language, Retrospective study.

RESUMEN

El objetivo: Pocos estudios examinan la relación entre el idioma primario del paciente y los resultados quirúrgicos. El idioma no se incluyen como variable en muchas de las bases de datos. El objetivo de este estudio fue examinar la relación entre el idioma primario del paciente y los resultados después de trauma.

Materiales y métodos: Una revisión retrospectiva de cinco años se realizó en un centro de trauma del nivel uno. Todos los pacientes adultos del traumatismo con un idioma principal que no era inglés fueron emparejados con una cohorte de habla inglés por la edad, el sexo, el mecanismo de lesiones, Glasgow coma scale inicial (GCS), y el score de gravedad de lesión ISS. El análisis se incluyó una prueba *t* del estudiante no emparejado por las variables continuas y una prueba exacta de Fisher por las variables categóricas.

Resultados: Trescientos noventa y cinco pacientes que no hablan inglés fueron identificados. No se encontró una diferencia entre la mortalidad, la tasa de intubación, el número de días de ventilación, la duración media de la estancia hospitalaria, las tasas de readmisión, o las tasas de nuevas complicaciones, incluso cuando se estratifica por ISS alta (≥ 15) y baja (≤ 14). Los pacientes que no hablan inglés tenían una duración media de la estancia en la unidad de cuidados intensivos (UCI) más corta (5.4 vs 6.9 días, $p = 0.03$), eran en su mayoría auto-pagado (236, 59.7% vs 127, 32.2%, $p < 0.01$) y fueron enviados a la casa más frecuentemente (340, 86.1% vs 309, 78.2%, $p = 0.01$).

La conclusión: A pesar de resultados similares, los pacientes del traumatismo que no hablan inglés se fueron de la unidad de cuidados intensivos (UCI) más rápidamente, eran más propensos a ser auto-pagado, y más propensos a ser enviados a la casa y no a otros hospitales de cuidado intermedio.

El significado clínico: Estos descubrimientos suscitan preocupaciones sobre la disparidad en la atención médica para el traumatismo por los pacientes que no hablan inglés, y destacan la importancia de la inclusión del idioma como variable en registros de pacientes y bases de datos nacionales. Estudios futuros deben investigar otros factores socioeconómicos que son potencialmente significativos.

Palabras clave: Lenguaje, Resultados del trauma, Retrospective study.

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INTRODUCTION

In 2011, the American Community Survey reported that of 291.5 million people greater than 5 years old, 60.6 million people, or 21% of the population, spoke a language other than English at home.¹ The relationship between patient language and its effect on treatment outcomes has been studied in various fields of medicine, with such reports on this topic covering the span of specialties from

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pediatric emergency medicine to patients treated with radiotherapy for head and neck malignancies.²⁻⁴ However, a void exists in the trauma literature, where a single study published in 2004 addressed the question of potentially preventable intubations for Spanish-speaking patients in the National Trauma Registry of the American College of Surgeons using demographic information on ethnicity to describe statistics for “patients who typically speak English” and “patients who typically speak Spanish”.⁵ Language was not captured as a variable in the National Trauma Registry at the time of this study and has also not been included as a variable in other large surgical databases, including the American College of Surgeons National Surgery Quality Improvement Program database.⁶

In 2000, United States Executive Order 13166, *Improving access to services for persons with limited english proficiency*, formally established that all federally funded agencies must draft guidance on this topic.⁷ Consequently, the Department of Health and Human Services’ Office of Minority Health issued a statement in 2001 regarding *Standards for culturally and linguistically appropriate services in healthcare*, deeming that healthcare organizations must provide language assistance services at no cost and in a timely matter at all points of contact and throughout all hours of operation for all patients with limited English proficiency.⁸ This document also states that healthcare organizations must ensure that data on patient race, ethnicity, and spoken and written language are collected in health records, integrated into the organization’s information management systems, and periodically updated. Therefore, medical records now provide a repository of data on patient language, which can provide insight into trends in treatment and outcomes. Due to the lack of preexisting studies on this topic, the aim of this study is to examine the association of language and trauma in patient outcomes.

MATERIALS AND METHODS

A retrospective review of consecutive adult patients presenting as trauma activations to the Spirit of Charity Level I Trauma Center at University Medical Center in New Orleans, Louisiana, from July 1, 2012, through August 31, 2017, was performed. Patients younger than 18 years old, incarcerated patients, and pregnant female patients were excluded. A query of the variable “preferred language” in the electronic medical record system was asked for all patients meeting the inclusion criteria. Interpretation services were provided via telephone for this hospital during the study period by CyraCom International (Tucson, AZ, USA). Approval for this study was obtained from the Tulane University School of Medicine Institutional Review Board.

Non-English-speaking patients were matched to an English-speaking cohort by age, gender, mechanism of injury, initial GCS, and ISS. Predefined ranges for the continuous variables of interest were determined prior to selecting patients for matching. Primary outcome variables for the study included patient mortality, overall length of hospital stay, length of ICU stay, intubation rates, and the number of ventilator days for intubated patients. Secondary outcomes included readmission rates and rates of nine common complications including deep venous thrombosis, pulmonary embolism, acute kidney injury, acute respiratory distress syndrome, myocardial infarction, pneumonia, sepsis, stroke, and urinary tract infection. Additionally, data regarding self-pay status and the percentage of patients with a discharge disposition to home (vs. skilled nursing facility, inpatient rehabilitation facility, etc.) were collected and analyzed. Statistical analysis was then performed

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using an unpaired two-tailed Student’s *t* test for continuous variables and a Fisher’s exact test for categorical variables (version 5; GraphPad Prism, La Jolla, CA). A multivariate analysis was performed using binary logistic regression controlling for confounders of language, age, ISS, insurance status, and gender. A *p* value of <0.05 was considered significant.

RESULTS

Study Demographics

A total of 395 trauma patients with a primary language spoken other than English met the study inclusion criteria (Flowchart 1). Three hundred forty-two patients (86.6%) reported Spanish and 53 patients (13.4%) reported a preferred language other than Spanish (Vietnamese, Arabic, Chinese, Greek, German, Afrikaans, and Abkhaz). Compared to the English-speaking cohort, non-English-speaking patients were well matched in terms of average patient age (36.5 ± 0.6 years vs 36.8 ± 0.7 years, $p = 0.75$), male gender (84.8% vs 86.3%, $p = 0.61$), percentage of blunt trauma patients (73.4% vs 75.4%, $p = 0.57$), average ISS (9.4 ± 0.5 vs 9.0 ± 0.5 , $p = 0.57$), and average GCS (13.3 ± 0.2 , $p = 1.0$). These trends were similar when non-English-speaking patients were further stratified in terms of demographics. However, non-English-speaking trauma patients with a preferred language other than Spanish were significantly older compared to Spanish speakers (45.3 ± 2.5 years vs 35.5 ± 0.7 years, $p < 0.0001$). Table 1 demonstrates additional demographic data.

CLINICAL OUTCOMES

Table 2 demonstrates the results of a comparison of clinical outcomes for trauma patients with English as a preferred language compared to the other patients. There was no significant difference

Flowchart 1: Flowchart of study design, from chart review to matching for groups reporting non-English preferred language to matched group reporting English as the preferred language. ISS = injury severity score

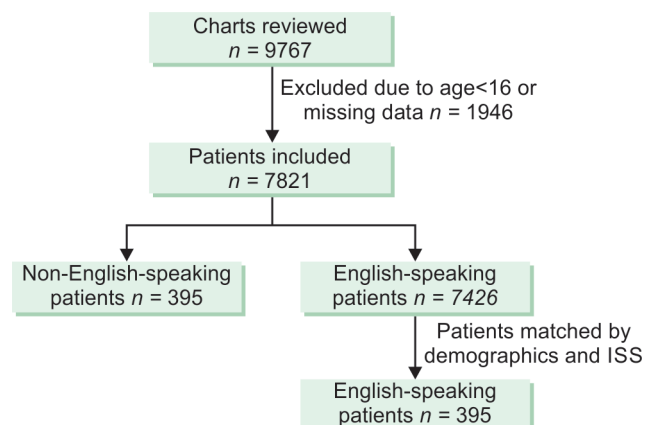


Table 1: Patient demographics for English-speaking and non-English-speaking trauma patients

Patient demographics	English (n = 395)	Non-English (n = 395)	p value
Age average, years (SEM)	36.5 (0.6)	36.8 (0.7)	0.8
Male gender, n (%)	335 (84.8)	341 (86.3)	0.6
Blunt trauma, n (%)	290 (73.4)	298 (75.4)	0.6
ISS, average (SEM)	9.4 (0.5)	9.0 (0.5)	0.6
GCS, average (SEM)	13.3 (0.2)	13.3 (0.2)	1.0
ED vital signs			
SBP, average (SEM)	136.0 (1.5)	133.5 (1.4)	0.2
RR, average (SEM)	18.7 (0.3)	19.3 (0.3)	0.2

SEM, standard error of the mean; ISS, injury severity score; GCS, Glasgow coma scale; ED, emergency department; SBP, systolic blood pressure; RR, respiratory rate

in mortality or average overall length of hospital stay for these groups ($p > 0.05$), but patients reporting a preferred language other than English left the ICU more quickly and in fact spent on average a day less in the ICU than their English-speaking counterparts (6.9 ± 0.6 days for English speakers vs 5.4 ± 0.3 days for non-English speakers, $p = 0.03$). Intubation rates in the emergency room were equivalent for both groups, with 35 patients intubated in each (8.7%, $p = 1.0$). Once intubated, there was also no significant difference in the average number of days during which patients received ventilator support. Rates of readmission to the hospital, as well as rates of nine common complications, demonstrated no significant difference for patients reporting a preferred language of English vs patients reporting a preferred language other than English. Additionally, when non-English speakers were discharged from the hospital, they were more likely to be discharged to home (86.1% vs 78.2%, $p = 0.01$) and more likely to be “self-pay” with regard to insurance status (59.7% vs 32.2% of English speakers, $p < 0.01$). When stratified for high (≥ 15) vs low (≤ 14) ISS, these same overall trends held for the cohorts as shown in Table 3. A multivariate analysis showed that when controlling for several confounding factors, language was not associated with in-hospital mortality ($p = 0.136$). Insurance status, age, and ISS were significantly associated with mortality ($p < 0.05$).

OUTCOMES BY NON-ENGLISH LANGUAGE

A subanalysis regarding a comparison of the primary clinical outcomes for trauma patients reporting a preferred language of Spanish vs patients reporting a preferred language other than Spanish or English. Results of this analysis are demonstrated in Table 4. No difference was observed ($p > 0.05$) in mortality rates, average length of hospitalization, number and percentage of patients in each group undergoing intubation in the emergency department, or average number of days spent on the ventilator machine for intubated patients. However, patients reporting a preferred language other than English or Spanish spent significantly less days on average in the ICU compared to the patient cohort reporting a preferred language of Spanish (5.7 ± 0.3 days for Spanish speakers vs. 3.7 ± 1.3 days for non-English, non-Spanish speakers, $p = 0.01$).

DISCUSSION

Language barriers likely play an intricate role in the outcome of patients. However, this issue has not been well studied. In 2016,

Table 2: Comparison of clinical outcomes for trauma patients with non-English-speaking patients matched to an English-speaking cohort

Clinical outcomes	English (n = 395)	Non-English (n = 395)	p value
Hospital LOS, average, days (SEM)	6.6 (0.6)	6.3 (0.6)	0.7
ICU LOS average, days (SEM)	6.9 (0.6)	5.4 (0.3)	0.03
Intubated in ED, n (%)	35 (8.7)	35 (8.7)	1.0
Ventilator days, average (SEM)	0.6 (0.2)	0.4 (0.1)	0.4
In-hospital mortality, n (%)	19 (4.8)	18 (4.6)	1.0
Discharged to home, n (%)	309 (78.2)	340 (86.1)	0.01
Self-pay status, n (%)	127 (32.2)	236 (59.7)	<0.01
Complications, n (%)			
Any in-hospital complication	41 (10.4)	40 (10.1)	1.0
Readmission	24 (6.1)	18 (4.6)	0.4
Deep venous thrombosis	5 (1.3)	2 (0.5)	0.5
Pulmonary embolism	8 (2.0)	2 (0.5)	0.1
Acute kidney injury	4 (1.0)	2 (0.5)	0.7
Acute respiratory distress syndrome	1 (0.3)	2 (0.5)	1.0
Myocardial infarction	1 (0.3)	0	1.0
Pneumonia	10 (2.5)	10 (2.5)	1.0
Sepsis	5 (1.3)	2 (0.5)	0.5
Stroke	0	0	1.0
Urinary tract infection	6 (1.5)	3 (0.8)	0.5

LOS, length of stay; SEM, standard error of the mean; ED, emergency department

Torain et al. published the results of a comprehensive review on surgical disparities, describing a new conceptual framework of factors contributing to these disparities by thematic area, including the themes of patient, provider, system, clinical care/quality and postoperative care/rehabilitation factors.⁹ In this review, language is noted as a patient factor that may contribute to surgical disparities. The authors concluded that although associations between surgical outcomes and race or ethnicity have been well defined, relatively little is known about potential outcomes of disparities associated with other characteristics, and future research should address this topic. Therefore, the goal of this study was to provide information on the clinical experience and outcomes for non-English-speaking trauma patients at a major level 1 trauma center.

This study serves as a first examination of the association between the patient factor of language and outcomes in the surgical subspecialty of trauma. Therefore, the results from this study help to fill the void in the literature regarding outcomes and patient factors beyond ethnicity and race. It is also notable that although Bard et al. published a study on trauma outcomes in the context of language and unnecessary intubations in 2004, the actual variable of patient language was not collected and analyzed in this study, with race and ethnicity used as a surrogate for language.⁵ To our knowledge, this is the first study in the literature to analyze

Table 3: Comparison of clinical parameters and outcomes for trauma patients with non-English-speaking patients matched to an English-speaking cohort, stratified for low (≤ 14) and high (≥ 15) injury severity score (ISS)

	English (n = 307)	Non-English (n = 307)	p value
<i>Low ISS (<14)</i>			
Blunt trauma, n (%)	221 (72.0)	218 (71.0)	0.9
GCS, average (SEM)	14.0 (0.1)	14.0 (0.1)	1.0
Hospital LOS average, days (SEM)	4.4 (0.5)	4.0 (0.4)	0.5
ICU LOS average, days (SEM)	5.3 (0.6)	3.6 (0.1)	0.0054
Intubated in ED, n (%)	14 (4.6)	17 (5.5)	0.7
Ventilator days, average (SEM)	0.20 (0.06)	0.10 (0.02)	0.1
In-hospital mortality, n (%)	0	1 (0.3)	1.0
Discharged home, n (%)	265 (34.9)	282 (91.9)	0.038
Self-pay status, n (%)	107 (34.9)	202 (65.8)	<0.0001
<i>High ISS (≥ 15)</i>	N = 88	N = 88	
Blunt trauma, n (%)	69 (78.4)	80 (90.9)	0.035
GCS, average (SEM)	11.0 (0.3)	10.7 (0.5)	1.0
Hospital LOS, average, days (SEM)	14.4 (2.2)	14.4 (1.9)	1.0
ICU LOS, average, days (SEM)	8.7 (1.2)	7.0 (0.8)	0.2
Intubated ED, n (%)	21 (23.9)	18 (20.5)	0.7
Ventilator days, average (SEM)	2.0 (0.7)	1.2 (0.4)	0.3
In-hospital mortality, n (%)	18 (20.5)	17 (19.3)	1.0
Discharged to home, n (%)	44 (50.0)	58 (65.9)	0.047
Self-pay status, n (%)	20 (22.7)	34 (38.6)	0.033

ISS, injury severity scale; GCS, Glasgow coma scale; SEM, standard error of the mean; LOS, length of stay; ED, emergency department

the variable of patient-reported preferred language in the context of outcomes in trauma.

The results of this study demonstrated no significant difference with regard to most clinical outcomes and characteristics when the English-speaking and non-English-speaking cohorts were compared. This trend regarding similarities in outcomes may therefore be reassuring regarding quality and consistency of care provided to patients from diverse backgrounds, especially since it holds true when the cohorts are stratified for high (≥ 15) and low (≤ 14) ISS, and also when patients reporting a preferred language of Spanish are compared to patients reporting a preferred language other than English or Spanish. However, exceptions to these trends in outcomes were identified in regard to ICU length of stay, with patients reporting a non-English preferred language leaving the ICU 1 day earlier. In a subanalysis of non-English-speaking patients, the patients with preferred languages other than English or Spanish left the ICU on average 2 days sooner than their Spanish-speaking counterparts. These findings raise concern about the reasons driving patient transfers from the ICU which will require further investigation. The possibility exists that non-English-speaking patients are transferred more quickly because they cannot easily

Table 4: Comparison of clinical outcomes for trauma patients reporting a preferred language of Spanish vs patients reporting a preferred language other than English or Spanish

	Spanish (n = 342)	Non-English/ Non-Spanish (n = 53)	p value
Patient demographics			
Age average, years (SEM)	35.5 (0.7)	45.3 (2.5)	<0.0001
Male gender, n (%)	299 (87.4)	42 (79.2)	0.1
Blunt trauma, n (%)	252 (73.7)	46 (86.8)	0.04
ISS, average (SEM)	9.0 (0.6)	8.9 (1.1)	1.0
GCS, average (SEM)	13.4 (0.2)	12.9 (0.5)	0.4
Clinical outcome			
Hospital LOS average, days (SEM)	6.4 (0.6)	6.1 (1.3)	0.9
ICU LOS average, days (SEM)	5.7 (0.3)	3.7 (1.3)	0.01
Intubated in ED, n (%)	28 (8.2)	7 (13.2)	0.3
Ventilator days, average (SEM)	0.4 (0.1)	0.4 (0.2)	1.0
In-hospital mortality, n (%)	15 (4.4)	3 (5.7)	0.7

LOS, length of stay; SEM, standard error of the mean; ED, emergency department

complain or question their care plan or that patient care teams may not fully understand the condition of a patient despite the availability of resources for interpretation and communication. Alternatively, given that non-English-speaking patients are more likely to be self-pay with regard to insurance status, perhaps this related socioeconomic factor may be driving some aspects of care despite no overall significant differences in outcomes. Further research is needed in this area to elucidate the factors that are driving shorter ICU length of stay for non-English-speaking patients.

Similar questions exist regarding the finding that patients preferring a language other than English were more likely to be discharged to home as a final disposition location, vs such alternatives as inpatient rehab, long-term acute care facilities, or skilled nursing facilities. Additional investigation into the factors driving this trend is also needed, especially to contextualize whether this finding represents a trend that may improve or deter from the overall patient care. Discharge to home may be a sign of good social support if the patient can be cared for by family and friends, since patients without these social resources may require discharge to alternative locations such as skilled nursing facilities. However, if patients would benefit from services such as inpatient rehab but do not have the financial means to utilize these services, this finding represents an area for potential intervention and improvement in quality of care provided to all patients. To answer these questions, long-term data on patient recovery for non-English-speaking patients are needed, and it presents another area for further study.

This study is limited in the fact that it is a retrospective analysis from a single institution. However, the authors believe that it presents an initial investigation into a topic that has not been studied extensively in the surgical literature and will encourage additional institutions to evaluate outcomes in the context of patient language as a demographic variable and allow for multi-institutional studies on this topic. Ultimately, such research may

reveal the importance of the inclusion of the demographic variable of patient language in large national databases, with the goal of promoting research on the relationship between patient language and outcomes in all fields of surgery, and presenting areas for improvement in patient care if disparities are better characterized with this research.

CONCLUSION

Patients reporting a preferred language other than English presenting as trauma activations to an urban level 1 trauma center experienced similar outcomes when compared to patients reporting a preferred language of English with regard to mortality, rates of intubation in the emergency department, number of days spent on the ventilator when intubated, average overall length of hospital stay, and readmission and complication rates. These trends held when stratifying the cohorts for high and low ISS. However, non-English-speaking trauma patients left the ICU more quickly, were more likely to have a self-pay insurance, and were more likely to be discharged home after their admission for trauma.

CLINICAL SIGNIFICANCE

These findings raise concerns about possible areas of disparity in trauma care for non-English-speaking patients, and highlight the importance of inclusion of language as a variable in patient registries and national databases. Future studies on this topic are needed to investigate additional potentially significant socioeconomic factors related to the patient factor of language and identify areas for improvement in care.

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