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Non-English speaking is a predictor of survival after admission to intensive care☆,☆☆,★,★★,☆☆☆

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ABSTRACT

Purpose: The relationship between English proficiency and health care outcomes in intensive care has rarely been examined. This study aimed to determine whether being a non-English speaker would predict mortality in a critical care setting. Secondary end points were intensive care unit (ICU) and hospital length of stay.
Materials and methods: This is a single-center, retrospective, cohort study of admissions from January 1, 2000 until December 31, 2011 in a tertiary level intensive care setting in Melbourne, Australia. All admissions during the study period were included. Patients without language data were excluded. Of those with multiple admissions, only the first was included. Analysis of 20 082 ICU admissions was undertaken, of which 19 059 (94.9%) were English speakers.
Results: After adjusting for confounding variables (age, severity of illness, diagnostic group, year of admission, and socioeconomic status), English-speaking status was independently associated with an increased risk of death (odds ratio, 1.91; 95% confidence interval 1.46-2.49; $P < .001$). There was no difference in ICU length of stay between groups. Hospital length of stay was shorter for English speakers.
Conclusion: Contrary to expectations, this large single-center study shows a consistent relationship between non-English–speaking status and increased survival after admission to ICU.

1. Purpose

1.1. Background

Predictors of hospital morbidity, mortality, and length of stay are of importance to clinicians, medical administrators, and governments in facilitating inpatient management, discharge planning, and optimizing health care delivery. Although health care systems differ in assessment and management approaches, the interaction between patients and providers is common to all institutions worldwide. The adequacy of communication between these 2 groups is a universal measure of how well a system delivers care [1,2]. Linguistic barriers provide a challenge in the general medical and surgical setting.

The impact of patient-clinician communication on health outcomes has been well described [3-10]. Effective communication between patients and providers has been reported to result in improvements in pain management, blood pressure, blood glucose, recovery time, emotional health, and functional status [7-9]. Non-English speaking can present a barrier to effective communication. In the general inpatient setting, this has been shown to result in longer inpatient stays [11], increased rates of readmission [12], worse understanding of discharge instructions [13], and lower patient satisfaction [14]. Professional interpreters reduce length of stay [15] and improve clinical outcomes [16] but are uncommonly used [17,18]. Studies in outpatient environments demonstrate that linguistic barriers have a negative impact on both patient satisfaction [19,20] and comprehension [21].

There are little data on the influence of non-English speaking in the intensive care unit (ICU) population. Direct doctor-patient communication in ICUs may potentially be less important as a large

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proportion of patients are sedated or intubated, and clinical decisions are often based on physiologic data rather than patient-derived history. The importance of communication with family members of the ICU patient is clear [22], but non-English–speaking families receive less information and support in family conferences [23]. The outcomes of these critically ill patients have not been previously assessed.

In Australia, in 2011, 1 in 4 of Australia's 22 million people were born overseas, 4 million spoke a language other than English, and more than 260 languages were spoken [24]. Of the 3 million residents of Melbourne, 42% are born overseas [25]. Strengthening access and equity to health care among linguistically diverse groups warrant significant attention by health care practitioners and governing authorities.

1.2. Objectives

We sought to determine whether Non-English–speaking patients had differences in mortality or length of stay compared with English-speaking patients in a large 45-bed ICU within a metropolitan, tertiary referral hospital.

In view of the potential linguistic barriers, our hypothesis was that patients who were non-English speaking would have higher mortality rates and longer ICU and hospital lengths of stay than English-speaking patients.

2. Materials and methods

2.1. Study design

We undertook a single-center, retrospective, cohort study of admissions to the ICU at The Alfred Hospital (Melbourne, Australia) and examined the relationship between language status and hospital mortality and length of stay.

2.2. Setting

The Alfred Hospital is a public, tertiary referral teaching hospital in Melbourne, Australia, and currently admits approximately 2300 admissions per annum to the ICU. The hospital provides comprehensive care in cancer services, bone marrow transplant, cardiothoracic and neurosurgery, mechanical cardiac support, cystic fibrosis, burns, human immunodeficiency virus/acquired immunodeficiency syndrome, hemophilia, sexual health and hyperbaric medicine and is 1 of 2 adult trauma centers within the state of Victoria. It provides heart and lung transplantation services to Victoria, South Australia, and Tasmania and is also the national center for pediatric lung transplantation. Routine health care services are also provided to the local population. All admissions to the hospital are asked to select a "language status," which is recorded in the hospital administrative database. Alfred Health has an onsite interpreter service including Greek, Russian, and Mandarin and a 24-hour countrywide phone interpreting service. In 2011, approximately 20 300 interpreter services were used through the hospital.

2.3. Participants

All patients admitted to the ICU between January 1, 2000, and December 31, 2011 were included.

2.4. Variables and data sources

The primary outcome examined was hospital mortality. Secondary outcomes included mortality during first ICU admission, readmission to ICU, and length of stay in both the ICU and the hospital. All patients were classified into 1 of 2 groups: English or non-English speaking. Demographic data, diagnosis leading to ICU admission, Acute Physiology and Chronic Health (APACHE II) severity of illness score, duration of ventilation, and survival to hospital discharge were extracted from the ICU database and matched to the hospital administrative database, which holds information on the patients' language and medical insurance status. Dedicated trained data collection and administrative staff maintain each database. Patients whose stay in hospital was privately funded through either private insurance company, trauma accident commission, work cover or veteran's affairs, Australian Defence Forces, or as overseas nationals were classified as being privately insured. Individual diagnoses were collapsed into the following groups: "cardiothoracic," "trauma (including burns patients but excluding head trauma)," "neurology (including cerebrovascular accidents, intracerebral hemorrhages, trauma that involved the head, and coma diagnoses)," "surgical (including all postoperative diagnoses not assigned to cardiothoracic, trauma, or neurologic categories)," "medical," and "other (including patients not assignable to other groups)." To attempt to adjust for socioeconomic factors, which might confound any findings, the Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD) was downloaded from the Australian Bureau of Statistics [26] and was matched to each patient's postcode. Higher values represent postcode areas with a higher socioeconomic status and were analyzed by absolute index value and in deciles.

2.5. Statistical analysis

Data were analyzed using STATA version 12.0 (StataCorp, College Station, TX). Parametric data were presented as means with SDs; nonparametric data as medians with interquartile ranges (IQR) and categorical variables as number (%). Univariate comparisons between groups (non-English speaking vs English speaking and alive vs dead) were conducted using Student t test for parametric continuous variables, Wilcoxon rank sum test for nonparametric continuous variables, and χ^2 test for categorical variables. Multivariate logistic regression analysis was undertaken to identify factors independently associated with in-hospital mortality. To avoid a confounding effect of age in the multivariate analysis, its component was removed from the APACHE II score, leaving "APACHE II score without age," which represented a score based on the physiologic and biochemical disturbances in the first 24 hours of ICU admission together with markers of preexisting chronic organ failures. Discrimination and calibration of multivariate models were assessed using the area under the receiver operating characteristic curve and the Hosmer-Lemeshow C statistic. Statistical significance was set at a 2-sided $P = .05$.

3. Results

3.1. Participants

There were 22 683 admissions during the study period. If a patient had multiple admissions to the ICU, only the first admission was counted, and subsequent admissions ignored. A final study population for analysis of 20 082 was reached after 1620 "readmission episodes" and 981 patients, where no language information was available were excluded. Of these, 19 059 (94.9%) were listed as English speakers. Of the 1023 non-English speakers, the major languages represented included Greek, Russian, and Italian with smaller numbers of others (Table 1).

3.2. Baseline data and mortality

Baseline data are summarized in Table 2. Patients who died were more commonly English speakers, older, public patients, had longer ICU length of stay, shorter hospital length of stay, were more likely to be readmitted to ICU, and had higher APACHE II scores. Across diagnostic groups, medical and neurologic patients had the highest mortality, and cardiothoracic patients had the lowest mortality.

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