Patient-Centered Care Outcomes for Emergency Department Patients with Non-English Language Preferences

By

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Abstract

Background: Patient-centered care (PCC) is an essential component of high-quality healthcare, yet PCC outcomes are worse for patients with non-English language preferences (NELP). The objective of these studies was to understand, identify and assess PCC outcomes for emergency department (ED) patients with NELP.

Methods: We completed three studies: a scoping review, a qualitative study using semi-structured interviews and a retrospective observational study using electronic health record data.

Results: Of the 20 studies included in the scoping review, 16 focused on patient needs; 4 on patient preferences and 8 on patient values. In the semi-structured interviews, participants identified three domains of PCC: patient; medical team's skills and system. In the retrospective observational study we found that there were no overall differences in time to sepsis alert or time to antibiotic administration between patients with ELP and patients with NELP. However, in the ESI 3-5 subgroup we found that in the fully adjusted model with IPTW weights, NELP patients had 28% slower time to manually triggered sepsis alerts than the ELP patients; however, this did not lead to delayed antibiotic treatment. We found no differences in time to alert or time to antibiotic administration between different NELP groups.

Conclusions: In the scoping review, most studies found that not speaking English negatively influenced perceptions of care and highlighted a large unmet need for language services in the ED. From the qualitative interview study, we found that the conceptualization of PCC varies based on the setting where care is provided and the population who is receiving care. The findings from the retrospective observational study suggest that sepsis alerts could be a useful tool in eliminating health disparities for patients with NELP.

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1. Introduction and Literature Review

Provision of High Quality Care to Patients with NELP Is an Important Priority

Patients with non-English language preferences (NELP) are defined as "individuals who prefer a non-English language with respect to a particular type of service, benefit or encounter."[1] In healthcare, patients with NELP prefer to speak a language other than English during their visits and often use interpreters to communicate. In 2021, approximately 25.7 million people in the United States, 8% of the population, were considered non-English speakers.[2] The US Census Bureau cites over 350 different languages spoken in the US[3] with the top 5 languages being Spanish, Chinese, Tagalog, Vietnamese and Arabic.[4] While identifying as a non-English speaker does not equate perfectly with having a NELP in healthcare, there is significant overlap in these groups. These numbers highlight that this is a significant segment of the population, one that has increased significantly in the last 20 years.[5]

Defining Patient-Centered Care: A Historical Perspective

Over the last 20 years, the concept of patient-centered care (PCC) has developed and is now considered an essential component of high-quality healthcare.[6] The next section describes a brief history of the concept of PCC and the development of various definitions.

Patient-centered medicine was mentioned by Enid Balint in 1969 as an alternative to Michael Balint's 'illness-oriented medicine.[7] Enid Balint defined patient-centered medicine as the importance of understanding each patient as a unique human being.[7] Since that time, many definitions have been proposed and utilized without a clear consensus in the field.[6,8–11]

In 2000, Mead et al. summarized existing definitions and proposed five dimensions of PCC: biopsychosocial perspective; the patient-as-person; sharing power and responsibility; the therapeutic alliance; and the doctor-as-person.[8] The biopsychosocial perspective suggested that the biological, psychological, and social perspective were all important to fully understand a patient's concern. The patient-as-person dimension conceptualized the patient as an experiencing entity instead of an object of a disease and focused on understanding the individual's experience of the illness. The third dimension, sharing power and responsibility, encouraged greater patient involvement in care while acknowledging that an egalitarian doctor-patient relationship, which they considered the ideal, may not always be possible. The therapeutic alliance dimension described the importance of the personal relationship

between the doctor and patient and emphasized that strong positive therapeutic alliances have potential therapeutic benefits for patients independent of biomedical treatments that are offered. Finally, the doctor-as-person dimension highlighted the impact that the doctor has on the patient (positively or negatively) and emphasized the importance of self-awareness by the doctor. This review pointed out that while work on understanding and defining PCC was becoming more common in other medical specialties, the majority of the work used to develop the concept of PCC through the year 2000 had been done in primary care.[8]

Since the publication by Mead et al. in 2000, additional definitions of PCC have been proposed. In 2001 the Institute of Medicine's Committee on the Quality of Health Care defined PCC as "care that is respectful of and responsive to individual patient preferences, needs, and values and ensures that patient values guide all clinical decisions."[6] In 2009, Berwick et al. suggested PCC be defined as "the experience (to the extent the informed individual patient desires it) of transparency, individualization, recognition, respect, dignity, and choice in all matters without exception, related to one's person, circumstances and relationship with healthcare."[12] In 2012, Greene et al. conceptualized PCC using three dimensions: interpersonal (relationship); clinical (provision of care) and structural (system features).[11] While these definitions help us understand the history and evolution of PCC; they were generated by groups of health care experts with limited patient input. Greene et al. cited patient involvement in the creation of their definition; however, they did not provide any methodological details for how patients were involved or what healthcare settings were considered when generating the definition.[11]

In 2019 Langberg et al. conducted a systematic review of the literature to explore how PCC had been defined historically. This review included 80 studies, many of which sought patient perspectives, and included patient experiences from a wide variety of settings (e.g. primary care or fertility clinics) and patient populations (e.g. cancer survivors or patients with chronic diseases). They concluded that patient-centeredness could be narrowed to three areas of focus: understanding of the patients' experience of the illness in their life situation; the professional's relationship with the patient; and coordination of care in the system.[10]

This systematic review by Langberg et al. provided a new, concise definition of PCC. However, only one study in this review explored definitions of PCC explicitly in the ED.[10] In 2022 Walsh et al.

conducted a systematic review and meta-ethnographic synthesis to understand what is known about PCC in the Emergency Department.[13] This review concluded that there is not yet an operational definition for how PCC should be implemented or evaluated holistically in the ED and that most studies only explore individual components of patient-centeredness.[13] Collectively, the ED has only been considered peripherally in existing PCC definitions. Likewise, to our knowledge no work has been done to explore and understand PCC experiences among patients with NELP.

The Value of a Context-Specific Exploration of PCC

Although the concept of PCC has often been applied across populations and healthcare settings,[6,8,10] this concept is multidimensional and the broad components are likely understood uniquely among different populations and in different settings. For example, language discordance and communicating via a professional interpreter may impact patients with NELP experience of PCC. Likewise, a healthcare encounter in the ED is different than an encounter with a primary care provider. ED visits are often unplanned and dynamic, consisting of a series of communications over many hours. Thus, the idea that one monistic PCC definition exists for all people in all health care settings is problematic.[14] There is a need for a context-specific exploration of PCC in the ED among patients with NELP.

Patient-Centered Care in the Emergency Department Includes Technical Proficiency

Recent work studying PCC in Spanish-speaking ED patients found that technical proficiency is a critically important component of PCC.[15] Based on these findings, we sought to evaluate if there were differences in the management of sepsis at our institution based on language status. We chose to evaluate sepsis outcomes, because sepsis is a major cause of morbidity and mortality in the United States causing an estimate 1.7 million annual hospitalizations and 270,000 deaths.[16] Additionally, prior research has identified significant differences in outcomes based on a variety of social determinants of health including sex, race, socioeconomic status and English proficiency.[17–21] Two recent studies have found increases in sepsis mortality among patients with limited English proficiency compared with English-speaking patients.[20,21] However, it is unclear what is driving this disparity.

1.4. Objective and Impact

In summary we know that the patients with NELP are an important and growing segment of the

population in the United States.[5] Additionally PCC is an important component of high quality healthcare.[6,22] However, it is plausible that PCC is conceptualized and experienced uniquely in the ED setting and among patients with NELP given the unique characteristics of this population and the setting. We also know that technical proficiency is an important component of PCC in the ED and prior work has identified differences in technical components of care by language status. Before we develop and test strategies to improve PCC in this setting and population, we need to develop context-specific knowledge about PCC in ED patients with NELP.

Therefore, the overall objective of this proposal is to explore PCC outcomes for ED patients with NELP. We will pursue this broad objective by developing an understanding of what is known about PCC outcomes for ED patients with NELP; by exploring how Spanish-speaking patients with NELP experience PCC in the ED and identifying factors that influenced their perceptions of PCC**;** and by assessing how our institution performs on a specific PCC outcome, time to alert and antibiotics in patients with sepsis. At the end of this study, we will have a comprehensive understanding of PCC for ED patients with NELP and we will be well situated to design evidence-based interventions to improve PCC outcomes.

2. Specific Aims

Patients with non-English language preferences (NELP) are an important and growing segment of the population[5] that often experience worse patient-centered care (PCC) outcomes than their English-speaking counterparts.[23–25]. PCC has increasingly been regarded as an important component of high quality healthcare;[6,22] however, current definitions have only peripherally explored the emergency department (ED) setting and have not considered patients with NELP.[8,10] It is plausible that patients may experience PCC differently in the ED given that ED visits are often unplanned and dynamic, consisting of a series of communications over many hours. Additionally, patients with NELP have unique needs during healthcare encounters related to interpreter services and communication that may impact PCC. Likewise, technical proficiency has been identified as an important component of PCC in the ED.[15] A context-specific understanding of PCC in this population and setting is an important first step in improving PCC. Therefore, the overall objective of this proposal is to understand, identify and assess PCC outcomes for ED patients with NELP. To accomplish this objective we will pursue the following aims:

Aim 1: Highlight what is known about performance on PCC outcomes for ED patients with NELP. We conducted a scoping review and thematically analyzed the results.

Aim 2: Understand how Spanish-speaking ED patients experience care and identify the factors that influenced their perceptions of the patient-centeredness of that care. We conducted semi-structured interviews with Spanish-speaking ED patients and analyzed transcripts using inductive and deductive thematic analysis.

Aim 3: Compare time to sepsis alert activation and time to antibiotic administration between patients with a NELP and patients with an English language preference (ELP). Our secondary objectives are to compare outcomes within ESI 2 patients only, within ESI 3-5 patients and between language groups. We conducted a retrospective observational study using electronic health record (EHR) data. We built Cox proportional hazard models to evaluate differences in time to event outcomes while controlling for known patient and system factors that influence outcomes. Hypotheses: We hypothesized that due to language discordant communication, patients with NELP will have longer time to sepsis alert and time to antibiotic administration compared to patients with ELP. We ran subgroup analyses based on ESI status because we hypothesized that compared to patients with ESI 2,

patients with an ESI of 3-5 would have less obvious signs and symptoms of sepsis and therefore the clinical team would need to rely more heavily on their communication with the patient to make diagnostic and treatment decisions. We hypothesized that we would be more likely to see longer time to event outcomes in NELP patients compared to ELP patients among patients with ESI 3-5. Additionally, because Spanish-speaking patients are the largest NELP group in our health system and have access to high quality interpreter services, we hypothesized that Spanish-speaking patients will have better time to sepsis alert and time to antibiotic administration than other less common language groups. The overall impact of this project is significant as we will better understand PCC outcomes for ED patients with NELP, and we will be well situated to design an evidence-based intervention to improve PCC in this population and setting.

3. Manuscript 1

Patient-Centered Care Outcomes for Patients in the Emergency Department with a Non-English Language Preference: A Scoping Review

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Abstract

Objective: This review highlights what is known about patient-centered care outcomes (PCCOs) for emergency department (ED) patients with non-English language preferences (NELP).

Methods: Four databases were searched and included article were written in English, presented primary evidence, published in a peer-reviewed journal, and reported PCCOs from the perspective of ED patients with NELP. PCCOs were defined using the Institute of Medicine definition, outcomes that evaluate respect and responsiveness to patient preferences, needs and values. Two reviewers assessed all articles, extracted data, and resolved discrepancies. PCCOs were grouped in categories (needs, preferences, and values) based on the definition's domains.

Results: Of the 6,524 potentially eligible studies, 20 met inclusion criteria. Of these, 16 focused on needs; 4 on preferences and 8 on values. Within patient need, five studies found a large unmet need for language services. Within patient value, three studies found that language discordance negatively influenced perceptions of care.

Conclusions: Most studies in this review found that not speaking English negatively influenced perceptions of care and highlighted a large unmet need for language services in the ED.

Practice Implications: More work needs to be done to characterize PCCOs in ED patients with NELP and develop interventions to improve care.

Keywords: patient-centered care, limited English proficient, non-English language preference, emergency department; scoping review

Introduction

Patients with non-English language preferences (NELP) are defined as "individuals who prefer a non-English language with respect to a particular type of service, benefit or encounter."[1] In healthcare, patients with NELP prefer to speak a language other than English during their visits. The provision of high quality care to this population is an important priority as the number of patients with NELP in many English-speaking countries grows.[5,26]

Patient-centered care has increasingly been recognized as an important quality consideration. In 2001 the Committee on the Quality of Health Care in America identified patient-centered care as one of six areas of focus needed to substantially improve health care quality.[6] The committee defined patient-centered care as "care that is respectful of and responsive to individual patient preferences, needs, and values and ensures that patient values guide all clinical decisions."[6]

The impact of patient and provider language discordance on healthcare outcomes is particularly important to study in the emergency department (ED) setting because patients with NELP have higher rates of ED use and hospital admissions compared with English-speaking patients.[27] Additionally, ED visits are often unplanned and dynamic, consisting of a series of communications over many hours. ED encounters also have the potential to have high acuity and complexity, requiring coordination of care with many medical personnel. More research is needed to better understand patient-centered care outcomes (PCCOs) for ED patients with NELP. Therefore, this scoping review seeks to highlight what is known about performance on PCCOs for ED patients with NELP and to identify future areas of inquiry.

Methods

Research Design

We conducted a scoping review to assess the volume and scope of available research and to identify knowledge gaps.[28] In keeping with suggested methodology, this review offers a thematic and descriptive analysis[29] of the findings and follows the Preferred Reporting Items (PRISMA) guidelines and we used the PRISMA-ScR checklist (Appendices).[30,31] This project was registered at Open Science Framework on January 6, 2022.[32]

The guiding research question was to understand what is known about PCCOs for ED patients with NELP. Consistent with the Institute of Medicine definition, we defined PCCOs as outcomes that

evaluated respectfulness of or responsiveness to patient preferences; needs or values related to care; or assessed how individual patient preferences, needs, and values guided clinical decisions.[6] To answer this question, we summarized the evidence according to the data extraction fields and highlighted knowledge gaps.

Search Strategy

In consultation with a research librarian (PW), we developed a search strategy which was translated and executed in PubMed, Scopus, CINHAL Plus with Full Text (EBSCOhost), and Google Scholar on August 17, 2021 and then again on December 5, 2022. The search used a combination of controlled vocabulary and keywords relating to EDs and patients with NELP. No language, date, or publication type filters were used. The Appendices have the complete search strategy. Records were deduplicated using EndNote 20 and Covidence.

Inclusion and Exclusion

To be included in the scoping review, studies needed to meet the following inclusion criteria: 1.) written in English; 2.) presented primary evidence; 3.) published in a peer-reviewed journal; 4.) referenced care received in an emergency setting (ED or emergency medical services); 5.) reported PCCOs; 6.) the PCCOs were among patients with NELP; and 7.) the PCCOs were reported from the participants' perspective. Studies were excluded if they 1.) focused on pediatric patients or their families; 2.) were a published abstract that was duplicated in a published study, 3.) evaluated sign language. Further descriptions of these criteria are in the Appendices.

Data Extraction

Two reviewers (RJS and LH) screened titles and abstracts and completed a full text screening in Covidence. When we identified discrepancies in the abstract or full-text screening process, the first author (RJS) would re-review the title and abstract or full text and make an eligibility determination. These decisions were then sent to the second author (LH) for confirmation. In the abstract screening phase, if LH did not agree with the decision, or if the abstract did not have enough details to fully assess eligibility, articles were advanced to the full text review stage. For the final inclusion decision, when discrepancies persisted, we would discuss them and come to mutually agreed upon final decision. We examined the references of review articles to identify additional articles and no new articles were added. After the full

text review, all studies that met the inclusion criteria were transferred to a data extraction form in Excel. Both reviewers independently extracted the following information: design, intervention, study group assignment, language(s) studied, country, sample size, method for identifying patients with NELP, PCCOs evaluated and PCCO results. When discrepancies in data abstraction occurred, RJS would re-review the manuscript text and decide what should be abstracted. All decisions were then confirmed by LH. If discrepancies persisted, we would discuss them, always referring back to the manuscript and come to mutually agreed upon final decision. In three articles, PCCO results were collapsed across setting. Our attempts to acquire more granular data were unsuccessful and thus the collapsed results were excluded.

After extraction, we organized and summarized the data to identify patterns of PCCOs. We categorized languages as Spanish, Mandarin or Cantonese, other languages that were identified, and/or languages that were not identified. We counted the number of languages studied in each article (1, 2, 3+, or not stated). The following categories identified the methods used for identifying NELP patients: identified via language preference in the electronic health record, identified via professional interpreter required field in the electronic health record and patient requested a professional medical interpreter, patient identified preferred language as something other than English, patient identified preferred language as something other than English and requested a professional interpreter, patient identified as primarily speaking a language other than English, patient self-reported not speaking English well, patient utilized a professional or ad hoc interpreter, or registration staff identified a language discordance. For study design, we recorded if a study was quantitative or qualitative; had prospective or retrospective data collection; and if it was a chart review, cross sectional survey, randomized controlled trial, pre/post analysis, open-ended questions on a survey, patient shadowing or semi-structured interviews. Studies that had multiple designs were counted in multiple categories. We recorded the overall sample size and the NELP sample size used in the PCCO analyses and grouped studies in the following categories: 20 participants or less, 21-100; 101-500 or 501 or more participants. We also calculated the proportion of the sample that was NELP. Year of publication ranged from 1996 to 2022 and was grouped into three periods.

Consistent with Arksey and O'Malley's scoping review framework,[29] we thematically analyzed the PCCO results. We bucketed results into the large group categories of patient needs, patient preferences and patient values as these are the domains of the Institute of Medicine's patient-centered care definition.

For patient needs and patient values we further divided each category into subcategories based on the PCCO results. Within patient needs we had four subcategories: 1.) need for language services; 2.) utilization of language services; 3.) patient perceived understanding; and 4.) satisfaction with communication. Within patient values we had three subcategories: 1.) satisfaction with interpersonal aspects of care; 2.) satisfaction with time in the room; and 3.) impact of language discordance on care. The patient-centered care categories and associated definitions are listed in Table 1.

Table 1. Mapping domain of patient-centered care to category in scoping review and associated definition

Patient-centered Care Domain	Category in Scoping Review	Definition in Scoping Review
Patient Needs	Need for Language Services	Evaluated the need for a professional medical interpreter or bilingual provider
	Utilization of Language Services	Evaluated the utilization of a professional medical interpreter, ad hoc interpreter or bilingual provider
	Patient Perceived Understanding	Evaluated impact of language services on patient understanding
	Satisfaction with Communication	Evaluated patient satisfaction with communication
Patient Preferences	Patient Preferences	Evaluated opinions regarding method of communication
Patient Values	Satisfaction with Interpersonal Aspects of Care	Evaluated the relational components of an encounter such as friendliness, respect, concern, or spiritual/emotional wellbeing
	Satisfaction with Time in the Room	Evaluated patient satisfaction with time provider was in room
	Impact of Language Discordance on Care	Explored how patient-provider language discordance affected care

Results

Abstraction Process

The search yielded 8,231 references. After removing duplicates (n=1,706), we performed title and abstract screening for 6,525 studies and excluded 6,408. One hundred seventeen studies were assessed for full-text eligibility of which 97 studies were excluded for reasons described in **Figure 1**.[33] Twenty studies were included in this scoping review. We had inter-rater reliability of 0.60 during title and abstract screening and 0.71 during full text review which is considered substantial agreement.[34]

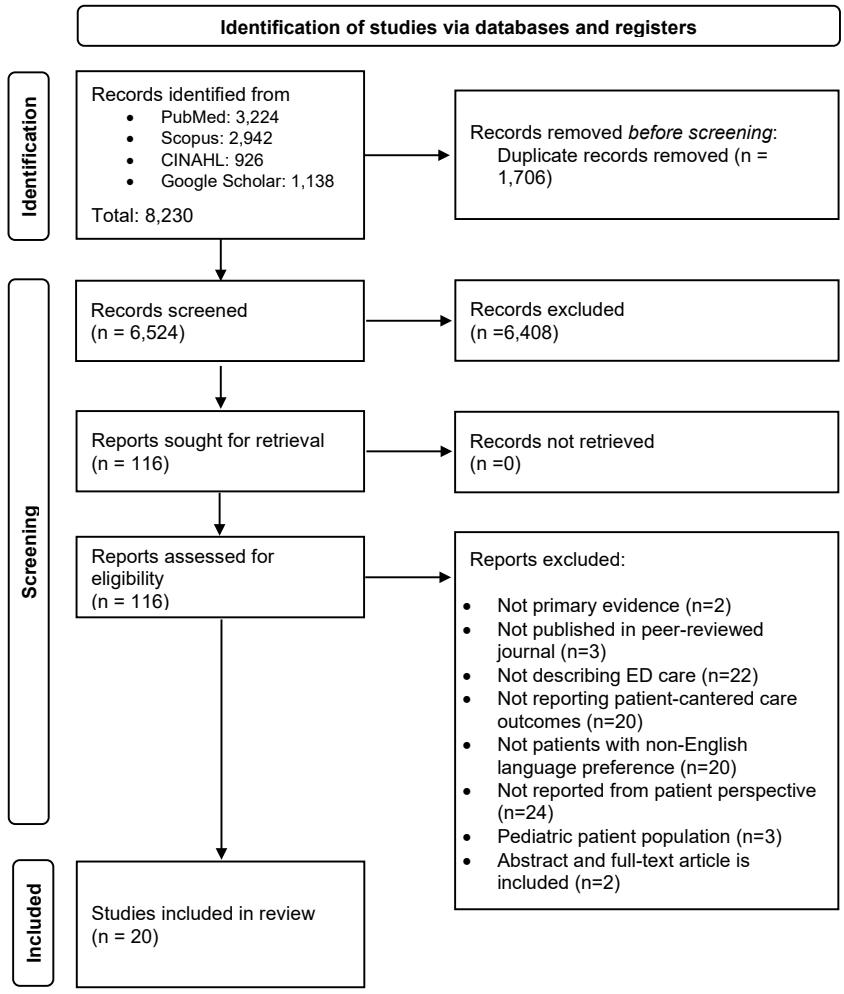

Figure 1. PRISMA flow diagram

Study Characteristics

Among the 20 included studies, 15 were conducted in the United States and Spanish was the most studied language (n=18, Table 2). There were nine different ways of identifying patients with NELP with the most common strategy being patient self-identified language preference (n=8). The most common design was cross-sectional surveys (n=12). Twelve of the studies (60%) were published in the last nine years. The most studied PCCO was patient need (n=16).

Table 2. Summary Characteristics of Articles Included in Review (n=20)

	Overall n (%)
Country	
Australia	3 (15)
Canada	1 (5)
United States	15 (75)
Not Stated	1 (5)
Languages Studied*	
Spanish	18 (90)
Mandarin or Cantonese	3 (15)
Other identified languages**	5 (25)
Unidentified languages	2 (10)
Number of Languages Studied	
1	14 (70)
2	1 (5)
3+	4 (20)
Not Stated	1 (5)
Method of identifying Non-English Language Preference*	
Identified via language preference in the electronic health record	1 (5)
Identified via professional interpreter required field in the electronic health record AND requested a professional medical interpreter	1 (5)
Patient identified preferred language as something other than English	8 (40)
Patient identified preferred language as something other than English AND requested a professional medical interpreter	3 (15)
Patient requested a professional medical interpreter	2 (10)
Patient self-identifies as primarily speaking a language other than English	2 (10)
Patient self-reported not speaking English well	2 (10)
Patient utilized a professional medical or ad hoc interpreter	1 (5)
Registration staff assessment of language discordance	1 (5)
Design*	
Qualitative: Prospective Open-ended question analysis	1(5)
Qualitative: Prospective Patient Shadowing	1(5)
Qualitative: Prospective Semi-structured interviews	1(5)
Quantitative: Prospective Cross-Sectional Survey	12 (60)
Quantitative: Prospective Patient Shadowing	1 (5)
Quantitative: Prospective Pre/Post Analysis	1(5)
Quantitative: Prospective Randomized Controlled Trial	1 (5)
Quantitative: Retrospective Chart Review	3 (15)
Total Sample Size*	

≤ 20 participants	3 (15)
21 to ≤ 100	4 (20)
101 to ≤ 500	10 (50)
> 500	3 (15)
Proportion of Sample Size that was NELP*	
≤ 25%	0 (0)
26-50%	5 (25)
51-75%	3 (15)
75-99%	1 (5)
100%	11 (55)
Year of Publication	
1996- 2004	6 (30)
2005-2013	2 (10)
2014-2022	12 (60)
Patient Centered Care Outcome Evaluated*	
Patient Need	16 (80)
Need for Language Services	5 (25)
Utilization of Language Services	8 (40)
Satisfaction with Communication	5 (25)
Patient Understanding	10 (50)
Patient Preferences	4 (20)
Patient Values	8 (40)
Satisfaction with Interpersonal Aspects of Care	5 (25)
Satisfaction with Time in the Room	3 (15)
Impact of Language Discordance on Care	3 (15)

*Studies can be grouped in more than one category
**Includes Arabic, Armenian, Cambodian, Croatian, Farsi/Persian, Greek, Italian, Portuguese, Serbian, Somali, Tagalog, Vietnamese
***Includes Education, Health Services Research, Medical Humanities, Medicine-General, Underserved Communities

Patient Needs

We categorized PCCOs as patient needs if they evaluated the need for language services; utilization of language services; impact of language services on patient understanding; or impact of language services on satisfaction with communication.

Need for Language Services

Five articles evaluated need for language services (Table 3). All five studied unmet need for ad hoc or professional interpreter services and one also examined unmet need for language concordant discharge instructions.[35–39] Studies reported rates of unmet need for language services between 46% and

87%.[37,39] Taira et al. 2021[36] developed an intervention to improve use of professional interpreters and provision of language-concordant discharge instructions during ED encounters. They found an increase in met need for professional interpreters of 14% after the intervention (baseline unmet need of 85%). The rate of language-concordant pre-printed discharge instructions did not change, but the proportion of patients receiving free text instructions written by the providers in Spanish increased

Utilization of Language Services

Eight studies[35,39–45] examined utilization of language services such as professional interpreters, own language abilities, other staff, family members or nonverbal communication. Benda et al. observed ED encounters and recorded the type of communication that occurred and the amount of time spent in each communication type.[41] They found that a wide variety of strategies were used to communicate with an individual patient, and that the communication strategies varied across phase of care with professional interpreters most commonly being used during triage, initial nurse assessment, initial provider assessment and disposition.[41] Five other studies also found that a wide variety of communication strategies were utilized during ED encounters in addition to professional interpreters.[39,42–45]

Two studies[35,40] examined how utilization of ad hoc or professional interpreters was influenced by patient or provider language skills. The studies found that providers were more likely to use their own language skills instead of an ad hoc or professional interpreter as their own language proficiency improved or after completing a medical language training program. Patients were also more likely to rate the communication of physicians who received language training as very good compared with physicians who did not receive training. The authors concluded that by improving provider language proficiency, you can increase the frequency with which physicians speak to their patients in another language.

Patients Perceived Understanding

Nine studies[35,42–49] evaluated patient understanding based on type of language service used. Crane studied Spanish-speaking patients rating of adequacy of discharge explanation and helpfulness of discharge instructions compared with English-speaking patients. He found that Spanish-speaking patients rated adequacy and helpfulness of the discharge instructions lower than English-speaking patients.[49] Three studies[35,44,45] compared perceived understanding between English-speaking and Spanish-speaking patients. Two studies found that the English-speaking patients felt better understood and that they

understood their diagnosis and treatments better than Spanish-speaking patients who used a variety of methods to communicate[44] or used an ad hoc or professional interpreter.[35] However, patients who did not use an ad hoc or professional interpreter and needed one had the lowest rated understanding.[35] One study found no difference in satisfaction with explanation of tests and procedures between English-speakers and those that used an ad hoc or professional interpreter.[45]

Three studies[42,46,48] compared understanding and helpfulness of interpretation between various interpreter modalities. They found that professional video and in-person interpreters promoted higher levels of understanding compared with professional telephone or ad hoc interpreters. Likewise, in one qualitative study by Villalona et al. 2021, patients reported that ad hoc and professional interpretation services facilitated understanding and helped avoid miscommunications even though they often reported not fully understanding what was happening in their ED encounters.[43] There were mixed findings regarding whether consistency of interpretation mode across an encounter resulted in higher ratings of understanding and helpfulness.[42,46]

Han et al.[47] designed and pilot tested a brief language education and translation aid for physicians and then investigated patient perceptions of the impact of this intervention on communication. The patients said the tool helped them communicate with clinicians, approved of the tool, and thought it should be expanded. Patients were extremely appreciative of physician attempts at language concordant communication, even though the clinician spoke only a limited number of phrases in Portuguese.

Satisfaction with Communication

Five studies measured patient satisfaction with communication.[42,43,45,46,48] Mahmoud et al. found no difference in satisfaction with communication between English-speaking patients and patients who used an ad hoc or professional interpreter.[45] Bagchi et al. conducted a randomized controlled trial and found that patients who received in-person professional interpreters reported improved satisfaction with communication compared to patients who received professional telephone interpreters or ad hoc interpreters.[48] Villalona et al. 2020 found that when ED staff were used as ad hoc interpreters, they were rated more highly regarding keeping patients informed about their care than when family members or professional telephone interpreters were used.[46] They also found that a consistent ad hoc or professional interpreter modality resulted in patients feeling more informed about their visit.[46] Muir et al. found that

greater than 80% of patients reported excellent care for the following domains of communication: respectfulness of professional interpreter; understanding of patient, interpretation of the provider, access to the best professional interpreter possible, and a professional interpreter that listened carefully.[42] This did not vary by mode of professional interpreter.[42] In contrast, during semi-structured interviews, patients who used professional or ad hoc interpreter during parts of the healthcare encounter reported only being able to partially communicate with their healthcare team.[43]

Patient Preferences

Four articles[39,42,43,50] evaluated patients with NELP opinions regarding method of communication in the ED (Table 3). Two studies focused on preferred communication method. One found that just over half of patients in Australia speaking a variety of languages preferred using a relative or friend as an interpreter.[39] The other article found that compared to using a professional interpreter to communicate, Spanish-speaking patients in Chicago preferred a language concordant provider.[42] The third article, by Puntillo et al.[50], evaluated the method of communication for two pain scales between English-speaking and Spanish-speaking ED patients.[50] They found that slightly more Spanish-speaking patients preferred the word descriptor scale compared to the numerical rating scale; however, differences were not statistically significant. In the fourth article, patients emphasized the importance of having interpreter services available as a way to facilitate communication although it was not clear if this was in reference to professional and/or ad hoc interpreter services.[43]

Patient Values

We categorized PCCOs as patient values if they evaluated satisfaction with interpersonal aspects of care, satisfaction with time in the room or if they described the impact of patient-provider language discordance on care on experience of ED care (Table 3).

<u>Satisfaction with Interpersonal Aspects of Care</u>

Five studies[25,45,46,51,52] evaluated satisfaction with interpersonal aspects of care defined as studies that evaluated the relational components of an encounter such as friendliness, respect, concern, spiritual/emotional wellbeing or management of personal issues. Four studies compared various interpersonal aspects of care such as friendliness, respectfulness, and spiritual and emotional needs between English-speaking patients and patients who had language discordant healthcare

encounters.[25,45,51,52] In three of these studies[25,51,52] across most measures, patients in language discordant health care encounters were less satisfied than patients who were able to communicate adequately and directly with a provider. Additionally, patients who did not use an ad hoc or professional interpreter but thought one was needed were even less satisfied.[25,51] When examined by gender, only Spanish-speaking men reported being significantly less satisfied with interpersonal aspects of care when using an ad hoc or professional interpreter; there were no differences among women.[51] Likewise, the study by Mahmoud et al.[45] found that patients who used an ad hoc or professional interpreter were less satisfied than patients from an English-speaking background with having their spiritual/emotional needs met during the ED encounter. However, there were no differences between groups across other domains of satisfaction such as compassion, courtesy and respect, and quality of care.[45]

Villalona et al. 2020[46] evaluated patient perceptions of helpfulness, attentiveness, healthcare staff concern for them, and patient perception of being taken seriously across various modes of professional or ad hoc interpretation. Overall, video-based professional interpretation positively affected patient perceptions of ED staff concern. Patients who used the same mode of interpretation during their encounter had higher scores regarding how family members were treated, and perceived amount of caring compared to patients who received different modalities of interpretation during their ED visit.

Satisfaction with Time in Patient Room

Three studies [25,45,51] examined satisfaction with amount of time spent in the room overall and stratified by gender. Baker et al. 1998 found that patients who did not use an ad hoc or professional interpreter but needed one were significantly less satisfied with the amount of time spent in the room compared to patients who communicated directly with the provider.[25] Derose et al. looked at this by gender and found a similar result for women but not men.[51] Mahmoud et al. found no difference in satisfaction with time in the room between patients who used an ad hoc or professional interpreter and those who were from an English-speaking background.[45]

Patient Perceptions of how Language Discordance Affected Care

Three studies explored how language discordance affected ED care broadly.[39,43,53] Two studies found that not being able to communicate directly with the healthcare team negatively affected their ED visit.[39,43] Two qualitative studies identified phenomena that were related to the participants' experiences

of language discordance. The first phenomenon was feelings of linguistic powerlessness which came from an inability to fully communicate with the healthcare team and to advocate for themselves.[43,53] A second phenomenon was gratitude for medical services received. Patients felt lucky when medical staff attempted to communicate with them; did not view having someone speak in their language as a requirement; and were grateful for any attempts at communication in their preferred language.[43,53] These phenomena coexisted with feelings of self-blame for not being able to communicate in English leading the authors to concluded that power differentials between patient and provider were magnified by language preferences.[43,53]

Table 3. Study Descriptors by Patient Centered Outcome Category

Article	Design	Country	Total Sample/ NELP Sample	Languages	Patient-Centered Care Outcome Results
Patient Needs					
Need for Language Services					
Baker et al. (1996)	Quantitative Prospective Cross-Sectional	USA	467/222	Spanish	• For 240 patients (52%), an interpreter was not used, and the patient thought an interpreter was not necessary. An interpreter was used for 121 patients (26%), and for 101 patients (22%), an interpreter was not used, although the patient thought an interpreter should have been used. No interpreter was used for 101 (46%) of 222 patients for whom an interpreter was thought to be necessary by the patient.
Garrett et al. (2008)	Quantitative Retrospective & Prospective Chart Review & Cross-Sectional	Australia	148/123	Arabic, Spanish, Italian, Greek, Cambodian, Vietnamese, Chinese, Croatian, and Serbian	• Between 33% (Multilingual Telephone Survey (MTS), n=41)) and 13% ((Medical Records Audit), n=16) of non-English speaking (NES) patients used an interpreter in the ED while somewhere between 64% (MTS, n=79) and 33% (MRA, n=90) of patients used a relative or friend as an interpreter when they were in the ED. NES patients had an interpreter for medication explanation between 10.5% (MTS, n=13) and 4.8% (MRA, n=6) of the time.
Ryan et al. (2017)	Quantitative Retrospective Chart Review	Australia	582/582	All, most commonly Greek, Vietnamese, Farsi/Persian, Spanish, Mandarin, Arabic, Cantonese, Italian, Auslan/sign language, and Somali	• 115 of the 582 (20%) patients who had limited English and were admitted to the hospital were provided professional interpreting services during their ED stay.

Taira et al. (2019)	Quantitative Retrospective Chart Review	USA	253/110	All including Spanish Armenian Tagalog	• 12 of the 110 patients (11%) who asked for an interpreter were seen by a certified bilingual provider. Of the remaining patients, 5 of the 98 (5%) had medical records with documentation that language assistance was used. They found 93/110 (85%) of patients requesting language assistance and 93/253 (37%, 95%CI 31–42.9%) of total ED patients had unmet need for language assistance.
Taira et al. (2021)	Quantitative Prospective Pre/Post	USA	Pre: 110/110 Post: 159/159	Pre: all languages including Spanish; Armenian, Tagalog Post: languages not specified	• Pre-intervention: 17 of the 110 patient charts (16%) had documentation of a request for an interpreter, had documentation of an interpreter-mediated encounter or they were seen by a bilingual certified provider. Post-interventions: 47 of the 159 patient charts (30%) had documentation of an interpreter or were seen by a bilingual provider. The unmet need for language assistance in the pre period was 85% compared to the post intervention of 70% which was a pre-post difference of +0.14 (CI = 0.03–0.23). • The rate of language concordant pre-printed discharge instructions for patients discharged from the ED did not change. (pre = 66/95, 70%, post = 97/134, 72%, difference 0.029, CI -0.08 to 0.14). Patients receiving free text instructions in Spanish increased, but not significantly, 32/95 (34%) in pre-intervention compared to 58/134 (43%) in post-intervention (difference 0.096, 95% CI -0.03 to 0.21).
Utilization of Language Services					

Baker et al. (1996)	Quantitative Prospective Cross-Sectional	USA	467/222	Spanish	• Interpreters were used more often, as patients' English proficiency and examiners' Spanish ability declined (p<0.001 for both). Interpreter use and patient ability to speak English or provider ability to speak Spanish had an inverse relationship (p <0.001 for both). When patients reported that the provider had good Spanish proficiency, between 0 to 6% of patients thought an interpreter should have been used and this varied by the patient's English proficiency. If the patients said the providers did not speak Spanish well, then > 25% of patients thought an interpreter should have been used, independent of their English language abilities. If provider Spanish and patient English were both poor, 87% of patients who did not have an interpreter, thought one should have been used. • When either the patient's self-reported English proficiency was good or the patient reported that the provider's Spanish proficiency was good an interpreter was used 12% of the time, 83% of patients thought an interpreter was not needed, and 5% said an interpreter was needed but not used. When the patient's English or the provider's Spanish was rated fair, 25% said an interpreter was used, 41% said an interpreter was not needed, and 34% said an interpreter was needed but not used. When the patient's English and the provider Spanish were both rated poor, an interpreter was used 66% of the time, 4% of patients said an interpreter was not needed, and 30% said an interpreter was needed but not used. • Most commonly, the interpreter that was used was a physician or nurse. Professional interpreters were only used 12% of the time. Family members were used 12% of the time and 1/3 of the family members less than 18 years of age.
Balakrishnan et al. (2016)	Quantitative Prospective Cross-Sectional	Not Stated	163/55	Spanish	• For English-speaking patients, nurses used ‘‘question and answer’’ for most interactions. In one instance, a nurse used a telephone interpreter with a patient who self-identified as an English-speaker, and in 3 interactions, nurses relied on ‘‘gestures’’ in addition to ‘‘question and answer.’’ For Spanish-speaking patients, nurses utilized ‘‘family member as translators’’ in 31 % of interactions (n = 17), ‘‘question and answer’’ in 58 % of interactions (n = 32), ‘‘gestures’’ in 5.5 % of interactions (n = 3), ‘‘other’’ (specifically, written or online translational assistance) in

					3.6 % of patients (n = 2), and ‘‘telephone based professional interpreter services’’ in 2 % of patients (n = 1).
Benda et a. (2019)	Quantitative Prospective Observational	USA	9/9	Spanish	• Eight different strategies were used to communicate with patients. Each patient received communication using at least two and as many as five strategies. All nine patients received communication using at least one type of recommended strategy and one type that was not recommended. The most common strategy was to communicate with the patient in English (not recommended), followed by use of a telephone interpreter, then use of in-person interpreters. • A professional interpreter or a Spanish-concordant staff member were used for over 70% of the total time spent exchanging information with patients. • Professional interpreters and language concordant staff members were consistently used during triage, initial nurse assessment, initial provider assessment and disposition. The ongoing evaluation and treatment phase communication often did not include the use of professional interpreters or language concordant staff.
Garrett et al. (2008)	Quantitative Retrospective & Prospective Chart Review & Cross-Sectional	Australia	148/123	Arabic, Spanish, Italian, Greek, Cambodian, Vietnamese, Chinese, Croatian, and Serbian	• Between 64% (Multilingual Telephone Survey (MTS), n=79) and 33% (Medical Records Abstraction (MRA), n=90) of patients used a relative or friend as an interpreter when they were in the ED.
Mahmoud et al. (2014)	Quantitative Prospective Cross-Sectional	Australia	678/81	Not Stated	• Of the 81 patients who used an interpreter during their visit, 33 (41%) used a professional interpreter and 48 (59%) used a family member or friend as an interpreter.
Muir et al. (2021)	Quantitative Prospective Cross-Sectional Survey	USA	42/42	Spanish	• Even though professional interpreters were used during parts of all patient encounters, patients reported 60% (25/42) of provider tried to communicate with the patient in Spanish without an interpreter and 48% (20/42) of providers tried to speak English to the patient without an interpreter.

Stoneking et al. (2016)	Quantitative Prospective Cross-Sectional	USA	55/55	Spanish	• Resident physicians who received medical Spanish training spoke Spanish with 66% (23/35) of their patients versus 45% (9/20) for resident physicians who received no medical Spanish training. Resident physicians with training used translator phones in 6% (2/35) of encounters while other resident physicians used them in 30% (6/20) of encounters. • Patients rated resident physician Spanish as very good in 13% of all encounters, with 17% for residents with training versus 5% for residents without training.
Villalona, Castañeda et al. (2021)	Qualitative Prospective Semi-structured interviews	USA	25/25	Spanish	• Participants reported that a wide variety of communication strategies were utilized including family members, bilingual or partially bilingual medical staff, and telephone or video interpreters.
Patient Perceived Understanding					
Bagchi et al. (2011)	Quantitative Prospective Randomized Controlled Trial	USA	447/447	Spanish	• In unadjusted results 88% of patients in the treatment group reported that it was very easy to understand compared with 16%in the control group. In adjusted results, 93% of patients in the treatment group found it very easy to understand the versus only 18% of patients in the control group (OR = 61; 95% CI: 23 to 166)
Baker et al. (1996)	Quantitative Prospective Cross-Sectional	USA	467/222	Spanish	• A total of 67% of patients who said an interpreter was unnecessary rated their understanding of their condition as good to excellent compared with 57% of patients for whom an interpreter was used (p=0.09) and 38% of patients for whom an interpreter was thought to be necessary by the patient but was not used (p<0.001). Similarly, 86% of patients who said an interpreter was unnecessary judged their understanding of their treatment plan as good to excellent compared with 82% of patients for whom an interpreter was used (not significant) and 58% of patients for whom an interpreter was not used but necessary (p<.001). • 34% of patients who said an interpreter was unnecessary said they wished the provider explained better compared with 63% of patients for whom an interpreter was used (p<0.001) and 90% of patients for whom an interpreter was not used but necessary (p<0.001).
Balakrishnan et al. (2016)	Quantitative Prospective Cross-Sectional	Not Stated	163/55	Spanish	• English speakers generally felt that the nurses completely understood their medical complaints, scoring a median of 5 on a 5-point Likert scale (IQR 4–5). Overall, Spanish

					speakers felt nurses mostly understood their medical complaint, scoring a median of 4 on a 5-point Likert scale (IQR 4–5) with a statistical difference between the groups (p = 0.002).
Crane (1997)	Quantitative Prospective Cross-Sectional	USA	314/97	Spanish	• 96.8% of English-speaking patients thought everything was adequately explained in their language compared with 81.4% of Spanish speaking patients (p <0.001). • 78.7% of patients found the written instructions helpful. Only 61.9% of Spanish-speaking patients said this compared with 86.2% of English-speaking patients (p <0.001).
Han et al. (2009)	Qualitative Prospective Open-ended question analysis	Canada	8/8	Portuguese	• Most patients (7/8) agreed or strongly agreed that the language tool helped them to communicate with the provider. Most patients (5/8) said they approved of the tool, said it was helpful (n=2), made them feel more comfortable (n=2), and should be expanded (n=1).
Mahmoud et al. (2014)	Quantitative Prospective Cross-Sectional	Australia	678/81	Not Stated	• In adjusted analyses when controlling for sex, age, education and income, here was no difference in satisfaction between patients who used an interpreter and patients from an English-speaking background regarding explanation of tests and procedures.
Muir et al. (2021)	Quantitative Prospective Cross-Sectional Survey	USA	42/42	Spanish	• 70% of patients indicated that they understood their discharge instructions and how to take their medication. 100% (n=19) of patients said everything was explained adequately. 72% (n=13) and found written discharge instructions helpful and this did not vary by modality. Across interpreter modalities, 26% (n=5) patients wanted additional explanation of discharge instructions.
Villalona, Castañeda et al. (2021)	Qualitative Prospective Semi-structured interviews	USA	25/25	Spanish	• Participants reported that professional interpretation services facilitated patient understanding during ED encounters specifically as it related to understanding why tests were being done, results of tests, provision of adequate explanations from the provider, and to avoid miscommunications. • Some patients also reported having difficulty understanding medical terms, purpose of diagnostic exams, wait times for results, or follow up care recommendations.
Villalona et al. (2020)	Quantitative Prospective Cross-Sectional	USA	100/100	Spanish	• Video-based interpretation positively affected overall awareness and understanding of LEP patients' medical care in relation to other interpretation modalities. The use of phone interpreters was associated with higher scores

					than ED staff as interpreters when rating the clarity in understanding the information provided by doctors. • When looking at consistency of interpretation, there were higher overall scores among participants who received care via the same communication modalities based on ratings of clarity in understanding and information provided by doctors.
Satisfaction with or Communication					
Bagchi et al. (2011)	Quantitative Prospective Randomized Controlled Trial	USA	447/447	Spanish	• In unadjusted results 91% of treatment group patients were very satisfied with communication and 0.4% were somewhat or very dissatisfied. In the control group 22% were very satisfied and 31% somewhat dissatisfied or very dissatisfied. In the regression, adjusted results 96% of the patients in the treatment group were very satisfied with communication compared to 24% in the control group (OR= 72 95% CI: 31 to 167)
Mahmoud et al. (2014)	Quantitative Prospective Cross-Sectional	Australia	678/81	Not Stated	• There was no difference in satisfaction between patients who used an interpreter and patients from an English-speaking background regarding satisfaction with communication.
Muir et al. (2021)	Quantitative Prospective Cross-Sectional Survey	USA	42/42	Spanish	• 83% (35/42) of patients rated interpreter respectfulness as excellent; 81% (34/42) of patients reported interpreters had excellent understanding of patients; 93% (37/42) of patients reported excellent interpretation during their encounter; 81% (34/42) reported that they had the best interpreter possible; and 100% of patients reported that they had an interpreter that listened carefully. This did not vary by mode of interpreter.
Villalona et al. (2020)	Quantitative Prospective Cross-Sectional	USA	100/100	Spanish	• At disposition, the use of family members or phone interpreters were associated with lower scores when compared with ED staff due to ratings of how informed nurses and doctors kept patients about their care during the ED visit. • When analyzing consistency of interpreter modality, there were higher overall scores among participants who received care via the same communication modalities compared with patients who did not. This was observed in ratings of how informed nurses and doctors kept patients during their stay, how family members were kept informed and helpfulness of translation modality.

Villalona, Castañeda et al. (2021)	Qualitative Prospective Semi-structured interviews	USA	25/25	Spanish	• Some participants reported only being able to partially communicate with the healthcare team.
Patient Preferences					
Garrett et al. (2008)	Quantitative Prospective Cross-Sectional	Australia	148/123	Arabic, Spanish, Italian, Greek, Cambodian, Vietnamese, Chinese, Croatian, and Serbian	• 65/123 (52.8%) of non-English speaking patients preferred to use their relative/friend as an interpreter in the ED.
Muir et al. (2021)	Quantitative Prospective Cross-Sectional Survey	USA	42/42	Spanish	• 100% of participants would recommend the interpreter modality that they utilized during their ED visit. 33% of participants (14/42) preferred in-person interpreters; 52% (22/42) preferred a language concordant provider and 12% (5/42) preferred a telephone interpreter.
Puntillo et al. (1997)	Quantitative Prospective Cross-Sectional	USA	116/21	Spanish and Chinese	• 50 English-speaking patients preferred the numerical rating scale (NRS) compared to the word descriptor scale (WDS, n=35). 11 Spanish-speaking patients preferred the WDS compared to the NRS (n=9). Differences were not statistically significant.
Villalona, Castañeda et al. (2021)	Qualitative Prospective Semi-structured interviews	USA	25/25	Spanish	• Participants placed a high level of importance on availability of interpretation services to facilitate communication.
Patient Values					
Satisfaction with Interpersonal Aspects of Care					
Baker et al. (1998)	Quantitative Prospective Cross-Sectional	USA	457/220	Spanish	• Comparing patients that did not use and interpreter and did not want one (group 1) to patients who used an interpreter (group 2): Patients in group 1 had the highest satisfaction with their examiners' interpersonal skills. Patients in group 2 rated their provider as less friendly ($p = 0.003$), less respectful ($p = 0.002$), less concerned for them as a person ($p < 0.001$), and less likely to make them feel comfortable ($p < 0.01$). • Comparing group 1 to patients who did not have an interpreter but thought one should have been used (group

					3): Patients in group 3 had lower satisfaction on all items ($p < 0.001$). • Comparing group 2 and group 3: Patients in group 3 rated their provider as less friendly ($p = 0.059$), less concerned for them as a person ($p < 0.006$), and less likely to make them feel comfortable ($p < 0.001$). • Mean scores on the Interpersonal Aspects of Care satisfaction scale were highest for patients in group 1 (73 +/- 20), intermediate for group 2 (65 +/- 19), and lowest for group 3 (55 +/- 21; P< 0.001 across all three groups and for all pairwise comparisons). • In multivariate analysis, using an interpreter or indicating that an interpreter was needed but not used was strongly associated with satisfaction score.
Derose et al. (2001)	Quantitative Prospective Cross-Sectional	USA	599/393	Spanish	• Spanish-speaking women who did not have an and needed one were consistently less satisfied than native English-speakers on all 7 measures of patient satisfaction. • Spanish-speaking women who used an interpreter had a significantly lower rating of trust in their physician than English-speaking women. There were no differences in other domains of interpersonal aspects of care between Spanish-speaking women who used an interpreter and English-speaking women. • Spanish-speaking men who did not have an interpreter and thought one was needed were significantly less satisfied than native English-speaking men with the friendliness of the physician, the respect and concern shown, and the extent to which the physician made them feel comfortable. • Spanish-speaking men who had interpreters in the encounter were significantly less satisfied than English-speaking men with the respectfulness, the concern shown, and the extent to which the physician made them feel comfortable. • For men, there were no statistically significant differences in trust based on language status or interpreter use.
Edelman et al. (2022)	Quantitative Prospective Cross-sectional	USA	275/933	Spanish	• Limited English proficient patients were significantly more likely to report sub-optimal scores on the Interpersonal Process of Care survey than patients with advanced English proficiency (35.6% vs. 27.6%; p=0.05). • In unadjusted analyses, having limited English proficiency was associated in increased odds of sub-optimal

					performance on the interpersonal survey (OR; 1.45; 95% CI: 1.06 to 1.98).
Mahmoud et al. (2014)	Quantitative Prospective Cross-Sectional	Australia	678/81	Not Stated	• Patients who used an interpreter had significantly greater odds of not having their spiritual and emotional needs met compared to patients from an English-speaking background (odds ratio 0.4; 95% CI: 0.2–0.9, p =0.040). • There was no difference in satisfaction between patients who used an interpreter and English-speaking background patients on the domains of encouraged to talk; concern for well-being; respect for privacy; courtesy; promptness; care quality.
Villalona et al. (2020)	Quantitative Prospective Cross-Sectional	USA	100/100	Spanish	• At the first time point following the initial assessment and history of present illness, the use of ED staff as a modality of interpretation was found to be associated with higher scores compared to phone interpreters regarding perceptions on how seriously nurses and doctors took patient's problems; and health care providers took patient concerns, and the perceived amount of attention demonstrated by doctors for patient concerns. The use of family members as an interpreter was associated with higher scores than phone-based interpretation regarding the perceived amount of attention demonstrated by doctors for patient concerns. • At disposition, the use of family members as interpreters was associated with higher scores when compared with ED staff due to the perceived amount of care demonstrated by the ED staff during a patients visit. The use of phone-based interpretation at disposition was associated with lower scores when compared with the use of ED staff as interpreters due to the perceived amount of care demonstrated by ED staff. • When analyzing the impact of consistency of interpretation modality, there were higher scores among participants who received care via the same communication modalities regarding perceived amount of caring demonstrated by ED staff and treatment of family members.
Satisfaction with Time in Patient Room					

Baker et al. (1998)	Quantitative Prospective Cross-Sectional	USA	457/220	Spanish	• Patients who used an interpreter were less satisfied with the amount of time their provider spent with them compared to patients who communicated directly with the providers and did not need an interpreter, but the result was not statistically significant (p = 0.15). • Patients who did not have an interpreter and thought one was needed were significantly less satisfied with the amount of time spent in the room compared to patients who communicated directly with the provider and did not need an interpreter (p = 0.003).
Derose et al. (2001)	Quantitative Prospective Cross-Sectional	USA	599/393	Spanish	• Spanish-speaking women patients who did not have an interpreter and thought one was needed were significantly less satisfied with the amount of time spent in the room than English-speaking patients (P<0.001). There was no difference in satisfaction among Spanish-speaking men. • There was no difference satisfaction with time spent in the room between men or women who had an interpreter compared with men or women English-speaking patients.
Mahmoud et al. (2014)	Quantitative Prospective Cross-Sectional	Australia	678/81	Not Stated	• There was no difference in satisfaction between patients who used an interpreter and patients from an English-speaking background regarding time with staff or time with doctor.
Patient Perceptions of how Language Barriers Affect Care					
Garrett, et al. (2008)	Quantitative Prospective Cross-Sectional	Australia	148/123	Arabic, Spanish, Italian, Greek, Cambodian, Vietnamese, Chinese, Croatian, and Serbian	• 46% (n=56) of non-English speaking patient felt that not being able to speak English negatively affected their hospital stay.
Villalona (2021)	Qualitative Prospective Patient Shadowing	USA	10/10	Spanish	• Linguistic Powerlessness: Inability of patients with limited English proficiency to fully communicate with the medical personnel overseeing their care and inability to be a self-advocate. Patients are not able to tell providers about relevant chronic conditions or symptoms. Patients feel like they are in limbo because they do not know what is happening. • Gratitude: Gratefulness for any sort of medical services received. Patient perspective is one of luck in having the

					medical team attempt to communicate. Does not view having the health care team speak the patient's language as a demand or requirement. Grateful for any attempts made by medical team to understand them. The responsibility to communicate falls on the patient and not on the medical team. Attitudes of immense gratitude coexist with feelings of self-blame for not being able to speak the language. • Patience: Patient with patience partially due to his limited English proficiency. Patients wait for things to be communicated to them because you cannot have autonomy due to the language barrier.
Villalona, Castañeda et al. (2021)	Qualitative Prospective Semi-structured interviews	USA	25	Spanish	• Participants reported that the use of interpreter services improves the overall experience of care by making it less complicated and because it allowed healthcare staff to better understand their needs. • Not being able to communicate with the healthcare team contributes to negative sentiments about the experience. • Many participants reported a positive experience in the ED due to receiving great care or staff's efforts in assisting them communicate. • Many patients blamed themselves for not speaking English.

Discussion and Conclusion

This scoping review is the first to identify what is known about performance on PCCOs for ED patients with NELP. We found a limited amount of work being done in this area. Similar to previous reviews about language discordant healthcare encounters across a variety of settings and outcomes,[54,55] we found the majority of studies in this review are descriptive. Additionally, there continue to be multiple ways of defining this population which is a methodological problem[54,56] because different definitions define slightly different groups of people making it difficult to understand how patient-provider language discordance impacts outcomes. Ortega et al.[1] recently suggested replacing the commonly used term limited English proficient to NELP because it would more accurately describe the population of interest.

Another methodological issue in many of the studies in this review was combining patients who used ad hoc or professional interpreters.[25,35,37,39,43,45,46,51] Ad hoc and professional interpreters have vastly different training and likely influence PCCOs uniquely. Therefore, future studies should clearly report which type of interpreters are included in the study and encounters utilizing ad hoc and professional interpreters should be analyzed separately so that we can understand how various types of interpreters impact PCCOs.

The impact of language discordance on PCOOs is particularly important to study in the ED setting because the logistics of ED encounters are unique. ED encounters are often unplanned and include a series of interactions over many hours. High acuity ED encounters require special consideration regarding appropriate language services. For example, some situations require time-sensitive intervention with coordination across many teams and the use of interpreters may be time-intensive. Thus, provision of appropriate language services during ED encounters requires different considerations than health care encounters that are planned. Three studies in this review examined unique features of communication in ED encounters. One examined interpreter availability throughout the duration of an ED visit[41] and two explored consistency of interpreter mode.[42,46] Further exploration of what appropriate language access means during an ED encounter, how communication occurs at various time points over several hours with different interpretation modalities should be explored in future work.

This review found a large unmet need for language services in the ED. Most studies reported rates 70% or higher suggesting that seven in ten ED patients with NELP are not getting the language

services they need.[36–39] This is true despite legislation in both the United States and many parts of Australia entitling patients with NELP to language assistance in healthcare encounters.[57,58] It could be that the large unmet need is partially a documentation issue, as these studies were retrospective chart reviews[37–39] and documentation in the electronic health record may be inaccurate.[59] Poor documentation is unlikely to fully explain the unmet need given the magnitude of the problem. It is also possible that retrospective reviews capture all patients with NELP including language groups of smaller sizes who may be at higher risk for not receiving appropriate language services in the ED. More work needs to be done by institutions to ensure patients are aware of their right to use a professional interpreter in healthcare encounters, professional interpreter use is properly documented in medical records and institutional language access plans are implemented, and accessible to clinicians in accordance with current legislation for all patients with NELP.[57,58,60]

Use of professional interpreters is a common ED communication strategy for patients with NELP. Current legislation requires use of professional interpretation for healthcare encounters when there is language discordance between patient and provider.[57] In the United States professional interpreters are seen as the gold standard due to concerns with accuracy of communication, patient safety, quality of care and patient privacy when using ad hoc interpreters.[61,62] Recent research suggests that during primary care visits, patients with NELP prefer family members to be present at a visit for support and as an advocate but not as an interpreter.[63] Future research should seek to identify the roles that patients with NELP want family members to have during their ED visits. Additionally, among those that prefer family members as interpreters, future research could explore if barriers to professional interpreter use could be overcome with well-trained professional interpreters or other interventions.

When promoting the utilization of professional interpreters, the question of preferred modality becomes highly relevant. Two studies in this review found professional in-person and video interpreters promoted high levels of perceived understanding compared with professional telephone or ad hoc interpreters.[42,48] This finding is consistent with previous studies.[64,65]

Another strategy to decrease unmet need for language services would be to increase the number of clinicians that speak other languages. Consistent with other research, one study in this review found that compared to using professional interpreters to communicate, patients preferred to speak to their

healthcare team directly.[42,66] Evidence suggests that with quality assurance such as proficiency evaluations, resources spent on teaching clinicians non-English language skills could have a positive impact on PCCOs for ED patients with NELP. Several editorials have suggested that health professionals who practice in other languages should be rewarded financially by healthcare systems.[1,67] Nonetheless, even with increased efforts to improve clinicians' non-English language skills, this strategy will not fill the unmet need in provision of language services due to the heterogeneity of languages spoken.

Although professional interpreters are essential in language discordant health care encounters, consistent with previous work, studies in this review found that patients who use an ad hoc or professional interpreter often rate many of the relational aspects of care lower than patients who were able to talk directly to the health care team.[25,45,51,52,68,69] It is unclear if these differences were due to language discordance, cultural differences or something else. Future work should seek to identify ways to improve interpersonal aspects of care in professional interpreter-mediated encounters.

Another way to promote positive relationships when language discordance exists could be for clinicians to learn some non-English language words or phrases to show patients that they are attempting to communicate in the patient's language. We do not support the idea of clinicians communicating with patients in another language without the support of a professional interpreter unless they have passed a proficiency test. However, based on the findings from two studies in this review,[47,53] the use of a few language concordant phrases could improve interpersonal aspects of care.

Two studies in this review highlighted how lack of access to language services can lead to a power dynamic where the patient feels powerless or unable to communicate with their healthcare team.[43,53] These results suggest that language ability should be considered when studying social determinates of health because institutional barriers such as lack of well-trained interpreters and culturally competent health care providers adversely affect the health of individuals with NELP.[70] Further work to understand how ED patients with NELP experience PCCOs may help mitigate these power dynamics and promote health equity.

Limitations

The findings of the study should be considered in the context of certain limitations. First, only English-language articles were included which is a considerable limitation for an article studying language

access issues. Second, although the search strategy was comprehensive and guided by a research librarian it is always possible that relevant studies were missed. Third, we excluded studies that included pediatric ED encounters due to their inherent complexity and our belief that pediatric patients with NELP experience of PCCOs may be different than adult patients with NELP. In keeping with scoping review methodology, we did not formally report on the quality of the literature which may have impacted our results because results from all studies were given equal weight.[71] Finally, no studies from the Emergency Medical Services (EMS) were included in this review. When we designed this study, we planned to include EMS studies, however, none met our inclusion and exclusion criteria (Appendices). Future work needs to be done in this setting to understand how EMS providers address language discordant encounters in the community. Accurate communication in these time-sensitive fast paced encounters where professional interpreters may not be available is critical to ensuring EMS providers accurately understand what occurred and can provide the most appropriate care.

Practice Implications

Studies describing performance of PCCOs for ED patients with NELP are limited and continue to be mostly descriptive. This review found that ED patients with NELP had worse PCCOs than English-speaking patients and having a language discordant healthcare visit negatively impacted perceptions of care. Additionally, there remains a large unmet need for provision of language services in the ED. More work needs to be done to characterize performance on PCCOs in patients with NELP and develop quality improvement interventions. Additional studies should characterize PCCOs among patients with NELP in other setting such as primary care, specialty clinics and inpatient units. Fahimi et al. proposed a multi-pronged approached to address issues that fall under the social emergency medicine umbrella that when applied to patients with NELP would include solutions targeting clinical care for patients with NELP, systems-based solutions for addressing patient language services needs and population and community based work.[72] Work in all of these areas is urgently needed in order to meaningfully improve PCCOs for ED patients with NELP.

4. Manuscript 2

Characterizing Spanish-Speaking Patients Patient Centered Care Experiences in the Emergency Department

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Abstract

Background: Patient-centered care (PCC) is an essential component of high-quality health, yet, patients with non-English language preferences (NELP) experience worse PCC outcomes. Additionally, there are likely unique aspects to PCC for patients with NELP in the emergency department (ED). To inform the development of strategies to improve PCC for NELP in the ED, we sought to understand how Spanish-speaking ED patients experience care and the factors that influenced their perceptions of the patient-centeredness of that care.

Methods: We conducted a single center qualitative study using semi-structured interviews with adult, Spanish-speaking patients who had been discharged home from the ED. Interviews were conducted using an interview guide, recorded, transcribed, and analyzed iteratively in Spanish using inductive and deductive thematic analysis.

Results: We conducted 19 interviews with participants from 24 to 72 years old. Participants were born in 7 different Spanish-speaking countries. Participants identified three domains of PCC: patient; medical team's skills and system. Several of the identified themes such as shared decision-making, open communication, compassionate care, and coordination of follow-up care, are often incorporated into PCC definitions. However, other themes, including uncertainty leading to fear, use of professional interpreters to promote understanding, receiving equitable care, technical proficiency and efficiency of care expand upon existing domains in PCC definitions.

Conclusions: We now have a more nuanced understanding of how Spanish-speaking patients with NELP experience PCC in the ED and what matters to them. Several of the themes identified in this analysis add details about what matters to patients within the domains of previous PCC definitions. This suggests that the conceptualization of PCC may vary based on the setting where care is provided and the population who is receiving this care. Future work should consider patient-population and setting when conceptualizing PCC.

Introduction

Patient-centered care (PCC) is an essential component of high-quality healthcare,[6] yet PCC outcomes are worse for patients with non-English language preferences (NELP) [25,39,45,51,73] defined as

individuals who prefer a non-English language.[1] Specifically, not speaking English can negatively influence interpersonal perceptions of care,[25,39,45,51] and language discordance impacts the ability of patients with NELP to advocate for themselves contributing to feelings of linguistic powerlessness.[53] PCC has been positively associated with health outcomes including recovery from pain, improved physical and mental health, and fewer diagnostic tests and referrals.[74,75] Provision of PCC to this population continues to be an important priority.[76]

There are likely unique aspects to PCC for patients with NELP in the emergency department (ED). PCC broadly has been defined as understanding the patients' experience of the illness; the professional's relationship with the patient; and coordination of care in the system.[10] ED visits and language discordant healthcare encounters present unique barriers to each of these. For example, it can be hard for health care providers to establish meaningful therapeutic relationships when patients and families are stressed, the environment is noisy and chaotic and healthcare providers are faced with time pressures and overcrowding.[77] Likewise, coordination of care can be more challenging in patients with NELP as they often have more questions about discharge instructions, and are less likely to receive and complete follow-up appointments.[78–80] Further, ED visits consist of a series of communications over many hours and professional interpreter use in patients with NELP is inconsistent.[41,81] To inform the development of strategies to improve PCC for NELP in the ED, we sought to understand how Spanish-speaking ED patients experience care and the factors that influenced their perceptions of the patient-centeredness of that care.

Methods

Sampling

We recruited participants for virtual semi-structured interviews from a quaternary care academic ED in the Midwestern US that has approximately 60,000 visits per year. Approximately 5% of all ED visits are with patients with NELP and half of those are with Spanish-speakers. To identify eligible patients with NELP who were discharged home we used a two-part screening process. First, we identified adult ED patients who had indicated in their medical record that their preferred language was Spanish and were likely to go home according to the physicians caring for the patient. Second, at the beginning of the interview, we confirmed with the patient that they were discharged from the ED and preferred to receive

their medical services in Spanish. We sought to characterize lower acuity ED encounters with patients that were living independently in the community. Therefore, we excluded patients who were incarcerated persons or were discharged to a long-term care facility because there are likely other factors influencing their perceptions of PCC. Likewise, we excluded patients who were activated traumas, were unable to give informed consent, or had a primary complaint that was psychiatric because we deemed them inappropriate to approach for the goals of this study. All participants received a $50 gift card following the interview.

Emergency department research coordinators (EDRCs) recruited patients in the ED. Eligible patients were approached by the EDRC and a Spanish-language interpreter who asked them if they would be willing to be contacted to participate in the research study. Participants who gave permission were contacted via telephone or email according to their preference. Interviews were scheduled for a later date with the majority scheduled 1-4 weeks after participants' ED visit. We selected potential participants by purposive criterion sampling to ensure we had representation of perspectives from a range of ages, sexes, and time lived in the US.[82] Interviews and analysis took place from November 2022 through December 2023. The local institutional review board approved all study activities. We followed the consolidated criteria for reporting qualitative studies.

Design and Procedure

We used semi-structured interviews to explore broad themes around patients' experiences in the ED. Interview questions were primarily open-ended to elicit what came to mind first for the participant. Follow-up probing questions were based on components of PCC that are present in the Institute of Medicine and Langberg et al. definitions (Table 1).[6,10] We pilot tested the interviews among Spanish-speakers on our team who had been to the ED to ensure questions were clear and appropriate. The English and Spanish language interview guides are in Appendices.

Table 1. Interview Guide Questions Associated with Specific Patient-Centered Care Domains

Interview Question	Patient-Centered Care Domain
• How did you feel about your emergency department visit? Which parts were positive? Which parts were negative?	Langberg: Patient Experience of Illness
• In an ideal visit, can you describe how personal interactions would be in an emergency department visit? • Compared to the ideal, how were the personal interactions during your visit to the emergency department?	Langberg: Patient and Provider Relationship
• How receptive was the medical team in the emergency room to your preferences? • What could they have done to make you feel like they were listening to your needs and preferences?	Institute of Medicine: Preferences and Needs
• When you returned home after the emergency room, did you know if you needed to schedule any follow-up visits?	Langberg: Coordination of Care

Interviews were conducted in Spanish by AC and GG, female medical students who self-identify as White and non-Latina and White and Latina respectively. JM participated in analysis and is a female, practicing emergency medicine physician and is a fluent reader, writer and speaker of Spanish. RJS, a female PhD student who self identifies as White and non-Latina and has advanced training in qualitative methods, attended all interviews, asked follow-up questions and led the analysis. This project was overseen by MSP, a practicing emergency medicine physician with advanced training in qualitative methods. All members of the study team involved in data collection had current advanced proficiency rating of their speaking and listening Spanish language abilities on file with the local health system. As interviews progressed, we refined questions and incorporated pointed follow-up questions to encourage patients to elaborate on the emerging themes.

We audio recorded all interviews and RJS, GG, JM, AE, APR transcribed audio files verbatim and reviewed them for accuracy. We asked participants questions about their demographics (sex and age), social history (insurance status, country of birth, number of years lived in a Spanish-speaking country), and familiarity with the ED (time since last visit).

Thematic Analysis

We used deductive and inductive thematic analysis.[83] Inductive thematic analysis allowed us to identify emerging themes. We used deductive thematic analysis for the more directed interview questions that were guided by the domains of the PCC definitions described previously. Analysis included several steps.[83] RJS, GG, AC wrote an initial memo after each interview to capture emerging concepts and

general observations. The research team (RJS, GG, JM) read through the transcripts several times to achieve immersion and coded concepts about patients experience of care in the ED line by line. Using concepts from open coding, in combination with the existing domains of PCC, we developed a preliminary codebook (Appendices). Next, at least two study team members coded each interview. All interviews were coded in Spanish. As we coded, we began grouping similar concepts into broader, more overarching themes. We used Dedoose, qualitative data software, to facilitate the coding process.[84]

We ensured qualitative rigor across three criteria: 1.) credibility, 2.) transferability, and 3.) confirmability. We strove for credible findings by having in-depth conversations with the study participants. Additionally, we debriefed the findings with members of the study team not actively involved in the coding as an external check on the inquiry process and we conducted negative case analyses to refine our hypotheses as we proceeded with analysis.[85] We sought to have transferable findings by providing detailed quotations in the manuscript so readers can determine if our findings can be transferred to their setting. Quotations are presented in English and Spanish. RJS translated quotes and the translations were reviewed for accuracy. Collectively agreed upon translations are presented in the manuscript. Finally, we achieved confirmability by maintaining a detailed audit trail of our research processes and decision-making using memos.[86]

Results

A total of 19 interviews were completed **(Figure 1**), and Table 2 describes patient demographics, ED use and interview characteristics. Participants ranged in age from 24 to 72. There is heterogeneity in terms of country of origin and background; participants were born in 7 different Spanish-speaking countries. Other than the recruitment encounter, 7 of the participants had no other ED visits in the last year and 3 had never previously been to an ED in the US.

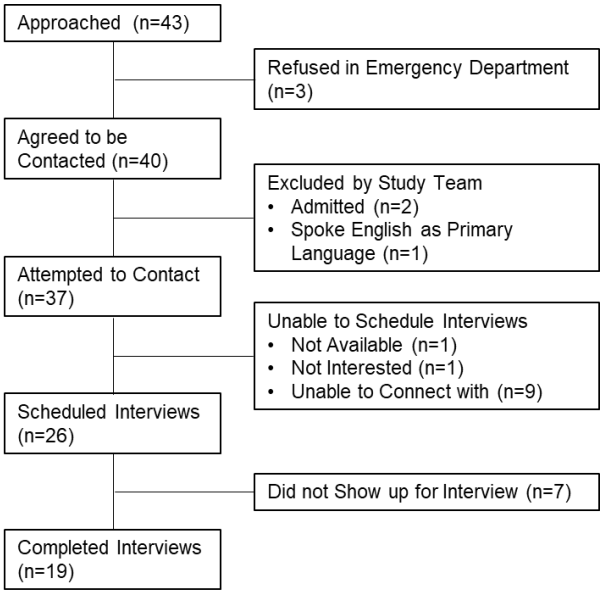

Figure 1. Flow Diagram of Recruitment

Table 2. Demographic, Emergency Department Use, and Interview Characteristics (n=19), n(%)

Age Group (years)	
20-29	2 (10.5%)
30-39	4 (21.1%)
40-49	5 (26.3%)
50-59	5 (26.3%)
60-69	2 (10.5%)
70-79	1 (5.3%)
Female	11 (57.9%)
Insurance	
Private	11 (57.9%)
None	8 (42.1%)
# Years Lived in a Spanish-speaking Country	
0-10	0 (0%)
10-19	4 (21.2%)
20-29	9 (47.4%)
30-39	3 (15.8%)
40-49	1 (5.3%)
≥50	2 (10.5%)
Birth Country	
Bolivia	1 (5.3%)
Colombia	2 (10.5%)
Costa Rica	1 (5.3%)
Honduras	1 (5.3%)
Mexico	9 (47.4%)
Uruguay	2 (10.5%)
Venezuela	3 (15.8%)
Time Since Last Emergency Department Visit	
<1 month	1 (5.3%)
1-6 months	3 (15.8%)
6-12 months	3 (15.8%)
> 1 year	7 (36.8%)
Never Been Before	3 (15.8%)
Unknown	2 (10.5%)
Weeks Between ED Visit and Interview	
< 1 week	2 (10.5%)
1-2 weeks	8 (42.1%)
3-4 weeks	7 (36.8%)
5-6 weeks	1 (5.3%)
7-8 weeks	1 (5.3%)

To conceptualize how participants experienced PCC we grouped themes within patient-level, medical team's skill-level, or system-level domains. The themes and sub-themes that emerged are presented in **Figure 2**. The theme uncertainty leading to fear, is connected with other concepts in the figure using a dashed line because this was something that participants

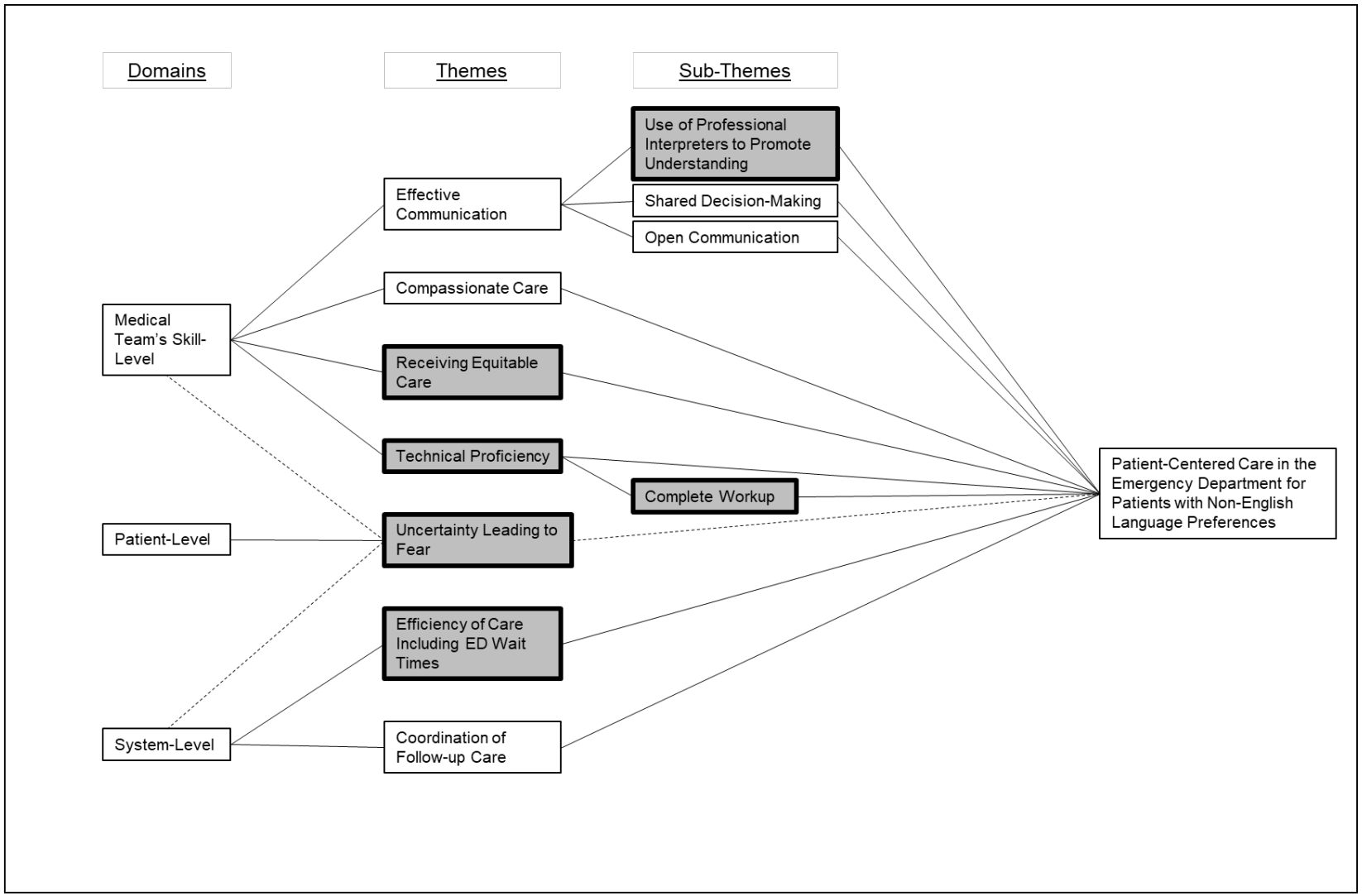

Figure 2. Domains, Themes and Sub-Themes that Impacted Patient-Centered Care in the Emergency Department for Patients with Non-English Language Preferences
This figure highlights themes and sub-themes within the domains of patient, medical team's skill, and system that impacted participants' perceptions of patient-centered care in the emergency department. The theme uncertainty leading to care is connected to other concepts in the model using a dashed line because participants talked about these relationships indirectly. In contrast, all other boxes are connected to each other using a solid line because participants described these relationships directly. Boxes shaded in gray with bold outlines are themes and sub-themes of patient-centered care that emerged in this analysis and are not traditionally discussed as components of PCC.

brought with them to their ED encounter and indirectly influenced many aspects of the participants' experiences of care. In contrast, participants described how themes within the medical team's skill-level and system-level domains directly impacted experiences of PCC. Throughout these interviews, when we asked participants about patient-centered care, they responded with instances when their needs were met/not met. Therefore, during analysis we operationalized the concept of PCC by exploring scenarios where participants' needs were met/not met. Exemplar quotes in English and Spanish corresponding to each theme are listed in Table 3. In the next paragraphs we first discuss themes that have previously been identified as components of PCC. In the second section, we discuss themes that further develop existing high-level domains of PCC by describing unique themes and sub-themes important to ED patients with NELP .

Previously Described PCC Themes

Medical Team's Skill Domain

Themes in the medical team's skill domain are defined as interactional themes that happened between the patient and the medical team. Previously described PCC themes included in this domain are effective communication and compassionate care.

Effective Communication: Shared Decision-Making

Shared decision-making, a sub-theme of effective communication, was defined as both the patient and medical team contributing to decision-making. A few participants did not want to be involved in decision-making. In contrast, some participants described situations during their ED visits where they were actively involved in decisions about their care. For these participants shared decision-making was about being heard and negotiating a plan of care. In many cases, participants spoke up about decision-making when they did not agree with a plan of care. One woman described a discharge conversation this way,

> ...I told him, well, I don't want to leave because I know it's going to hurt again because I saw what they gave me, [the pain] calmed down and then the pain came again. So, I don't want to go home and come back ... [the physician] said well then what we are going to do is we are going to do the surgery. (Q1; 1002)

In this scenario the medical team adjusted the care plan. However, this was not required for participants to feel like they had received PCC. For this group of participants, feeling heard and having a shared understanding of a plan of care was what contributed to feelings of PCC.

However, some participants described trying to engage in shared decision-making with the medical team but feeling like their opinions were disregarded. One participant said,

> I told them how I felt and because my blood pressure goes up, sometimes they think it's my anxiety, but I told them that it's not my anxiety because I know how to tell when it's my anxiety and when it's something else. They always tell me it's anxiety that's just what it is—so I don't fight it. (Q2, 1016)

In addition to not feeling heard due to lack of shared decision-making, this quote intersects with the theme complete workup because she did not feel the necessary tests were completed to understand why her blood pressure was rising. Lack of shared decision-making likely contributed to her perception that she received an incomplete workup which led her to feel like she was not receiving PCC.

Effective Communication: Open Communication

Open communication, a sub-theme of effective communication, defined as explaining what was happening, answering questions, and updating patients about the status of their care, contributed to many participants feeling like they received PCC. One participant described an example of open communication. "Yes, they asked if I had any concerns or any questions. And since it wasn't much, a little medication that they gave me, I told them no, that it was fine, I had already understood everything." (Q3, 1018) Medical teams that kept participants informed about what was happening; explained the reasoning behind the exams and procedures; provided updates and allowed space for questions contributed to patients' perceptions of receiving PCC.

Compassionate Care

Compassionate care included staff who were kind, responsive to requests and cared about the participants' well-being and social needs. This theme focused on the interpersonal and social aspects of care not technical components. Participants described how in spite of uncertainty and fear, kindness from the medical team contributed to feeling more confident in the medical care they were receiving. One participant said, "they brought me to the emergency room, and I was afraid but the kindness and courage

they showed me gave me confidence in the doctor, the nurses, all of them." (Q4; 1006) In contrast, a few participants felt like the medical team could have been more responsive to their social needs. One woman said, "And, when my husband asked to stay there, the nurse started to get rude and started telling my son that my husband didn't really have to be there because there are only two visitors per day." (Q5, 1020) Overall, medical team members who were kind and responsive to patients contributed to participants' feelings of PCC while perceived dismissive or rude behavior did the opposite.

System Domain

Coordination of Follow-up Care

Coordination of follow-up care, or the ability of the participants to schedule and complete follow-up after their ED visit, was a theme in the system-level domain that contributed to perceptions among some participants of PCC in the ED. While some participants described a seamless process, for other participants who required follow-up care to address their medical issue, delays in care were frustrating. One man described his experience this way,

> They will call me in four to eight weeks, but it seems to me that the esophagus is something delicate so waiting eight weeks, that's two months … so I'm taking my medication that they gave me, but it is pain medication and that's it. But that's not treatment. (Q6; 1027)

Another participant also described how there were always delays with scheduling follow-up visits, even for urgent issues. She said, "…this is a very protocolized system, very bureaucratic that is extremely slow to care for you. Not for the emergencies but for the urgent things…you will wait a long time."(Q7; 1032) Delays in specialist appointments made many participants feel like they did not receive PCC in the ED.

Emerging PCC Themes

Patient Domain

Uncertainty Leading to Fear

Many participants described uncertainty about the severity of the concern that led them to present to the ED. One man said, "at the clinic they told me to go to the emergency room so that they could treat me because they did not know what was in my throat. So, this made me worry a little bit." (Q8, 1018) Another man described how compassionate care by ED staff assuaged the participant's fear (Q4, 1006).

Often uncertainty about the severity of their concern and how ED staff managed uncertainty influenced participants' perceptions of PCC in the ED.

Medical Team's Skill Domain

Effective Communication Skills: Use of Professional Interpreters to Promote Understanding

During an ED visit, communication occurs at multiple time points. Therefore, use of professional interpreters in an ED setting means that interpreters were used during all parts of the visit. One woman described how using professional interpreters throughout her ED visit *helped* her. "First there was a person that helped me… and then after she had to go help other people they put the video interpreter on so that I could speak to someone and this helped." (Q9; 1007)In contrast, a few other participants described scenarios where professional interpreters were not used during all parts of their visit. One man described his situation this way,

> "Sometimes they didn't put [an interpreter] on because I could answer some things in English so then after that, they didn't bring [an interpreter] for me. So, many times I had to try to understand the medical terms that they were using." (Q10; 1014)

Likewise, another participant described how she had not *understood a damn thing* during an exchange with an ED staff person that occurred when a professional interpreter was not used.

> '… so I told her, 'the translator is outside.' [The ED staff person] said, 'you don't need a translator.' Okay I told myself. I thought that they weren't going to speak. And therefore I stayed quiet. And when she left the translator was outside and she said, 'I am here to translate for her,' she had gone to the bathroom and had returned. [The ED staff person] said, 'oh yes, I already told her what she needed to know.' I hadn't understood a damn thing that she had said. (Q11; 1021)

The decision by ED staff members to not use professional interpreters when patients wanted them, made it difficult for participants to communicate, contributing to a lack of PCC.

There was also a small group of participants who declined a professional interpreter because of comfort using family members and negative comments by medical staff. One participant said, "Since he's my son, I feel more comfortable; my son isn't someone I don't know. So in this way I feel more comfortable when he is there." (Q12; 1020) In this ED, it is hospital policy that all non-English speaking patients are offered a professional interpreter and family members are only used after a professional

interpreter has been formally declined by the patient. Another participant declined an interpreter in the ED because of a prior negative experience. She said,

> Well, I had been at urgent care before and the doctor was angry that I had an interpreter on the Tablet …. Well, because of this I tried to speak [in the emergency room] in English without an interpreter because I felt like they prefer when you speak English so I tried not to use an interpreter…. I prefer to speak with an interpreter because with medical things, I want to be sure that they understand what I am saying and I want to be sure of what the doctor is telling me. (Q13; 1031)

In this last example, the participant declined a professional interpreter because she believes that is what health care providers prefer even though she prefers to have a professional interpreter during medical visits.

Receiving Equitable Care

Some participants described the importance of receiving equitable care, not being discriminated against, and how this improved PCC. One participant said,

> No, well, as I told you, they treat you normally as if you were another normal person, there is no discrimination. Some places, well, you know that sometimes because of your color or simply people don't like you because of the country you come from and that, but nothing, there was always a lot of respect. Everything was done with great respect. (Q14, 1014)

In contrast, a few participants felt that long wait times or rude interactions were because of their insurance status or because of their race or ethnicity. One woman said, “There was a lady who didn't pay attention to me …As a Hispanic, you know when someone is racist—there are specific words that you shouldn't use-- but I didn't like the way she treated me.” (Q15, 1021). Overall, receiving care that was equitable and free from discrimination was an important component of PCC.

Technical Proficiency

Technical proficiency, the medical team’s competence or skill with technical components of care such as blood draws, diagnostic abilities and managing pain, contributed to perceptions of PCC. One participant said, “… the girl that took my blood, couldn't find [my vein] and I felt very mistreated because she poked me three times and she couldn’t take the blood. I felt bad because what they did to me hurt a

lot.” (Q16, 1010) Another participant described how while in the ED her most pressing issue was not addressed. She said,

> They put my arm in a cast and … ‘now you can go.’ I told her, ‘excuse me, a question, and what about my face and my head, what?’ Then the girl was nervous and she said ‘one moment’ and she went to ask the doctors or I don't know who, and then they began to take x-rays of my whole face.... Something this obvious where I had a face like a monster, it was incredible that they didn't do any exam when I arrived. (Q17, 1001)

In contrast, some participants described how technical proficiency made them feel like they received PCC. One participant said, “… in spite of the fact that I was there with an illness, the treatment was really very good, the way they cared for me was very appropriate for my problem.”(Q18, 1011) Medical personnel who demonstrated technical proficiency positively impacted perceptions of PCC.

Technical Proficiency: Complete Workup

Many participants described how a complete workup, a sub-theme of technical proficiency, and defined as patient perceptions that all the necessary tests and procedures were completed, was an important component of technical proficiency. One participant felt the medical team had performed all the necessary tests and said, “I have known that the other hospitals, they take a long time and then they don't do the tests that they should do. For me, they did everything.”(Q19, 1004) A different participant felt she did not have a complete workup in the ED. When we asked her how she felt about the test she had been sent to the ED to receive not being done she said, “Well I thought they should have done [the test] because I definitely didn't know what was happening to me. And if the other [physician] recommended that they do this, I said well that's what I wanted to do.” (Q20, 1031) This example intersects with the theme, use of professional interpreters to promote understanding, because this was a participant who decided not to use any interpreter in the ED. Overall, receiving an incomplete workup contributed to participants feeling like they did not receive PCC.

System Domain

Efficiency of Care

Efficiency of care, time in the waiting room, time it took to see the doctor and general flow of the visit, impacted many participants’ perceptions of PCC. One man stated, “the most positive [part of my

visit] was how quickly I was treated." (Q21; 1011) Other participants described wait times as tiring and frustrating. Participants often acknowledged many of the system wide pressures on EDs that contribute to long wait times such as high patient volumes. One man said, "I understand that there are a lot of people, it's a small space so you have to wait…it is very delayed, a lot of delays." (Q22; 1027) Another woman said, "I did not like that I was there 12 hours-- this was an emergency—it seemed to me that they didn't care about me. Twelve hours waiting for them to take care of you…That seems outrageous to me."(Q23; 1021) Often, participants felt like they did not receive PCC due to delays in care.

Table 3. English and Spanish Quotes by Domain, Theme and Participant ID

#	Domain	Theme: Subtheme	English Quote	Spanish Quote	ID
Q1*	Medical Team's Skill	Effective Communication: Shared Decision-making	...I told him, well, I don't want to leave because I know it's going to hurt again because I saw what they gave me, [the pain] calmed down and then the pain came again. So, I don't want to go home and come back, because it's hurting me. ... [The physician] said well then what we are going to do is we are going to do the surgery.	...le digo pues yo no me quiero ir porque yo sé que [la pena] me va a volver a doler porque ya lo vi que me pusieron se me calmó y después me venía de nuevo el dolor. Entonces, yo no quiero ir a mi casa y volver a regresar, porque me está doliendo. ...[El médico] dijo bueno entonces lo que vamos a hacer es vamos a hacer la cirugía.	1002
Q2*†	Medical Team's Skill	Effective Communication: Shared Decision-making Technical Proficiency: Complete Workup	I told them how I felt and because my blood pressure goes up, sometimes they think it's my anxiety, but I told them that it's not my anxiety because I know how to tell when it's my anxiety and when it's something else and they always tell me it's anxiety that's just what it is sometimes—so I don't fight it	Yo les dijo lo que siento y como suba la presión a veces piensan ellos que es mi ansiedad, pero, yo les dijo que no es mi ansiedad porque yo sé distinguir mi ansiedad cuando es otra cosa y siempre me dicen es ansiedad eso es no más lo que a veces—así como no me agarre mucho	1016
Q3*	Medical Team's Skill	Effective Communication: Open Communication	Yes, they asked if I had any concerns or any questions. And since it wasn't much, a little medication that they gave me, I told them no, that it was fine, I had already understood everything	Sí ellos me dijeron que si tenía alguna duda o algunas preguntas y yo como no fue mucho nada más fue un poquito de medicamento que me dieron, les dije que no, que estaba bien que ya había entendido todo	1018
Q4*†	Medical Team's Skill Patient	Compassionate Care Uncertainty Leading to Fear	They brought me to the emergency room and I was afraid but the kindness and courage they showed me gave me confidence in the doctor, the nurses, all of them	Yo me llevaron de emergencias así tenía miedo, pero ya, el cariño y el valor que me mostraron me dieron confianza en el doctor, las enfermeras, todas.	1006
Q5*	Medical Team's Skill	Compassionate Care	And, when my husband asked to stay there, the nurse started to get rude and started telling my son that my husband didn't really have to be there because there are only two visitors per day…	Y, cuando mi esposo pidió quedar allí, la enfermera se puso a poner grosera y le empezó a decir a mi hijo que realmente mi esposo no tenía que estar allí porque solamente era dos visitas por día	1020
Q6*	System	Coordination of Care	They will call me in four to eight weeks, but it seems to me that the esophagus is something delicate so waiting eight weeks, that's two months… …. so I'm taking my medication that they gave me, but it is pain	De cuatro a ocho semanas me llamaban, pero, se supone que lo de el esófago es algo delicado entonces esperar ocho semanas son dos meses. … entonces estoy tomando mi medicamento que me	1027

			medication and that's it. But that's not treatment.	están dando, pero es medicamento que me- como para el dolor y ya. Pero entonces eso no es tratamiento	
Q7*	System	Coordination of Care	… this is a very protocolized system, very bureaucratic that is extremely slow to care for you. Not for the emergencies but for the urgent things, the quick ones, … you will wait a long time.	.. este es un sistema muy protocolar, muy burocrático que es muy sumamente lento para atender. No de las emergencias sino las urgencias, … te puede esperar más.	1032
Q8†	Patient	Uncertainty Leading to Fear	…at the clinic they told me to go to the emergency room so that they could treat me because they didn't know what I had in my throat. So, this made me worry a little bit.	…de la clínica me dijeron que fuera a la sala de emergencias para que me atendieron porque no sabían qué era lo que tenía yo en la garganta. Entonces eso fue lo que me dio un poquito de preocupación.	1018
Q9†	Medical Team's Skill	Effective Communication: Use of Professional Interpreters to Promote Understanding	First there was a person that helped me, and then after she had to go help other people and they put the video interpreter so that I could speak to someone and this helped.	Primero este estuve y ya después ella estuviera a ayudarles a otra persona y después este pusieron la, video intérprete, para estar hablando con alguien. Y ese me ayudó.	1007
Q10†	Medical Team's Skill	Effective Communication: Use of Professional Interpreters to Promote Understanding	Sometimes they didn't put [an interpreter] on because I could answer some things in English so then after that they didn't bring [an interpreter] for me. So many times I had to try to understand the medical terms that they were using.	A veces no los ponían [un intérprete] porque yo podía contestar algunas cosas en inglés entonces ya después ya no me llevaron [un intérprete]. Entonces tenía que--estaba muchas veces-- entender los términos médicos que me decían	1014
Q11†	Medical Team's Skill	Effective Communication: Use of Professional Interpreters to Promote Understanding	…so I told her 'Ther translator is outside' [The ED staff person] said, 'you don't need a translator' Okay I told myself. I thought that they weren't going to speak. And therefore I stayed quiet. And when she left the translator was outside and she said, 'I am here to translate for her;' she had gone to the bathroom and had returned. [The ED staff person said,], 'oh yes, I already told her what she needed to know.' I hadn't understood a damn thing that she had said.	…entonces le dije, "la traductora está fuera", [personal de ED] dijo, "no necesitaba una traductora," okey, me dije. Pensé que no me iba a hablar y no era para hablarme por eso me quedé quieto allí. Y cuando ella salió, estaba la traductora afuera y le dijo, "yo estoy para traducir a ella" o sea ella ha ido al baño y había vuelto. [El personal de ED dijo,]"o sí, yo ya le dije a ella," le dijo "yo ya le dije a ella lo que tenía que saber.". Yo no había entendido ni un carajo de que ella me había dicho	1021

Q12†	Medical Team's Skill	Effective Communication: Use of Professional Interpreters to Promote Understanding	Since he's my son, I feel more comfortable, my son isn't someone I don't know. So in this way I feel more comfortable when he is there.	Como es mi hijo, me siento más cómoda que sea mi hijo a una persona que no conozco. Entonces este, me sentía más cómodo cuando estaba mi hijo.	1020
Q13†	Medical Team's Skill	Effective Communication: Use of Professional Interpreters to Promote Understanding	Well, I had been at urgent care before and the doctor was angry that I had an interpreter on the Tablet …. Well, because of this I tried to speak [in the emergency room] in English without an interpreter because I felt like they prefer when you speak English so I tried to not use an interpreter…. I prefer to speak with an interpreter because with medical things, I want to be sure that they understand what I am saying and I want to be sure of what the doctor is telling me.	Bueno, yo, había estado en la sala de urgencia antes y la doctora se enojó que yo estaba con un intérprete en un Tablet… O sea esa trataba de hablarme [en la sala de emergencias] en inglés no estar el intérprete porque yo sentí como que oh, ellos prefieren que hablar en inglés. Entonces tratar de no usar intérprete…Yo prefiero hablar o sea hablar con un intérprete porque las cosas médicas quiero estar segura de que me entendieron lo que estoy diciendo y yo quiero estar segura de lo que me están diciendo la doctora.	1031
Q14†	Medical Team's Skill	Receiving Equitable Care	No, well, as I told you, they treat you normally as if you were another normal person, there is no discrimination. Some places, well, you know that sometimes because of your color or simply people don't like you because of the country you come from and that, but nothing, there was always a lot of respect. Everything was done with great respect.	No, pues, como te digo que, que te tratan normal como si fueras otra una persona normal, no hay discriminación. Algunos lugares pues, ya sabes que a veces por el color o simplemente la gente no le gustó uno por el país de que uno viene y eso, pero nada, siempre fue con mucho respeto. Todo fue con mucho respeto.	1014
Q15†	Medical Team's Skill	Receiving Equitable Care	There was a lady who didn't pay attention to me …As a Hispanic, you know when someone is racist—there are specific words that you shouldn't use-- but I didn't like the way she treated me,	Fuera una señora que no me puso atención …Una como hispana sabe cuándo alguien es racista--específica palabras que no tendría que usar-- pero no me gustó su manera de atenderme.	1021
Q16†	Medical Team's Skill	Technical Proficiency	… the girl that took my blood, couldn't find [my vein] and I felt very mistreated. Because she poked me three times and she couldn't take the blood. I felt bad because what they did to me hurt a lot.	… la muchacha que le tocó sacarme la sangre le costó encontrarme [la vena] y me sentí como me maltrató mucho. Porque me inyecto tres veces y no pudo sacarme la sangre, ves. Ahí sí me sentí un poco mal porque me, me dolió mucho lo que me hizo.	1010

Q17†	Medical Team's Skill	Technical Proficiency	They put my arm in a cast and … 'now you can go' I told her, 'excuse me, a question, and what about my face and my head, what?' Then the girl was nervous and she said 'one moment' and she went to ask the doctors or I don't know who, and then they began to take x-rays of my whole face.... Something this obvious where I had a face like a monster, it was incredible that they didn't do any exam when I arrived	Me enyesaron el brazo todo "y ya se puede ir" le dije "perdón, una pregunta, ¿y mi cara y mi cabeza qué?" Entonces la chica como se asustó dijo "Ha un momentito" y se fue a preguntar a los médicos o no sé quién y allí si me empezaron a tomar las tomografías y todo de la cara. ... y algo tan evidente donde yo tenía la cara como un monstro era increíble que no me hicieron ningún examen cuando yo ya llegué	1001
Q18†	Medical Team's Skill	Technical Proficiency	…in spite of the fact that I was there with an illness, the treatment was really very good, the way they cared for me was very appropriate for my problem	Sí, bueno la experiencia fue a pesar de que iba este con una enfermedad, el trato fue muy bueno realmente, este, lo que me atendieron se mostraron muy accesible a mi problema.	1011
Q19†	Medical Team's Skill	Technical Proficiency: Complete Workup	I have known that the other hospitals, they take a long time and then they don't do the tests that they should do. For me, they did everything	he sabido que los otros hospitales de este tardan mucho y aparte no les hacen estudios como deben hacer. A mí, me hicieron de todo.	1004
Q20†	Medical Team's Skill	Technical Proficiency: Complete Workup	Well I thought they should have done [the test] because I definitely didn't know what was happening to me. And if the other [physician] recommended that they do this, I said well, that's what I wanted to do.	Bueno yo pensé que sí, debería haber hecho [la prueba] porque definidamente eso no sabía qué era lo que me pasaba. Y este si la otra doctora todavía recomendaba que hicieron esto, dije bueno es lo que quería hacer.	1031
Q21†	System	Efficiency of Care	The most positive [part of my visit] was how quickly I was treated.	La más positivas [de la visita] fue lo rápido que, que fui atendido	1011
Q22†	System	Efficiency of Care	I understand that there are a lot of people, it's a small space so you have to wait…it is very delayed, a lot of delays.	hay que entender que llega mucha gente, el espacio es muy pequeño, entonces pues hay que esperar ... es bien demorado, mucha demora	1027
Q23†	System	Efficiency of Care	I did not like that I was there 12 hours-- this was an emergency—it seemed to me that they didn't care about me. Twelve hours waiting for them to take care of you…That seems outrageous to me	No me gustó haber estado 12 horas—este era una emergencia-- me parece que no les importaba. Doce horas esperando para que te atiendan. …o. Me pareció una barbaridad eh	1021

*Reinforcing theme; †Emerging theme

Discussion

We described how themes within the domains of patient, medical team's skill, and system, impacted Spanish-speaking patients with NELP perceptions of PCC, defined as understanding the patients' experience of the illness; the professional's relationship with the patient; and coordination of care in the system.[10] Several of the identified themes and sub-themes such as coordination of follow-up care, shared decision-making, open communication and compassionate care have been described previously and are often incorporated into PCC definitions.[10] However, other themes and sub-themes, including patient uncertainty leading to fear, use of professional interpreters to promote understanding, receiving equitable care, technical proficiency and efficiency of care are not explicitly described in PCC definitions. This suggests that while the proposed domains typically included in PCC definitions such as patient, relationship and system;[10] or needs, preferences, values;[6] may apply across settings and populations; the conceptualization of the themes and subthemes within each domain likely vary based on the setting where care is provided and the population who is receiving care.

The results of this study showed that for many patients, the uncertainty surrounding having to go to the ED contributed to fear about symptoms and the severity of their illness. This finding is similar to results from other studies in the ED.[87–92] Building on prior work by Rising et al., we hypothesize that in addition to common intrinsic uncertainty about symptoms and severity, patients with NELP specifically may have additional uncertainty due to extrinsic concerns about challenges with communication.[88] Effective communication and understanding were critical components of PCC for participants in this study. Interestingly, participants described situations where ED staff empathy assuaged patients' feelings of uncertainty and instilled confidence in the care that was given. Taken together, these findings suggest that effective communication that promotes understanding and empathy during ED encounters are strategies that promote PCC in Spanish-speaking ED patients.

Given the importance of effective communication and the role professional interpreters have in promoting understanding in patients with NELP, it was surprising how many of the participants in this study reported using professional interpreters only intermittently in the ED. Consistent use of professional interpreters in the ED setting can be challenging given that ED encounters are often unplanned and include several interactions over many hours. However, similar to previous studies that found a positive

association between use of professional interpreters and quality of care,[61,93–96] participants in this study described how use of professional interpreters promoted understanding and positively impacted their experience of PCC. This was true even among participants who spoke some English. Because of these results, we suggest that health care systems set up their electronic health records to flag patients as needing an interpreter based, at least in part, on patient preference. In the ED setting specifically, previous work has highlighted how various interventions to improve visibility of patient preference for an interpreter such as ED trackboard icons and triage screening questions can increase the identification of patients who need and use professional interpreters.[36,97,98] Likewise, placing the technology to access professional interpreters in each patient room and ensuring interpreters are rapidly available are two strategies that have successfully increased the use of professional interpreters in other acute care settings.[99,100] Interventions like these should be implemented in EDs to improve PCC in Spanish-speaking patients. Finally, it may be important to train all ED staff on the importance of identifying and honoring the patient's preference for interpreters during every communication encounter in the ED even if the medical staff perceive that the patient speaks English, or it is a trivial interaction.

Receiving equitable care is another component of PCC identified in this analysis that may be unique to patients with NELP and other patients at risk for experiencing discrimination. Similar to previous epidemiological studies that studied immigrant populations broadly,[101,102] participants in this study associated equitable care with PCC. Historically, Latinos in the US have faced discrimination in employment, housing, education and healthcare.[103,104] Additionally, in emergency medicine, discrimination has been widely studied.[105] The findings from this study suggest that treating patients with respect, being responsive to patient needs and using unprejudiced and inclusive language are important components of delivering equitable care to Spanish-speaking ED patients.

Similar to previous work about patient satisfaction in general ED populations, [87,106–109] the participants in this study associated efficiency of care in the ED with PCC. Interestingly, many of the participants expected to wait, acknowledging inherent limitations of the ED (e.g. high patient volumes, insufficient rooms, or health care staff). However, even among these patients, inefficiency of care was associated with a worse experience of PCC. ED crowding is a complex issue with no straightforward solutions. It is plausible that frustrations with delays are a result of misaligned expectations.[110] Previous

studies have found discrepancies between patient perception of urgency or anticipated wait times and the experienced wait times.[111,112] As suggested in other studies,[110,113] ED leaders could consider providing patients with expectations about wait time when they register at the ED as a way of improving PCC in patients.

Previous work[114,115] has explored the relationship between technical proficiency and quality of care and the results have been mixed. The results from this analysis suggest that technical proficiency is a critically important component of PCC in the ED for Spanish-speaking patients. While some may consider PCC as distinct from biomedical care, we believe that PCC is an orientation to care that should include all aspects of a patient's visit. Therefore, we suggest that future definitions of PCC include technical proficiency as a domain.

The results of this study should be considered in the context of several limitations. First, the recruitment strategy was an opt-in system, and it is possible that participants who had particularly memorable (good or bad) ED experiences were more willing to participate. Second, two of the interviews were very short (~ 16 minutes). Despite multiple attempts, we were unable to get these participants to expand on their experiences. Third, the sampling frame was limited given that only 2.5% of the ED visits at this site are with patients who are Spanish speakers. Finally, using study team members to pilot test the interviews is a limitation as study team members are likely not representative of the study population.

This study, in combination with what has been previously reported in ED literature, has provided a more nuanced understanding of how Spanish-speaking patients with NELP experience PCC in the ED. The strategies we suggest to improve PCC include system-level strategies such as increasing visibility of interpreter need via the electronic health record, placing technology to contact interpreters in every patient room and sharing expected wait times with patients during triage. Additionally, training opportunities for ED staff should focus on ensuring we honor patient preferences for interpreters in every communication exchange in the ED and recognizing the importance of respect and responsiveness to patient needs as strategies that can directly and indirectly promote PCC. Finally, future studies on PCC should include technical proficiency as a domain of PCC. By implementing these strategies, we can more comprehensively study PCC and we can improve PCC outcomes for Spanish-speaking ED patients with NELP.

5. Manuscript 3

Comparison of Time to Sepsis Alert and Time to Antibiotics between Emergency Department Patients with Non-English Language Preferences and English Language Preferences

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ABSTRACT

Objective: The objective of this study was to identify patients with sepsis and to compare time to sepsis alert activation and time to antibiotic administration, between patients with a non-English language preference (NELP) and patients with an English language preference (ELP). Our secondary objectives were to compare outcomes in ESI 2 only, ESI 3-5 and between language groups.

Methods: We conducted a retrospective observational study using data extracted from the electronic health record at two EDs in the Midwest. Our independent variable was preferred language, and the dependent variables were time to sepsis alerts and times to antibiotic administration. Time to sepsis alert was further divided into alerts triggered manually and alerts triggered automatically. We developed unadjusted, multivariable adjusted and multivariable adjusted + inverse probability of treatment weight (IPTW) Cox proportional hazard models for all time to event outcomes in the overall population, in ESI 2 only, in ESI 3-5 and then within NELP patient groups (Spanish-speakers vs. all other NELP patients).

Results: The NELP group comprised 3.3% (n=557) of the total sample and these patients spoke 41 unique languages. There were no overall differences in the time to sepsis alerts triggered manually in any of the three models comparing patients with ELP to patients with NELP. When comparing time to sepsis alerts triggered manually in the ESI 3-5 subgroup, depending on the model, time to sepsis alert in the NELP patients was anywhere from 22% to 28% slower than time to alert in the ELP patients (unadjusted: HR: 0.78, 95% CI 0.63-0.97, p=0.027; covariate adjusted: HR: 0.77, 95% CI 0.62, 0.97, p= 0.030; covariate +IPTW: HR: 0.72, 95% CI 0.56, 0.92, p<0.010). In multivariable models, there were no differences in time to alerts triggered automatically overall or by subgroup, and there were no differences in time to antibiotic administration overall or by subgroups.

Conclusion: Overall, we found that there were no differences in time to sepsis alert between patients with ELP and patients with NELP. However, in patients where the alert triggered manually, the NELP patients with ESI 2 had faster time to alert than the ELP patients while the NELP patients with ESI 3-5 had slower time to alert than the ELP patients. This suggests that more work needs to be done to rapidly identify NELP patients with sepsis and quickly access professional interpreters. Additionally, there were no differences in time to antibiotic administration overall or in any subgroup suggesting that well-designed BPAs could be a useful tool in eliminating health disparities for important clinical metrics.

Future research should explore differences in time to sepsis alert or antibiotic administration by language preference in nationally representative data and examine the association with short and long-term outcomes such as length of admission and mortality.

Key Words: Non-English language preference, sepsis, emergency department, best practice alerts

INTRODUCTION

Sepsis is a major cause of morbidity and mortality in the United States causing an estimated 1.7 million annual hospitalizations and 270,000 deaths.[16] However, there are significant differences in outcomes based on a variety of social determinants of health including sex, race, socioeconomic status and English proficiency.[17–21]

To improve morbidity and mortality related to sepsis, the Surviving Sepsis Campaign has focused on early detection via clinical decision support (CDS) tools.[116] Manual screening for sepsis or automatic electronic best practice alerts (BPAs) built into electronic health record (EHR) systems are routinely integrated into care, [117–119] and they are associated with better outcomes for patients.[119] CDS tools, which includes BPAs, have been proposed as a tool that could reduce disparities in healthcare;[120,121] however evidence of the effectiveness of CDS in reducing health disparities is mixed.[122–125]

Regarding treatment of sepsis, the Surviving Sepsis Campaign recommends immediate antibiotics for all patients with suspected severe sepsis and septic shock, ideally within 1 hour of recognition.[116] Guideline appropriate time to antibiotics has been associated with decreased lengths of stays and decreased morbidity and mortality in these populations.[126–128] However, it is unclear if the time to antibiotics varies by patient characteristics such as language status.

Two recent studies have found increases in sepsis mortality among patients with limited English proficiency compared with English-speaking patients.[20,21] However, it is unclear what is driving this disparity. Therefore, the objective of this study was to identify patients with sepsis and to compare diagnostic delays, defined as time to sepsis alert activation, and treatment delays, defined as time to antibiotic administration, between patients with a non-English language preference (NELP) and patients with an English language preference (ELP). Our secondary objectives were to compare outcomes by ESI severity (ESI 2 only and ESI 3-5) and between language groups. Overall, due to language discordant communication, we hypothesized that NELP patients would have longer time to sepsis alert and time to antibiotic administration compared to patients with ELP. We ran subgroup analyses based on ESI status because we hypothesized that compared to patients with ESI 2, patients with an ESI of 3-5 would have less obvious signs and symptoms of sepsis and therefore the clinical team would need to rely more heavily on their communication with the patient to make diagnostic and treatment decisions. Therefore

we hypothesized that we would be more likely to see longer time to event outcomes in NELP patients compared to ELP patients among patients with ESI 3-5. In the subgroup analyses by language group, we hypothesized that Spanish-speaking patients would have better time to sepsis alert and time to antibiotic administration than other less common language groups because Spanish-speaking patients are the largest NELP group treated in our ED and there is often rapid access to high quality, in-person interpreter services.

METHODS

We conducted a retrospective, observational study that used EHR data (Epic, Verona WI). This study included adult patients presenting to two Midwestern EDs in the same healthcare system from July 14, 2014 through December 31, 2023 with sepsis. Combined, these two EDs see approximately 70,000 patient-visits per year. This study was approved by the local institutional review board.

Selection of Participants

All adult patients who initially presented to these EDs, were not transferred in or out and had a sepsis or severe sepsis best practice alert (BPA) or code sepsis triggered during the first three hours of their ED stay were included in the sample. We included visits starting in July 2014 because that was when the sepsis BPAs were implemented. The BPA criteria are based on the current Centers for Medicare and Medicaid (CMS) definition, Sepsis 2, which defines sepsis as suspected or documented infection and greater than or equal to two SIRS criteria.[129] Functionally, the BPA is triggered when there is a combination of abnormal vital signs and/or laboratory values plus either fever or nurse documentation of suspected infection (**Table 1**). The severe sepsis BPA is triggered when there is a combination of abnormal vital signs and/or laboratory values and either fever or any of the following: antibiotics ordered, suspicion of infection documented by physician or nurse, rigors documented by nurse, abnormal bandemia, procalcitonin ordered or blood cultures ordered. Code sepsis is triggered manually by a nurse or physician when there is a suspicion of severe sepsis or septic shock.

Table 1. Description of Sepsis Best Practice Alert Logic and Description of Classification of a Manual Sepsis Alert Trigger

Sepsis Best Practice Alert Criteria	Severe Sepsis Best Practice Alert Criteria
1. Heart Rate > 90	1. Temperature > 38°C
2. Respiratory Rate > 20	2. Heart Rate > 90
3. Oxygen Saturation < 90	3. Respiratory Rate > 20
4. Temperature > 38°C	4. White Blood Cell < 4,000 or > 12,000
5. Mean Arterial Pressure < 65	5. Antibiotic Order Placed*
6. Suspicion of Infection*	6. Systolic Blood Pressure < 90
7. Severe Sepsis BPA has Fired	7. Mean Arterial Pressure < 65
8. Creatinine > 2	8. Creatinine > 2
9. Bilirubin > 2	9. Bilirubin > 2
10. Platelets <100,000	10. Platelets <100,000
11. International Normalized Ratio > 1.5 or Partial Thromboplastin Time > 60	11. International Normalized Ratio > 1.5 or Partial Thromboplastin Time > 60
12. Altered Mental Status	12. Altered Mental Status
13. Lactate > 2	13. Lactate > 2
	14. Suspicion of Infection*
	15. Troponin Ordered
	16. Rigors Documented*
	17. Abnormal Bandemia
	18. Procalcitonin Ordered*
	19. Blood Culture Ordered*
Logic: (((((1 AND 2) OR (1 AND 3) OR (1 AND 4) OR (2 AND 3) OR (2 AND 4) OR (3 AND 4)) AND 6) OR (4 AND (1 OR 2 OR 3))) AND NOT (5 OR 8 OR 9 OR 10 OR 11 0R 12 OR 13) AND NOT 7)	Logic: ((((1 AND 2) OR (1 AND 3) OR (1 AND 4) OR (2 AND 3) OR (2 AND 4) OR (3 AND 4)) AND ((6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 15))) AND (5 OR 1 OR 14 OR 16 OR 17 OR 18 OR 19))

* When there was no temperature > 38 °C during first 3 hours of ED visit, the presence of these criteria, bucketed the sepsis alert trigger as a manual trigger

We excluded patient encounters where the preferred language field was missing or listed as unknown as this was the independent variable in this study. We also excluded all patient encounters who had an emergency severity index (ESI) score of 1 because these patients receive immediate, intensive resuscitation efforts upon arrival to the ED and therefore we would not expect differences in outcomes by language status. Due to concerns with independence, we excluded any subsequent ED encounters involving sepsis alerts. Finally, we excluded encounters that had first alert > 3 hours after the ED arrival as these patients are developing signs and symptoms of sepsis while they are in the ED as opposed to arriving to the ED with signs and symptoms of sepsis. All patient encounters were then categorized as

being an ELP encounter or a NELP encounter based on the language that was populated in the preferred language field in the EHR.

Patient Characteristics

We extracted socio-demographic variables that included age, sex (male, female), race (American Indian or Alaska Native, Asian, Black, Native Hawaiian or Pacific Islander, White, mixed race, or patient declines to answer/unknown) and ethnicity (Hispanic/Latinx, non-Hispanic/Latinx, unknown/patient declines to answer). We also extracted several clinical encounter variables including patient insurance status (Medicaid, Medicare, private insurance, or unknown/self-pay); ED disposition (discharged, admitted/transferred, died in the ED or left against medical advice or before exam was complete); mode of arrival (self or family/friends, emergency medical services, or other/unknown); and ESI. ESI is a triage acuity tool measured on a scale of 1 through 5 with one being resuscitation and 5 being non-urgent. We collected first ED vitals including heart rate, pulse oxygen percentage, respiratory rate, temperature, and systolic and diastolic blood pressure. Lastly, we extracted length of hospital stay, intensive care unit admission during hospital stay (yes/no) and in hospital mortality (yes/no).

Outcomes

The primary outcomes were time to sepsis alert and time to antibiotic administration. We calculated time to alert by subtracting the arrival time from time of alert. During an ED encounter, each patient could have multiple BPAs and a code sepsis. For this analysis we utilized the time to first event as the outcome variable. We further divided time to alert encounters based on whether the alert was triggered manually or automatically. We hypothesized that we would see differences in the time to alert between NELP and ELP patients in the manually triggered alerts as these alerts likely require more communication than BPAs triggered automatically. We defined an alert as being triggered manually if their first alert was a code sepsis or if the patient had nurse or physician suspicion of infection, nurse documentation of rigors, antibiotics ordered, or blood culture orders and no fever was documented in the first three hours of the ED visit. We defined an alert as automatic if the first alert was a BPA and they had a documented fever within the first three hours of the visit. We dropped encounters when it was not clear what triggered the alert. Time to antibiotic administration was only calculated among patients who were

given antibiotics within the first three hours of their visit. We calculated time to antibiotic administration by subtracting the arrival time from time of antibiotic administration.

Analysis

We compared differences in socio-demographic variables, clinical encounter variables, vital signs and outcome variables between patient encounters that were ELP and NELP. Two sided t tests were used for continuous variables and Chi-Square tests were used to compare categorical variables. Given the skewed distribution of hospital length of stay, time to sepsis alert and time to antibiotics, we compared differences in the distribution by language groups using the Kruskal-Wallis test.

We built Cox proportional hazard models to evaluate differences in time to sepsis alert in patients where the alert was triggered manually, time to sepsis alert in patients where the alert was triggered automatically; and time to antibiotic administration in the ELP groups vs. the NELP group. We ran unadjusted, multivariable adjusted and multivariable + inverse probability of treatment weighting (IPTW) models. In multivariable adjustments, we adjusted for age, sex, insurance status, and ESI. We included age, sex, insurance status, and ESI in the propensity score used in the IPTW model because previous literature and expert opinion hypothesized these variables would confound the analysis.[126,130–132] We used IPTW to balance baseline patient characteristics that we hypothesized were confounders between the two groups.[133,134] To evaluate the success of the IPTW models we assessed the balance between the two groups for all baseline characteristics included in the propensity score before and after weighting using standardized differences. We used the rule of thumb that a standardized difference of <10% is negligible imbalance between the two groups.[134]

Finally, for subgroup analyses, we built Cox proportional hazard models for patients with ESI 2 only and ESI 3-5. We also evaluated differences within the NELP group (Spanish-speaking vs. all other NELP languages) using Cox proportional hazard models. We used the same analysis plan that was conducted in the primary analysis for all subgroup analyses. All analyses were conducted in R version 3.4.2.[135]

RESULTS

Figure 1 describes the selection of the sample. NELP patients comprised 3.3% (n=557) of the sample and these patients spoke 41 unique languages. The 5 most common non-English languages were

Spanish (65%, n=362); Hmong (8%, n=44); Chinese-Mandarin (5%, n=30); Arabic (3%, n=16) and American Sign Language (3%, n=14). Overall, 99% (n=16,779) of the encounters had a sepsis BPA and 6% (n=1,082) had a code sepsis. Five percent of encounters (n= 908) had both a sepsis BPA and code sepsis.

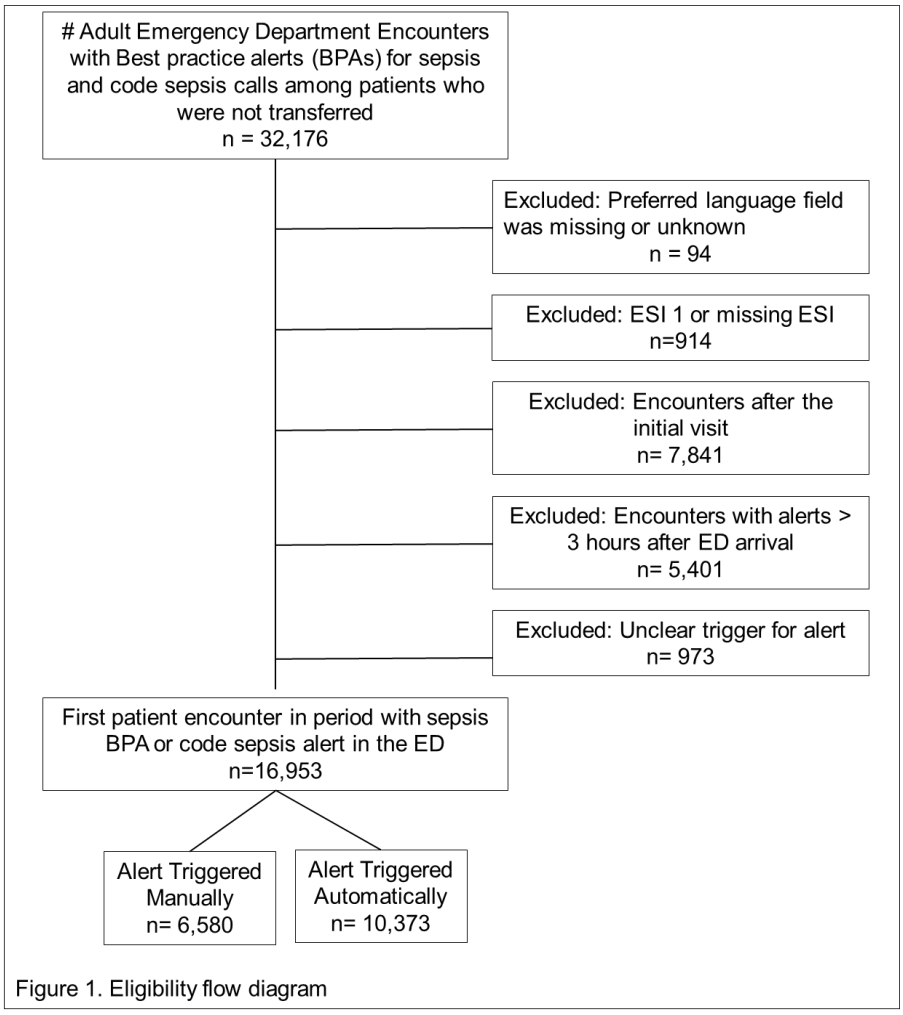

Figure 1. Eligibility flow diagram

Table 2 compares socio-demographic, clinical encounter variables, vitals and outcomes between the NELP and ELP populations. The NELP group was significantly younger than the ELP group (50.8 years vs. 52.7 years p=0.032). Additionally, the ELP group was significantly less racially and ethnically diverse than the NELP group with 96% of the ELP group identifying as non-Hispanic and 85% identifying as White compared with 65% and 56% in the NELP group (p<0.001 for both comparisons). A significantly higher proportion of patients in the NELP group had unknown or self-pay insurance status compared with patients in the ELP group (28% vs. 5%; p<0.001). ELP patients arrived by EMS significantly more often than NELP patients (35% vs. 24%; p<0.001). Patients in this sample had a median stay in the hospital of 2.2 days; about 9% of patients were admitted to the ICU and there was an overall in-hospital mortality of 3% and these outcomes did not vary by language group.

Table 2. Demographic and Healthcare Encounter Characteristics by Language Group for Patients who Had a Sepsis Best Practice Alert or Code Sepsis, n(%)

	Non-English Language Preference (n=557)	English Language Preference (n=16,396)	P Value*
Age, mean (sd)	50.8 (19.1)	52.7 (20.7)	0.032
Sex			0.267
Female	284 (51.0)	7,953 (48.5)	
Male	198 (35.5)	8,443 (51.5)	
Ethnicity			<0.001
Hispanic/Latinx	359 (64.5)	15,790 (96.3)	
Not Hispanic or Latinx	198 (35.5)	542 (3.3)	
Declined to Answer/Unknown	0 (0.0)	64 (0.4)	
Race			<0.001
American Indian or Alaska Native	29 (5.2)	124 (0.8)	
Asian	129 (23.2)	465 (2.8)	
Black	19 (3.4)	1,587 (9.7)	
Native Hawaiian or Pacific Islander	4 (0.7)	19 (0.1)	
White	309 (55.5)	13,896 (84.8)	
Mixed Race	8 (1.4)	170 (1.0)	
Declined to Answer/Unknown	59 (10.6)	135 (0.8)	
Insurance Status			<0.001
Private	179 (32.1)	7,274 (44.4)	
Medicare	106 (19.0)	6,281 (38.3)	
Medicaid	116 (20.8)	2,071 (12.6)	
Unknown/Self Pay	156 (28.0)	770 (4.7)	
ED Disposition			0.088
Discharged	219 (39.3)	5,607 (34.2)	
Admitted/Transferred	336 (60.3)	10,727 (65.4)	
Died in the ED	0 (0.0)	8 (0.0)	
Against Medical Advice or Before Exam Complete	2 (0.4)	54 (0.3)	
Mode of Arrival			<0.001
Self or Family/Friends	420 (75.4)	10,475 (63.9)	
EMS	135 (24.2)	5,783 (35.3)	
Other/Unknown	2 (0.4)	138 (0.8)	
Emergency Severity Index			0.053
1 (Resuscitation)	0 (0.0)	0 (0.0)	
2 (Emergent)	226 (40.6)	7,489 (45.7)	
3 (Urgent)	318 (57.1)	8,409 (51.3)	
4 (Less Urgent)	13 (2.3)	489 (3.0)	
5 (Nonurgent)	0 (0.0)	9 (0.1)	
First Heart Rate, mean (sd)	104.4 (18.6)	103.0 (18.6)	0.090

First Pulse Oxygen Percentage, mean (sd)	95.9 (4.4)	95.1 (4.7)	<0.001
First Respiratory Rate, mean (sd)	21.7 (6.6)	21.4 (5.6)	0.257
First Systolic Blood Pressure, mean (sd)	134.7 (27.5)	134.8 (27.0)	0.936
First Diastolic Blood Pressure, mean (sd)	77.5 (14.3)	77.1 (15.1)	0.551
First Temperature > 100.4°F	298 (54.0)	7,246 (44.4)	<0.001
Trigger for Alert			<0.001
Staff Suspicion of Infection & Abnormal Vitals (manual)	173 (31.1)	6,407 (39.1)	
Fever & Abnormal Vitals (automatic)	384 (68.9)	9,989 (60.9)	
Minutes to Sepsis Alert, median (IQR)	41.0 (17.0, 96.0)	46.0 (20.0, 96.0)	0.099
Given Antibiotics	237 (42.5)	7,231 (44.1)	0.495
Minutes to Administration of Antibiotics, median (IQR)	103.0 (66.0, 142.0)	99.0 (64.0, 134.0)	0.142
Hospital Length of Stay in days, median (IQR)	2.0 (0.2, 4.8)	2.2 (0.2, 5.0)	0.397
ICU Admission During Hospital Stay	48 (8.6)	1,441 (8.8)	0.949
Mortality During Hospital Stay	8 (1.4)	450 (2.7)	0.220

The overall median time to sepsis alerts triggered manually was 62 minutes and this did not vary by language group (p = 0.216, data not shown). Table 3 shows the results from the Cox proportional hazard models for time to sepsis alert in the patients who had their alert triggered manually when comparing NELP and ELP patients overall and in all subgroup analyses (full models in appendices). In the overall group, across all three models, there were no differences in time to sepsis alerts triggered manually between ELP and NELP patients. When comparing time to sepsis alerts triggered manually in the ESI 2 group only, we found that in the covariate adjusted and covariate +IPTW models, the time to sepsis alert in the NELP patients was 29% and 42% faster respectively than the ELP patients (covariate adjusted: HR: 1.29, 95% CI 1.04, 1.60, p= 0.019; covariate +IPTW: HR: 1.42, 95% CI 1.17, 1.73, p<0.001). When comparing time to sepsis alerts triggered manually in the ESI 3-5 group, depending on the model, time to sepsis alert in the NELP patients was anywhere from 22% to 28% slower than time to alert in ELP patients (unadjusted: HR: 0.78, 95% CI 0.63-0.97, p=0.027; covariate adjusted: HR: 0.77, 95% CI 0.62, 0.97, p= 0.030; covariate +IPTW: HR: 0.72, 95% CI 0.56, 0.92, p<0.010). There were no differences in time to sepsis alerts triggered manually in the subgroup analyses comparing Spanish-speaking NELP patients to other NELP patients.

In unadjusted comparisons, NELP patients were significantly more likely to have their alert trigger automatically compared to ELP patients (69% vs. 61%, p<0.001). The overall median time to sepsis alerts triggered automatically was 37 minutes and this did not vary by language group (p = 0.304, data not

Table 3. Cox Proportional Hazard Models for Time to Sepsis Alert among Patients where the Alert Triggered Manually

	Unadjusted Model		Covariate Adjusted Model		Covariate and IPTW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Comparison between Patients with Non-English Language Preference and English Language Preference (n=6,580)						
Non-English Language Preference	0.94 (0.81, 1.10)	0.458	1.00 (0.85, 1.16)	0.949	1.08 (0.92, 1.27)	0.348
English Language Preference	reference	reference	reference	reference	reference	reference
Emergency Severity Index of 2: Comparison between Patients with Non-English Language Preference and English Language Preference (n=3,576)						
Non-English Language Preference	1.21 (0.98, 1.49)	0.075	1.29 (1.04, 1.60)	0.019	1.42 (1.17, 1.73)	<0.001
English Language Preference	reference	reference	reference	reference	reference	reference
Emergency Severity Index of 3-5: Comparison between Patients with Non-English Language Preference and English Language Preference (n=3,004)						
Non-English Language Preference	0.78 (0.63, 0.97)	0.027	0.77 (0.62, 0.97)	0.030	0.72 (0.56, 0.92)	0.010
English Language Preference	reference	reference	reference	reference	reference	reference
Comparison between Spanish-speaking Patients with Non-English Language Preferences and All other Patients with Non-English Language Preferences (n=173)						
Other Non-English Language Preference	1.14 (0.84, 1.54)	0.405	1.04 (0.74, 1.46)	0.833	1.00 (0.70, 1.42)	0.980
Spanish Language Preference	reference	reference	reference	reference	reference	reference

shown). Table 4 shows the results from the Cox proportional hazard models for time to sepsis alert in the patients who had their alert triggered automatically when comparing NELP and ELP patients overall and in all subgroup analyses (full models in appendices). In the overall group, when comparing time to sepsis alert in alerts that triggered automatically between ELP and NELP patients, there was no difference across all three models. In the unadjusted model, when comparing time to sepsis alert when the alert triggered automatically in the ESI 2 group only, patients with NELP had 24% quicker time to alert than ELP patients (HR: 1.24, 95% CI 1.05, 1.48, $p < 0.012$). However, this comparison was no longer

statistically significant in the covariate adjusted and covariate +IPTW models. There were no differences in time to sepsis alerts that triggered automatically in the subgroup analyses comparing time to alert in NELP vs. ELP among patients with ESI 3-5 or when comparing Spanish-speaking NELP to other NELP patients.

Table 4. Cox Proportional Hazard Models for Time to Sepsis Alert among Patients where the Alert Triggered Automatically

	Unadjusted Model		Covariate Adjusted Model		Covariate and IPTW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Comparison between Patients with Non-English Language Preference and English Language Preference (n=10,373)						
Non-English Language Preference	1.05 (0.95, 1.16)	0.361	1.06 (0.96, 1.18)	0.263	1.06 (0.93, 1.20)	0.390
English Language Preference	reference	reference	reference	reference	reference	reference
Emergency Severity Index of 2: Comparison between Patients with Non-English Language Preference and English Language Preference (n=4,137)						
Non-English Language Preference	1.24 (1.05, 1.48)	0.012	1.23 (1.03, 1.46)	0.131	1.19 (0.97, 1.46)	0.091
English Language Preference	reference	reference	reference	reference	reference	reference
Emergency Severity Index of 3-5: Comparison between Patients with Non-English Language Preference and English Language Preference (n=6,234)						
Non-English Language Preference	0.99 (0.87, 1.13)	0.890	0.99 (0.87, 1.13)	0.932	0.95 (0.82, 1.11)	0.549
English Language Preference	reference	reference	reference	reference	reference	reference
Comparison between Spanish-speaking Patients with Non-English Language Preferences and All other Patients with Non-English Language Preferences (n=346)						
Other Non-English Language Preference	1.01 (0.81, 1.25)	0.947	1.14 (0.89, 1.45)	0.300	1.18 (0.93, 1.49)	0.169
Spanish Language Preference	reference	reference	reference	reference	reference	reference

Of the patients who had a sepsis BPA or code sepsis, 44% (n= 7,468) received antibiotics within the first three hours of their stay. A full description of the socio-demographic and clinical encounter variables, vital signs, and outcomes for this subgroup is available in appendices. Generally, this subgroup looked similar to the overall sample with NELP patients being significantly more racially and ethnically diverse, significantly more likely to have unknown or self-pay insurance status and significantly more likely to arrive by family or friend. NELP patients were also significantly more likely to have their first temperature in the ED be above 100.4 °F. Additionally, there were no significant differences between the two groups for hospital length of stay, ICU admission or mortality.

Table 5. Cox Proportional Hazard Models for Time to Antibiotics

	Unadjusted Model		Covariate Adjusted Model		Covariate and IPTW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Comparison between Patients with Non-English Language Preference and English Language Preference (n=7,468)						
Non-English Language Preference	0.91 (0.80, 1.04)	0.152	0.94 (0.82, 1.07)	0.335	0.93 (0.79, 1.09)	0.340
English Language Preference	reference	reference	reference	reference	reference	reference
Emergency Severity Index of 2: Comparison between Patients with Non-English Language Preference and English Language Preference (n=4,527)						
Non-English Language Preference	0.94 (0.80, 1.12)	0.510	0.97 (0.81, 1.15)	0.690	1.02 (0.83, 1.25)	0.869
English Language Preference	reference	reference	reference	reference	reference	reference
Emergency Severity Index of 3-5: Comparison between Patients with Non-English Language Preference and English Language Preference (n=2,941)						
Non-English Language Preference	0.89 (0.72, 1.08)	0.233	0.88 (0.71, 1.08)	0.207	0.89 (0.71, 1.14)	0.360
English Language Preference	reference	reference	reference	reference	reference	reference
Comparison between Spanish-speaking Patients with Non-English Language Preferences and All other Patients with Non-English Language Preferences (n=237)						
Other Non-English Language Preference	0.84 (0.64, 1.10)	0.208	0.93 (0.66, 1.31)	0.672	0.94 (0.66, 1.36)	0.773
Spanish Language Preference	reference	reference	reference	reference	reference	reference

In nonparametric comparisons of medians, there were no significant differences in time to antibiotic administration between ELP and NELP patients (99 minutes (Interquartile range (IQR): 64, 134) vs. 103 minutes (IQR 66, 142), p <0.420). Likewise, in all the Cox proportional hazard models, there were no significant differences in time to antibiotics when comparing NELP patients with ELP (Table 5, full models available in appendices). There were no differences in time to antibiotics in the subgroups analyses looking only at patients with ESI 2 and ESI 3 to 5 or in the subgroup comparing time to antibiotics by language subgroup.

DISCUSSION

This study included over 16,000 patient encounters involving sepsis alerts over 9.5 years. Overall, we found that there were no significant differences in time to sepsis alert when triggered manually or automatically when comparing patients with NELP to patients with ELP. Additionally in subgroup analyses there were no differences in time to sepsis alerts that were triggered automatically. These findings went against our hypothesis that NELP patients would have longer time to event outcomes due to language discordant communication. Although patients with NELP experience a wide variety of disparities in care,[136–140] these findings suggest that in our EDs, patients with NELP do not experience delays in sepsis alerts triggered automatically. It is important to study how CDS tools behave in different populations because algorithmic bias in health care can exacerbate social inequities.[141–144] This BPA is an example of a carefully built CDS tool that limits bias between ELP and NELP patients because it includes a pathway for triggering the alert that is completely based on objective vital sign data.

While we found no differences in time to alert overall and in the group that had an automatic trigger, we found that the time to alerts triggered manually in NELP patients with ESI 2 status was significantly shorter compared to ELP patients with ESI 2 status. Recent literature has shown a significant amount of cognitive bias in ED nurses assignment of ESI status.[145] It is possible that it is harder for nurses to communicate with NELP patients in language discordant triage encounters. This could result in differential assignment of ESI status based on how well the triage nurse is able to communicate with the patient. For example, it is possible that due to language discordant communication, only the NELP patients who are the most obviously ill (i.e. abnormal vital signs or appearance) are given an ESI 2 which

may be different from how ELP patients are assigned ESI 2 status. This could result in the NELP patients with ESI 2 status being more severely ill than the ELP patients with ESI 2 which could be why we are seeing faster time to alert in NELP patients with ESI 2.

We also found that NELP patients with ESI 3-5 status had significantly longer time to alerts triggered manually compared to ELP patients with ESI 3-5. We hypothesize that low acuity patients have less obvious signs and symptoms of sepsis and therefore the clinical team relies more heavily on their communication with the patient to make diagnostic and treatment decisions which could lead to delays in recognition and treatment of sepsis. Previous studies have described how across many settings, patients often have to wait for interpreters and how this can delay diagnosis and treatment.[146,147] Thus, it is important to ensure that patients who need interpreters are easily identifiable and interpreters are easy to access with limited delays. Previous work done in the ED has highlighted how ED trackboard icons and triage screening questions can increase the identification of patients who need and use professional interpreters.[36,97,98] Likewise, in previous studies in other acute care settings, placing the technology to access professional interpreters in each patient room and ensuring interpreters are rapidly available have successfully increased the use of professional interpreters.[99,100]

Interestingly, the differences in time to alerts triggered manually by acuity status did not lead to differences in time to antibiotic administration. NELP patients had a median time to antibiotic administration of 103 minutes versus 99 minutes for ELP patients. In addition to this not being statistically significant, a difference of 4 minutes is not a clinically significant difference. Our ED designed the sepsis BPA to be very sensitive with the understanding that it would fire in instances that were not sepsis. This is part of the reason only 44% of the patients that had a sepsis BPA or code sepsis received antibiotics which is in line with the Surviving Sepsis campaign which recommends deferring antibiotics if there is no suspicion of infection.[116] It is possible that BPAs could be implemented for other conditions as one tool to decrease health disparities. However, when designing BPAs or other CDS tools it is important to ensure tools are well-designed to minimize alert fatigue and prioritize patient safety.[148,149]

Finally, going against our hypothesis, we found no differences in time to manual or automatic alerts or time to antibiotics between Spanish-speaking NELP patients and NELP patients from other language groups. In 2019, approximately 68 million people in the United States spoke a language other

than English at home.[150] Spanish was the most common non-English language spoken making up approximately 62% of the non-English speaking population followed by Chinese, Tagalog, Vietnamese and Arabic.[150] In the northern Midwest there is also a large Hmong-speaking population due to Wisconsin and Minnesota's acceptance of Hmong refugees in the 1970s.[151] While all people with NELP may routinely participate in language discordant health care encounters, it is important to recognize that patients with NELP are a heterogenous group that have unique histories, reasons for coming to the United States, and experiences in the United States. Additionally, all languages may not have the same access to or quality of interpretation services which have been shown to improve communication and health outcomes in patients with NELP.[61] Therefore, when studying the impact of language on health care outcomes, it is important to disaggregate the NELP group. Due to small numbers, in this analysis we divided the NELP group into Spanish-speakers vs. speakers of all other languages. While we did not find differences in time to sepsis alert or time to antibiotic initiation between the Spanish-speaking NELP patients and the non-Spanish-speaking NELP patients, we think this could be due to a small sample size. We hypothesize that there may be important differences between language groups due to difficulty accessing interpreter services of minority language groups, lower quality interpreter services for minority language groups, or lack of understanding of cultural differences by interpreters or healthcare staff in minority language groups. Prior research has highlighted the importance of treating patients in the context of their culture,[152–154] and this can be harder to do in cultures that are less common in the United States. Whenever possible, future studies on language discordance should disaggregate the NELP group by language spoken so we can ensure patients from minority language groups receive high quality healthcare

There are several limitations that we acknowledge regarding this study. First, this is a study conducted at two EDs within one health system so the findings may not be generalizable. Second, the NELP patient population only made up about 3.3% of our sample. At baseline the NELP and ELP groups were very different in terms of sociodemographic variables which could confound our results. However, we used propensity score weighting to try and address baseline differences between the two groups, and we successfully achieved standardized differences < 10 in all but two of our models. Finally, it can be difficult to confirm the extent to which patients had access to professional interpreters

throughout their ED encounter which could be an important modifier to the relationships described in this paper.

In conclusion we found that overall, there were no differences in time to sepsis alert between patients with ELP and patients with NELP. However, in patients where the alert triggered manually, the NELP patients with ESI 2 had faster time to alert than the ELP patients while the NELP patients with ESI 3-5 had slower time to alert than the ELP patients. These results indicate that language preference does influence sepsis recognition. More work needs to be done to rapidly identify patients with NELP and quickly access professional interpreters. Additionally, there were no differences in time to antibiotic administration overall or in any subgroup suggesting that well-designed BPAs could be a useful tool in eliminating health disparities for important clinical metrics . Future research should explore differences in time to sepsis alert or antibiotic administration by language preference in nationally representative data and examine the association with short and long-term outcomes such as length of hospital admission and mortality.

7. Conclusions

Patient-centered care for patients with non-English language preferences (NELP) in the emergency department (ED) is an interesting, exciting and relevant topic of inquiry. In Aim 1, the scoping review, I sought to ground myself in the current literature. In this study we found that studies describing performance of patient centered care outcomes (PCCOs) for ED patients with NELP are limited and continue to be mostly descriptive. ED patients with NELP had worse PCCOs than English-speaking patients and having a language discordant healthcare visit negatively impacted perceptions of care. Additionally, there remains a large unmet need for provision of language services in the ED. More work needs to be done to characterize performance on PCCOs in patients with NELP and develop quality improvement interventions.

In Aim 2, the qualitative study, I sought to talk to Spanish-speaking patients and to hear from them about their patient-centered care (PCC) experiences in our ED. This was by far my favorite of the three studies. Talking to patients is always very life-giving for me, and the process of really digging into the data is professionally gratifying. This study, in combination with what has been previously reported in ED literature, has provided a more nuanced understanding of how Spanish-speaking patients with NELP experience PCC in the ED. The strategies we suggest to improve PCC include system-level strategies such as increasing visibility of interpreter need via the electronic health record, placing technology to contact interpreters in every patient room and sharing expected wait times with patients during triage. Additionally, training opportunities for ED staff should focus on ensuring we honor patient preferences for interpreters in every communication exchange in the ED and recognizing the importance of respect and responsiveness to patient needs as strategies that can directly and indirectly promote PCC. Finally, future studies on PCC should include technical proficiency as a domain of PCC. By implementing these strategies, we can more comprehensively study PCC and we can improve PCC outcomes for Spanish-speaking ED patients with NELP.

In Aim 3, the quantitative study, I sought to take what we learned from Aim 2 about technical proficiency being an important component of PCC and evaluate a technical component of care. We evaluated if time to sepsis alert or time to antibiotics was different among patients with NELP compared to patients with English language preferences (ELP). We found there were no overall differences in time

to sepsis alert between patients with ELP and those with NELP. However, in subgroup analyses that separated patients by severity, we did see differences in time to sepsis alert among patients that had alerts triggered manually even after controlling for clinical confounders. These differences did not occur in patients that had alerts triggered automatically. These results indicate that language preference does influence sepsis recognition. More work needs to be done to rapidly identify patients with NELP and quickly access professional interpreters. Additionally, there were no differences in time to antibiotic administration overall or in any subgroup suggesting that well-designed BPAs could be a useful tool in eliminating health disparities for important clinical metrics. Considering the results of all three studies, future studies should implement and evaluate interventions to improve PCCOs for ED patients with NELPs

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9. Appendices

9.1 Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	5
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Supp 1
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	5 & 7
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	7
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	7-8

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	n/a
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	7-8
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Fig. 1
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Table 3
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Table 3
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	11-16
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	16-19
Limitations	20	Discuss the limitations of the scoping review process.	20
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	20
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	20

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

9.2 Search Documentation

1. Results Overview

Searches first ran **08/17/2021**
Searches reran on **12/05/2022**

Database	Results (12/05/2022)
PubMed	3,224
Scopus	2,942
CINAHL Plus Full Text (EBSCOhost)	926
Google Scholar	1,138

Results before deduplication: **8,230**
Results after deduplication*: **6,524**

Results were duplicated using a combination of EndNote 20 and Covidence.

2. PubMed Search

PubMed Block Search

Search originally ran on: 8/17/2021
Search reran on: 12/05/2022

Results: 3,224

("emergency service, hospital"[mesh] OR "emergency medicine"[mesh] OR triage*[tw] OR EMS[tw] OR ED[tw] OR ER[tw] OR unscheduled-acute-care[tw] OR emergicenter*[tw] OR "emergency medical services"[mesh] OR ((emergency[tw] OR emergencies[tw] OR trauma[tw]) AND (service*[tw] OR department*[tw] OR ward*[tw] OR room*[tw] OR center*[tw] OR centre*[tw] OR dispensar*[tw] OR care[tw] OR unit*[tw] OR medicine[tw] OR personnel[tw] OR physician*[tw] OR provider*[tw] OR doctor*[tw] OR nurs*[tw] OR patient*[tw] OR visit*[tw] OR stay*[tw] OR admit*[tw] OR admission*[tw] OR evaluation*[tw] OR assess*[tw] OR dispatch*[tw])))

AND

(((English[tw]) AND (Abilit*[tw] OR proficien*[tw] OR fluen*[tw] OR "second language*"[tw] OR "2nd language*"[tw] OR foreign*[tw] OR "non native"[tw] OR nonnative[tw] OR nonproficien*[tw] OR "communication barriers"[mesh:noexp] OR Multilingual*[tw] OR "multi lingual*"[tw] OR bilingual*[tw] OR polylingual*[tw] OR ((communication[tw] OR language[tw]) AND (barrier*[tw])) OR "language"[mesh] OR "multilingualism"[mesh] OR "translating"[mesh] OR interpret*[tw] OR translat*[tw])) OR "non English"[tw] OR "English limited"[tw] OR "limited English"[tw] OR ESL[tw] OR ELL[tw] OR LEP[tw] OR "limited English proficiency"[mesh] OR "English language learner*"[tw] OR "English as a second*"[tw] OR "English as a 2nd"[tw] OR "English as second*"[tw] OR "English as 2nd"[tw]

PubMed Line by Line Search

Search string reference number	Search string

#1	emergency[tw] OR emergencies[tw] OR trauma[tw]
#2	service*[tw] OR department*[tw] OR ward*[tw] OR room*[tw] OR center*[tw] OR centre*[tw] OR dispensar*[tw] OR care[tw] OR unit*[tw] OR medicine[tw] OR personnel[tw] OR physician*[tw] OR provider*[tw] OR doctor*[tw] OR nurs*[tw] OR patient*[tw] OR visit*[tw] OR stay*[tw] OR admit*[tw] OR admission*[tw] OR evaluation*[tw] OR assess*[tw] OR dispatch*[tw]
#3	#1 AND #2
#4	"emergency service, hospital"[mesh] OR "emergency medicine"[mesh] OR "emergency medical services"[mesh]
#5	triage*[tw] OR EMS[tw] OR ED[tw] OR ER[tw] OR unscheduled-acute-care[tw] OR emergicenter*[tw]
#6	#3 OR #4 OR #5
#7	English[tw]
#8	"communication barriers"[mesh:noexp] OR "language"[mesh] OR "multilingualism"[mesh] OR "translating"[mesh]
#9	Abilit*[tw] OR proficien*[tw] OR fluen*[tw] OR "second language*"[tw] OR "2nd language*"[tw] OR foreign*[tw] OR "non

	native"[tw] OR nonnative[tw] OR nonproficien*[tw] OR Multilingual*[tw] OR "multi lingual*"[tw] OR bilingual*[tw] OR polylingual*[tw] OR interpret*[tw] OR translat*[tw]
#10	#8 OR #9
#11	communication[tw] OR language[tw]
#12	barrier*[tw]
#13	#11 AND #12
#14	#10 OR #13
#15	#7 AND #14
#16	"limited English proficiency"[mesh]
#17	"non English"[tw] OR "English limited"[tw] OR "limited English"[tw] OR ESL[tw] OR ELL[tw] OR LEP[tw] OR "English language learner*"[tw] OR "English as a second*"[tw] OR "English as a 2nd"[tw] OR "English as second*"[tw] OR "English as 2nd"[tw]
#18	#16 OR #17
#19	#15 OR #18
#20	#6 AND #19

3. Scopus Search

Search originally ran on: 8/17/2021
Search reran on: 12/05/2022

Results: 2,942

TITLE-ABS-KEY(((English) AND (Abilit* OR proficien* OR fluen* OR "second language*" OR "2nd language*" OR foreign* OR "non native" OR nonnative OR nonproficien* OR Multilingual* OR "multi lingual*" OR bilingual* OR polylingual* OR ((communication OR language) AND (barrier*)) OR interpret* OR translat*)) OR "non English" OR "English limited" OR "limited English" OR ESL OR ELL OR LEP OR "English language learner*" OR "English as a second*" OR "English as a 2nd" OR "English as second*" OR "English as 2nd")

AND

TITLE-ABS-KEY(triage* OR EMS OR ED OR ER OR unscheduled-acute-care OR emergicenter* OR ((emergency OR emergencies OR trauma) AND (service* OR department* OR ward* OR room* OR center* OR centre* OR dispensar* OR care OR unit* OR medicine OR personnel OR physician* OR provider* OR doctor* OR nurs* OR patient* OR visit* OR stay* OR admit* OR admission* OR evaluation* OR assess* OR dispatch*)))

4. CINAHL Search

Search originally ran on: 8/17/2021
Search reran on: 12/05/2022

Results: 926

((TI (triage* OR "EMS" OR "ED" OR "ER" OR "unscheduled acute care" OR emergicenter*) OR (TI (emergency OR emergencies OR trauma) AND TI (service* OR department* OR ward* OR room* OR center* OR centre* OR dispensar* OR care OR unit* OR medicine OR personnel OR physician* OR provider* OR doctor* OR nurs* OR patient* OR visit* OR stay* OR admit* OR admission* OR evaluation* OR assess* OR dispatch*)) OR MH ("emergency service+")) OR (AB (triage* OR "EMS" OR "ED" OR "ER" OR "unscheduled acute care" OR emergicenter*) OR (AB (emergency OR emergencies OR trauma) AND AB (service* OR department* OR ward* OR room* OR center* OR centre* OR dispensar* OR care OR unit* OR medicine OR personnel OR physician* OR provider* OR doctor* OR nurs* OR patient* OR visit* OR stay* OR admit* OR admission* OR evaluation* OR assess* OR dispatch*)) OR MH ("emergency service+")))

AND

(((TI (English) AND (TI (Abilit* OR proficien* OR fluen* OR "second language*" OR "2nd language*" OR foreign* OR "non native" OR nonnative OR nonproficien* OR Multilingual* OR "multi lingual*" OR bilingual* OR polylingual* OR ((communication OR language) AND (barrier*)) OR interpret* OR translat*) OR MH ("communication barriers" OR language+ OR multilingualism+ OR "interpreter services+"))) OR (TI ("non English" OR "English limited" OR "limited English" OR ESL OR ELL OR LEP OR "English language learner*" OR "English as a second*" OR "English as a 2nd" OR "English as second*" OR "English as 2nd") OR MH ("limited English proficiency+"))) OR ((AB (English) AND (AB (Abilit* OR proficien* OR fluen* OR "second language*" OR "2nd language*" OR foreign* OR "non native" OR nonnative OR nonproficien* OR Multilingual* OR "multi lingual*" OR bilingual* OR polylingual* OR ((communication OR language) AND (barrier*)) OR interpret* OR translat*) OR MH ("communication barriers" OR language+ OR multilingualism+ OR "interpreter services+"))) OR (AB ("non English" OR "English limited" OR "limited English" OR ESL OR ELL OR LEP OR "English language learner*" OR "English as a second*" OR "English as a 2nd" OR "English as second*" OR "English as 2nd") OR MH ("limited English proficiency+"))))

5. Google Scholar Search

Results Extracted: 1,138

Note: The Original Search ran in Google Scholar on 8/17/2021 had an error (i.e., it exceeded Google Scholar's 256 character limit). To rectify this issue, the second search, Revised Search, ran on 12/05/2022, was modified from the Original Search, and the same number of results were extracted from the Revised Search as the Original Search. No duplicates were found between the two Google Scholar searches, and both sets of results were included in the screening.

Original Search

Note: This search exceeded Google Scholar's 256 character limit. The search ran on 12/05/2022 (in the next section, entitled "Revised Search") was adapted to resolve this issue.

Search ran on: 8/17/2021

Results: 569

Results Extracted: 569

triage|EMS|ED|ER|unscheduled-acute-care|emergicenter|emergicenters|emergency|emergencies|trauma service|services|department|departments|ward|wards|room|rooms|center|centers|centre|centres|dispensar|dispensaries|dispensary|care|unit|units|medicine|personnel|physician|physicians|provider|providers|doctor|doctors|nurse|nurses|nursing|patient|patients|visit|visits|stay|stays|admit|admitting|admission|admissions|evaluation|evaluations|assess|assessments|assessment|dispatch|dispatches English Ability|abilities|proficient|proficiency|proficiencies|fluent|fluency|"second language"|"second languages"|"2nd language"|"second languages"|foreign|"non native"|nonnative|nonproficient|nonprofiency|nonproficiencies|Multilingual|multilingualism|"multilingual"|bilingual|bilingualism|polylingual|polylingualism|"communication barrier"|"communication barriers"|"language barrier"|"language barriers"|interpret|interpreter|interpreting|inperprets|interpreters|translate|translation|translating|translates|"non English"|"English limited"|"limited English"|ESL|ELL|LEP|"English language learner"|"English language learners"|"English as a second"|"English as a secondary"|"English as a 2nd"|"English as second"|"English as secondary"|"English as 2nd"

Revised Search

Note: This search was modified from the Original Search (above section) to fit Google Scholar's 256 character limit

Search ran on: 12/05/2022

Results: 2 million+

Results Extracted: First 569

Triage|"ER"|emergicenter|emergency service|department|room|center|centre|unit|medicine English ability|proficient|proficiency|fluency|"second language"|"non native"|nonproficient|"communication barrier"|"language barrier"|interpreter|translator|ESL

9.3 Inclusion and Exclusion Criteria and How Operationalized

Inclusion Criteria	How Operationalized
1.) Study written in English	Read the full text article and confirmed language was English
2.) Study presented primary evidence	Read the methods to see if primary data was collected. We excluded literature reviews and studies that summarized previous data or offered opinions without presenting new data
3.) Study published in a peer-reviewed journal	Documented where the article was published and reviewed publication policies if peer-review status was unclear
4.) Referenced care received in an emergency setting	Examined the methods to see if the patients were evaluating their own care. Excluded simulation studies (e.g., if you were in the ED, how would you feel about…) Note: We sought to include both studies in ED and Emergency Medical Services (EMS) settings; however, no EMS studies met inclusion exclusion criteria.
5.) The study reported PCCOs*	Defined PCCOs as outcomes that evaluated respectfulness of or responsiveness to patient preferences; needs or values related to care; or assessed how individual patient preferences, needs, and values guided clinical decisions. We excluded single item measures of overall satisfaction as it was unclear what contributed to this rating
6.) PCCOs were measured among patients with NELP**	Looked to see if the PCCOs were evaluated in a group of patients who wanted to use an interpreter during their visit. Did not count studies looking at people born in a non-English speaking country as this does not correspond to NELP. Excluded studies if PCCOs combined both English speakers and patients with NELP in reported data. Additionally, if the authors were not clear on how they defined the language preferences of their population, they were excluded
7.) PCCOs were reported from the patient perspective	Confirmed the patient who was in the ED was the one answering the questions. This did not include healthcare provider opinions of PCCOs or family members perceptions of care

Exclusion Criteria	How Operationalized	Rationale for Exclusion
1.) Study focused on pediatric patients or their families	Studies that only included pediatric patients or their families or the results included both pediatric and adult ED patients and were not broken out by subgroup	Pediatric visits in the ED often involve pediatric patients, family members, interpreters, and the medical team. These encounters are inherently more complex because there are more people involved with varying language abilities. Additionally, how patients less than 18 years of age conceptualize patient-centered care is likely different than adults.
2.) A published abstract was duplicated in a published study	For published abstracts that met inclusion/exclusion criteria, we searched for the full text article, and if present and in the review, we excluded the abstract	It would be inaccurate and redundant to present results from an abstract and a full text manuscript as two independent studies
3.) Language being evaluated was sign language	Read the methods to confirm that > 50 percent of patients were not patients with hearing impairments	Hearing impairment is a unique concept and goes beyond the scope of this manuscript

*PCCO: patient-centered care outcome; **NELP: non-English language preference

9.4 Semi-structured Interview Guide: The Experience of Limited English Proficiency Patients after Discharge from the Emergency Department

Thank you for taking the time to speak with us today. I am part of a team from the University of Wisconsin that is trying to understand the experiences of patients who receive care in the Emergency Room and use an interpreter to communicate. **For this interview, I was hoping you could share experiences you had during your recent emergency room visit.**

I am looking forward to having an open, honest and interactive discussion. We appreciate any feedback you have, as we try to understand the experiences of patients who are not comfortable using English to communicate about their healthcare needs.

I will be recording our discussion so that we are able to review it later. This enables us to better understand your perspective. No one outside of the research team will ever listen to these recordings. Your comments will be anonymous and we will never use your name or other information that would make it possible to identify you outside of this conversation. Do you have any questions or any concerns about recording this discussion?

Shall we begin?

1. First, can you tell me a little bit about your recent emergency department visit? [why did you come], [who went with you], [what was done while you were there]
    a. At first, when you entered the emergency room, what happened? [waiting rom}
    b. When you went to your room, what happened at first? [did they take blood, do an exam]
    c. What happened after this?

2. In general how did you feel about your ED visit? [what were the positive parts] [what were the more challenging parts]

3. Before you went to the ER, how did you expect that they would treat you? [was what happened different from what you expected]
    a. If yes, how did you expect to be treated?

4. Of the people we've talked to previously, some have talked about the medical care as an important part of an ER visit. In an ideal visit what would the medical care look like during an ER visit?
    a. Can you describe what good medical care looks like for you?
    b. Can you describe what bad medical care looks like for you?
    c. Compared with the ideal, how was the medical care during your ER visit?
5. Previous participants have also talked about the importance of interpersonal interactions during an ER visit. In an ideal visit can you describe how what interpersonal interactions would look like during an ER visit?
    a. Can you describe what good interpersonal interactions look like for you?
    b. Can you describe what interpersonal interactions look like for you?
    c. Compared with the ideal, how were the interpersonal interactions during your ER visit?

6. While you were in the ED, were you involved with decisions about your care? Can you give me some examples
    a. Would you have liked to be more involved? What would that have looked like?

7. During your emergency department visit, do you feel like the healthcare team listened to you? Can you describe when you felt listened to? Can you describe when you did not feel listened to?
    a. How did you communicate with the medical team? Did you use an interpreter? What kind? Was an interpreter available during all parts of your visit or only during parts?

8. How responsive were the ED staff to your needs, preferences, and values? What could they have done to make you feel like they were listening to your needs and preferences?

9. Can you describe when during your ED visit you felt most respected? Least respected? What would have made you and your family feel more respected?

10. Is there anything else you think we should know about how you were treated during your emergency department visit?

Now we are going to start talking specifically about the communication during your emergency department visit and at the end of your visit

11. How well were the tests and test results explained to you while you were in the ED?

12. Did a doctor or nurse review your discharge instructions with you? And did you have an opportunity to ask questions?

13. When you arrived home from the ED, how well did you understand what you were diagnosed with?

14. When you arrived home from the ED, did you know if you had any new prescriptions to start taking at home? Any medications to stop taking?

15. When you arrived home from the ED, did you know whether you needed to schedule any follow-up visits? And if any referrals to specialists had been made?

16. Did you read the discharge instructions that were written and printed in the ED? If so, were they helpful?

    a. If the discharge instructions were not helpful, why?

17. If there was an option to have your discharge instructions, including diagnosis, important test results, medications to start and stop taking, and follow-up plan, available as an audio recording or video instead of written, would that be more helpful?

18. Is there anything else you would like to share?

Las experiencias de los pacientes que prefieren hablar español durante su visita de cuida de salud y la comunicación durante el alta de la sala de emergencias

Guía de entrevista- semiestructurada

Gracias por tomarse el tiempo para hablar con nosotros hoy. Soy parte de un equipo de la Universidad de Wisconsin que está tratando de entender las experiencias de los pacientes que reciben atención en la

sala de emergencia y usan un intérprete para comunicarse. **Para esta entrevista, esperaba que pudiera compartir experiencias que tuvo durante su reciente visita a la sala de emergencias.**

Espero tener una discusión abierta, honesta e interactiva. Agradecemos cualquier comentario usted tiene, ya que es esencial para entender mejor las experiencias de los pacientes que hablan español y usan intérpretes comunicar sobre su salud.

Estaré grabando nuestra discusión para que podamos revisarla más tarde. Esto nos permite entender mejor su perspectiva. Nadie fuera del equipo de investigación escuchará jamás estas grabaciones. Sus comentarios serán anónimos y nunca usaremos su nombre u otra información que haría posible identificarlo fuera de esta conversación. ¿Usted tiene alguna preguntas o inquietudes acerca de la grabación de esta discusión?

¿Deberíamos empezar?

1. Primero, ¿puede contarme sobre su reciente visita a la sala de emergencias con tantos detalles como sea posible? [por qué lo hizo usted venir], [Que hizo el equipo médico mientras estuvo allí],[quién fue con usted],
    a. Al principio, cuando entró en la sala de emergencia, ¿qué pasó? [sala de espera]
    b. Cuando fue a su cuarto, que pasó al principio [le sacaron sangre, hicieron un examen]
    c. ¿Que pasó después de eso?

2. En general, ¿cómo se sintió acerca de su visita a la sala de emergencias? [qué partes fueron positivas], [qué partes fueron más desafiante]

3. Antes de usted fue a la sala de emergencias ¿Como esperaba que lo trataran en la sala de emergencias? [fue diferente de lo que esperaba]

    a. en caso afirmativo, que esperaba?

4. De las personas que ya hemos hablado, algunas han hablado sobre <u>la atención médica</u> como un aspecto importante de su visita a la sala de emergencias. ¿En una visita ideal, como sería la atención médica durante su visita a la sala de emergencias?

    a. ¿Usted puede describir cómo sería buena atención médica para usted?

    b. ¿ Usted puede describir cómo sería mala atención médica para usted?

    c. Comparado con el ideal, ¿Cómo fue la atención médica durante su visita a la sala de emergencias?

5. Participantes anteriores también han hablado de la importancia de las <u>interacciones personales</u> durante una visita a la sala de emergencias. ¿En una visita ideal, describe como sería las interacciones personales durante una visita a la sala de emergencias?

    a. ¿Usted puede describir cómo sería buenas interacciones personales para usted?

    b. ¿Usted puede describir cómo sería malas interacciones personales para usted?

    c. Comparado con el ideal, ¿Cómo fueron las interacciones personales durante la visita a la sala de emergencias?

6. Mientras estaba en la sala de emergencias, ¿estaba involucrado en las decisiones sobre su atención médica? ¿Dame unos ejemplos?

   a. ¿Se hubiera gustado estar más involucrado en las decisiones? ¿Cómo se habría visto eso durante su visita a la sala de emergencias?

7. Durante su visita a la sala de emergencias, ¿se siente que el equipo de salud médico le escucharon? ¿Puedes describir cuando se sintió escuchado? ¿Puede describir cuándo no se sintió escuchado?

   a. ¿Cómo se comunicó con el equipo médico? ¿Usó usted un intérprete? ¿Qué tipo? ¿Un interprete estaba disponible durante toda su visita o solamente durante partes?

8. ¿Qué tan receptivo fue el personal de la sala de emergencias a sus preferencias? ¿Qué podrían haber hecho para hacerse sentir que estaban escuchando a sus necesidades y preferencias?

9. ¿Puede describir cuándo se sintió más respetado durante su visita a la sala de emergencias? ¿Menos respetado? ¿Qué se podría haber hecho durante su visita para que usted y su familia se sintieran más respetados?

10. ¿Hay algo más que crea que debería saber sobre sus sentimientos o tratamiento durante la visita a la sala de emergencias?

Ahora vamos a empezar a hablar específicamente sobre la comunicación durante su visita a la sala de emergencias y al final de la visita

11. ¿Qué tan bien le explicaron las pruebas y los resultados de las pruebas mientras estuvo en la sala de emergencias?

12. ¿Revisó un médico o una enfermera las instrucciones de alta con usted? ¿Y tuvo la oportunidad de hacer preguntas?

13. Cuando llegó a casa de la sala de emergencias, ¿qué tan bien entendió lo que le diagnosticaron?

14. Cuando llegó a casa después de la sala de emergencias, ¿sabía si tenía alguna receta nueva para comenzar tomando en casa? ¿Algún medicamento para dejar de tomar?

15. Cuando llegó a casa de la sala de emergencias, ¿sabía si necesitaba programar algunas visitas de seguimiento? ¿Y si se hubieran hecho derivaciones a especialistas?

16. ¿Leyó las instrucciones de alta escritas e impresas en la sala de emergencia? Si es así, ¿fueron útil?

   a. Si las instrucciones de alta no fueron útiles, ¿por qué?

17. Si hubiera una opción para recibir instrucciones de alta, incluido el diagnóstico, prueba importante resultados, medicamentos para comenzar y dejar de tomar, y plan de seguimiento, disponible como una grabación de audio o video en lugar de escrito, ¿sería más útil?

18. ¿Hay algo más que creas que debería saber?

9.5 Codes & Definitions	Notes
1. Patient Relationship with Healthcare team: These codes are the interactive codes show engagement on both sides of the relationship	
Explained what was Happening: Patients feel like what was happening was clearly explained or they report not being quite sure what was happening.	
General Communication During Healthcare Encounter: Patient describes routine communications such as med check list, past medical history, etc.	
Power Dynamics: Describes power dynamics between themselves and members of the medical team. Could be something like the vist was on the doctor's time table, he cut me off when I spoke, etc.	
Shared Deliberation (Shared Communication) or Shared Decision Making: Description of deciding how to go come to a plan of care. Can also be lack of shared deliberation	Combined on 8/4/2023
Space for Questions: Patients comment on how the medical team allowed them to ask and answered their questions (or left them confused) Most commonly we see this during discharge communication but no exclusively	Updated 7/28/23
Treated patient as a person: Patient is more than their medical diagnosis, asked how they were or about their life, etc.	
Understood What Was Happening: Participant describes scenarios where they were unsure what was going on or it was very clear what was happening. Not the act of the ED team explaining what was going on but did the participant understand.	Added 7/22/23
2. Description of Care: These codes should be used when participants are simply describing what happened in the ED	
Challenges with Care: Patients describe some specific challenges they had with their ED visit or follow-up care	
Facilitators of Care: Participants described things that were really good about the care they received, could think of it like things that enhanced their care experience.	Added 7/28/23
Outcome of Visit: Participants describe the "end result" or lack of result from their ED visit.	
Reason for visit: Patients describe why they went to the ED. Can include long backstory	

	Time Spent With Patient: Participant describes feeling like the medical team spent sufficient time with them or felt rushed	Added 7/28/23Would also include if they describe which health care staff spent more/less time with them Updated 8 /17/2023
	Who went with them to ED: Description of who was there with them during the ED visit	
3. Characteristics of Care: These codes should be used to describe how patients felt about the medical care they received.		
	Attentive to care (atento) or responsive: Describes scenarios where they felt the medical team did or did not respond appropriately to their needs, preferences or values	Needs to be more than "estaban muy atentos". This would be overall experience of care. Needs to be describing how they were attentive, responsive
	Assistance with Needs: Participant describes the medical team helping them get their needs met, or not helping them. Needs could be ordering food, going to the bathroom, helping with a prescription. Should be physical needs not medical needs	Added 7/28/23
	Patient preferences: Patient preferences, are honnored or not honnered.	
	Compassion or Empathy: Describe providers as caring and kind, or lack of these characteristics	Would include general kindness of staff in the ED
	Discrimination/Equitable Care: Participants talk about the presence of or lack of discrimination, racism **due** to their latino/a ethnicity or the fact that they perceive that they don't speak English well or need an interpreter.	Could also be when a participant is taking about how they thought they were treated fairly or equitable (updated 7/28/23)
	Efficiency of Care: Patients talk about the pace of care and if they feel like they waited too long between things or if they thought conversations, procedures etc. moved along at a good pace.	
	Felt Better: Participants describe feeling or not feeling better during their ED visit. For example, they gave me this medication and then I felt better.	Should not be used when talking about how they felt after they left the ED, this would be outcome of visit. Update 8/17/2023
	Individual: Describe the sentiment that the care was unique to their needs and circumstance (or lack of individual care)	

	Involved in Care: Participant describes being involved in their care.	
	Listened To: Describes situations where they did or did not feel hear by the medical team	
	Overall Experience of Care: When they make summarizing statements about care generally, good or bad	
	Patient Comfort/Discomfort: Patient describes things the healthcare staff did to make them comfortable while in the ED. Would include scenarios where the participants described the medical personnel (not) having confidence in what they were doing which resulted in the patient feeling (un)comfortable. Would also include trust in medical team or distrust.	Would also include scenarios where they felt lack of privacy (updated 8/11/2023)
	Reassuring: Patients describe how the providers were very reassuring or how after the visit they felt reassured	
	Respectful: Describes scenarios where they felt respected or did not feel respected by the healthcare team	
	Technical Components of Care: Patients describe medical competence, or lack of skill with doing procedures, blood draws, diagnostic ability etc.	
	Transparent: Describe open communication or understanding what was going on in the healthcare encounter (or lack of transparency)	
4. Patient Characteristics		
	Acutely Ill: Patient perception of having symptoms that are so severe that they can't be at home either vomiting, fever, or mental status issue	Updated 7/28/23
	Age: Participants comment on how age impacts care	
	Assertive: Participant expresses that she is comfortable being assertive, asking questions, perhabps questioning the care received. This should only be used when they are describing care received during their care visit and how they communicated, advocated for themselves. Added 7/28/23	
	Chronic Illness: Patient describes having a chronic illness	
	Collectivist: Emphasis on supporting other people, including strangers (added 7/25/23)	
	Context: Patients make comments that give background context on their life or their health or their general belief system	
	Embarrassment: Patient describes feeling embarrassed or ashamed when taking clothes of, or sharing their history, etc.	

	Expectations of Care in the ED: Patients describe how they think care should go, or how they thought it should be	Added 7/28/23
	Experience of Illness: Patients describe their experience of their illness	
	Fearful: Participants say they were fearful or anxious about coming to the ED or what was wrong with them	
	Pain: Participants describe experiences being in pain in the ED	
	Familiarity with ED: Patients talk about going to the ED a lot or this being their very first time.	
	I don't want to complain/I have no complaints: Participants use the phrase, no me quejo when talking about healthcare in general	
	Language Fluency: Participant describes comfort with speaking English or where they speak English/Spanish	
	Language Preference During Medical Visits: Participants describe their preference for English/Spanish during medical visits and the reasons why they have these preferences	
	LatinX Identity: Participant is identifying themselves as LatinX or interpreters or other healthcare staff or patients as LatinX	Added 7/28/23
	Long-time User of System: Participant alludes to seeking most of healthcare at UW or impressions of care in the system overall	
	Religious Beliefs: Participants make religious statements, gracias a dios, or makes other statements about their religious beliefs	
	Socioeconomic Context: Participants are talking about their financial, education, work circumstances. paying for visits, being worried about paying etc.	
5. Structural System-level Factors that Influenced Care		
	Access to Care: Patients describe difficulty getting timely visits with their PCP or a specialist or whatever	
	Access to or Use of Professional Interpreter Services: Patients describe the times they had access to interpreter services, could be times they wanted interpreters, and they weren't present	Patients describe the presence or absence of interpreter services during their ED visit. or during visits in general or when they had access/did not have access to an interpreter. Combined with use of Professional Interpreter on 8/18/2023

	Coordination of Care: Patients describe challenges navigating healthcare system for follow-up visits	
	Decision to Use an Interpreter: Participant talks about how the decision to use an interpreter was made. did they request one, was it assumed they would need one based on how they looked, etc.	
	ED setting: Participants acknowledged inherent challenges with the ED setting	
	ED wait Times: Participants comment on the time they spent in the waiting room	
	Experience of Care Across the Symptoms: Participants say things like- I'm always treated well here, or every time I'm here I have this issue. Should be used when participants are generalizing up to the system level.	Added 7/28/23
	Healthcare Staff Attempting to Speak Spanish: Participants describe scenarios when non professional interpreters or bilingual staff spoke to them in Spanish and their impressions of this.	
	Hospital/ED Rule: Patient highlights policies or rules, and how that impacted their impressions of their ED visit.	Added 8/3/23
	Inexperience/Experience/Training of Healthcare Staff: Participant talks about the experience or inexperience of healthcare staff or makes references to everyone being young, or students perhaps indicating lack of experience.	Added 7/28/23 Also includes when talking about healthcare providers education or training. Updated 8/18/23
	Mode of Interpreter: Participant describes iPad vs. in person interpreter	
	Preference for Type of Interpreter: Patients describe preference for a specific type of interpreter whether it be in person, iPad, family member, etc.	
	Prioritization: Participants comment on the order in which patients in the waiting room are seen.	Added 7/28/23 Or who gets rooms vs. hallway beds (updated 8/11/2023)
	Purpose of ED: Participants describe how they think the ED should be used	
	Quality of Interpreters: Patients describe happiness with interpreter services in regards to technical ability or interpersonal interactions.	
	Recommendations: Participants give concrete recommendations on how to improve care to non-English language preference patients.	

	Total Time in ED: Participant tells us their length of stay in the ED or at urgent care and their feelings about this.	
	Use of Family Members as Interpreters: Patients describe using their family member as an interpreter	
6. Discharge Communication		
	Follow-Up Visits: Participants talking about outpatient plans, not understanding the plan, or wishing she had certain types of follow-up	Does not include follow-up instructions – Added 7/28/23
	Medications- new prescriptions: Participants talks about receiving new medications and the process of filling those medications or discontinuing medications.	Added 7/28/23
	Preference for Type of Discharge Communication: Patients talk about preferences for English vs. Spanish discharge communication or communication on paper vs. audio vs. video	
	Process of Discharge Communication: Participant describes how discharge communication happened	
	Return Precautions: Participants talk about when they should come back, understanding or not understanding.	
	Usefulness of Discharge Communication: Patients comment on how helpful discharge communication was	

9.6 Cox Proportional Hazard Model for Time to Sepsis Alert Comparison between Patients with Non-English Language Preference and English Language Preference among Patients where the Alert Triggered Manually (n=6,580)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	0.94 (0.81, 1.10)	0.458	1.00 (0.85, 1.16)	0.949	1.08 (0.92, 1.27)	0.348
English Language Preference	reference	reference	reference	reference	reference	reference
Age			1.00 (1.00,1.00)	0.058	1.00 (0.99, 1.00)	0.423
Sex						
Female			0.98 (0.93, 1.03)	0.446	0.90 (0.77, 1.06)	0.195
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			0.99 (0.93, 1.06)	0.875	1.07 (0.85, 1.35)	0.570
Medicaid			0.96 (0.89, 1.04)	0.296	1.05 (0.85, 1.31)	0.646
Unknown/Self Pay			0.88 (0.77, 1.00)	0.044	0.90 (0.68, 1.20)	0.464
Emergency Severity Index						
2 (Emergent)			reference	reference	reference	reference
3 (Urgent)			0.80 (0.76, 0.84)	<0.001	0.60 (0.51, 0.71)	<0.001
4 (Less Urgent) or 5 (Nonurgent)			0.85 (0.69, 1.04)	0.105	0.31 (0.12, 0.79)	0.014

9.7 Cox Proportional Hazard Model for Time to Sepsis Alert Comparison between Patients with Non-English Language Preference and English Language Preference among Patients where the Alert Triggered Manually and Had an Emergency Severity Index of 2 (n=3,576)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	1.21 (0.98, 1.49)	0.075	1.29 (1.04, 1.60)	0.019	1.42 (1.17, 1.73)	<0.001
English Language Preference	reference	reference	reference	reference	reference	reference
Age			1.00 (1.00, 1.00)	0.297	1.00 (0.99, 1.01)	0.575
Sex						
Female			0.98 (0.92, 1.05)	0.529	0.99 (0.81, 1.21)	0.922
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			1.05 (0.96, 1.15)	0.281	1.31 (0.96, 1.78)	0.086
Medicaid			0.94 (0.84, 1.05)	0.293	1.26 (0.91, 1.73)	0.162
Unknown/Self Pay			0.79 (0.65, 0.96)	0.012	0.69 (0.42, 1.14)	0.144

9.8 Cox Proportional Hazard Model for Time to Sepsis Alert Comparison between Patients with Non-English Language Preference and English Language Preference among Patients where the Alert Triggered Manually and Had an Emergency Severity Index of 3,4 or 5 (n=3,004)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	0.78 (0.63, 0.97)	0.027	0.77 (0.62, 0.97)	0.030	0.72 (0.56, 0.92)	0.010
English Language Preference	reference	reference	reference	reference	reference	reference
Age			1.00 (1.00, 1.00)	0.174	1.00 (0.99, 1.01)	0.695
Sex						
Female			0.99 (0.92, 1.06)	0.727	0.87 (0.69, 1.01)	0.252
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			0.91 (0.82, 1.01)	0.064	0.83 (0.58, 1.17)	0.283
Medicaid			0.99 (0.89, 1.10)	0.813	0.97 (0.72, 1.31)	0.851
Unknown/Self Pay			0.94 (0.80, 1.12)	0.490	1.09 (0.81, 1.48)	0.562

9.9 Cox Proportional Hazard Model for Time to Sepsis Alert Comparison between Spanish-speaking Patients with Non-English Language Preferences and All other Patients with Non-English Language Preferences Among Patients Whose Alert Triggered Manually (n=173)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	1.14 (0.84, 1.54)	0.405	1.04 (0.74, 1.46)	0.833	1.00 (0.70, 1.42)	0.980
English Language Preference	reference	reference	reference	reference	reference	reference
Age			0.99 (0.98, 1.00)	0.200	0.99 (0.98, 1.00)	0.093
Sex						
Female			0.81 (0.59, 1.10)	0.180	0.75 (0.52, 1.08)	0.126
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			1.27 (0.75, 2.13)	0.370	1.50 (0.91, 2.46)	0.114
Medicaid			1.25 (0.82, 1.89)	0.296	1.30 (0.84, 2.01)	0.237
Unknown/Self Pay			0.86 (0.55, 1.35)	0.503	0.71 (0.37, 1.38)	0.316
Emergency Severity Index						
2 (Emergent)			reference	reference	reference	reference
3 (Urgent), 4 (Less Urgent) or 5 (Nonurgent)			0.53 (0.39, 0.74)	<0.001	0.551 (0.37, 0.82)	0.003

9.10 Cox Proportional Hazard Model for Time to Sepsis Alert Comparison between Patients with Non-English Language Preference and English Language Preference among Patients where the Alert Triggered Automatically (n=10,373)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	1.05 (0.95, 1.16)	0.361	1.06 (0.96, 1.18)	0.263	1.06 (0.93, 1.20)	0.390
English Language Preference	reference	reference	reference	reference	reference	reference
Age Group			1.00 (1.00, 1.00)	<0.001	1.00 (0.99, 1.00)	0.074
Sex						
Female			1.01 (0.97, 1.05)	0.628	0.99 (0.87, 1.13)	0.922
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			1.02 (0.96, 1.08)	0.481	1.01 (0.82, 1.24)	0.902
Medicaid			1.03 (0.95, 1.12)	0.528	0.99 (0.83, 1.18)	0.938
Unknown/Self Pay			1.03 (0.95, 1.12)	0.510	1.06 (0.93, 1.22)	0.370
Emergency Severity Index						
2 (Emergent)			reference	reference	reference	reference
3 (Urgent)			0.81 (0.78, 0.85)	<0.001	0.73 (0.63, 0.85)	<0.001
4 (Less Urgent) or 5 (Nonurgent)			0.85 (0.77, 0.95)	0.003	0.64 (0.43, 0.96)	0.032

9.11 Cox Proportional Hazard Model for Time to Sepsis Alert Comparison between Patients with Non-English Language Preference and English Language Preference among Patients where the Alert Triggered Automatically and Had an Emergency Severity Index of 2 (n=4,137)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	1.24 (1.05, 1.48)	0.012	1.23 (1.03, 1.46)	0.131	1.19 (0.97, 1.46)	0.091
English Language Preference	reference	reference	reference	reference	reference	reference
Age			1.00 (1.00, 1.00)	0.131	1.00 (0.99, 1.00)	0.222
Sex						
Female			1.03 (0.96, 1.09)	0.417	1.12 (0.92, 1.37)	0.254
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			1.00 (0.92, 1.09)	0.943	1.02 (0.76, 1.36)	0.919
Medicaid			0.99 (0.89, 1.10)	0.859	0.93 (0.69, 1.26)	0.649
Unknown/Self Pay			1.07 (0.92, 1.23)	0.402	1.08 (0.84, 1.38)	0.538

9.12 Cox Proportional Hazard Model for Time to Sepsis Alert Comparison between Patients with Non-English Language Preference and English Language Preference among Patients where the Alert Triggered Automatically and Had an Emergency Severity Index of 3,4 or 5 (n=6,234)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	0.99 (0.87, 1.13)	0.890	0.99 (0.87, 1.13)	0.932	0.95 (0.82, 1.11)	0.549
English Language Preference	reference	reference	reference	reference	reference	reference
Age			1.00 (0.99, 1.00)	<0.001	1.00 (0.99, 1.00)	0.219
Sex						
Female			1.00 (0.95, 1.05)	0.867	0.87 (0.74, 1.03)	0.096
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			1.03 (0.95, 1.12)	0.501	0.97 (0.76, 1.23)	0.807
Medicaid			1.04 (0.97, 1.12)	0.289	1.09 (0.89, 1.34)	0.395
Unknown/Self Pay			1.02 (0.92, 1.12)	0.731	1.08 (0.92, 1.27)	0.344

9.13 Cox Proportional Hazard Model for Time to Sepsis Alert Comparison between Spanish-speaking Patients with Non-English Language Preferences and All other Patients with Non-English Language Preferences Among Patients Whose Alert Triggered Automatically (n=384)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	1.01 (0.81, 1.25)	0.947	1.14 (0.89, 1.45)	0.300	1.18 (0.93, 1.49)	0.169
English Language Preference	reference	reference	reference	reference	reference	reference
Age			1.00 (0.99, 1.00)	0.383	1.00 (0.99, 1.01)	0.929
Sex						
Female			0.93 (0.76, 1.14)	0.468	0.81 (0.64, 1.02)	0.078
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			0.88 (0.61, 1.27)	0.507	0.84 (0.58, 1.23)	0.324
Medicaid			0.97 (0.72, 1.29)	0.815	0.84 (0.58, 1.23)	0.369
Unknown/Self Pay			1.16 (0.90, 1.50)	0.244	1.19 (0.90, 1.58)	0.216
Emergency Severity Index						
2 (Emergent)			reference	reference	reference	reference
3 (Urgent), 4 (Less Urgent) or 5 (Nonurgent)			0.65 (0.52, 0.81)	<0.001	0.66 (0.50, 0.86)	0.002

9.14 Demographic and Healthcare Encounter Characteristics by Language Group for Patients who Received Antibiotics, n(%)

	Non-English Language Preference (n=237)	English Language Preference (n=7,231)	P Value*
Age Group	56.9 (18.7)	58.7 (19.2)	0.150
Sex			0.680
Female	111 (46.8)	3,273 (45.3)	
Male	126 (53.2)	3,958 (54.7)	
Ethnicity			<0.001
Hispanic/Latinx	144 (60.8)	149 (2.1)	
Not Hispanic or Latinx	93 (39.2)	7,053 (97.5)	
Declined to Answer/Unknown	0 (0.0)	29 (0.4)	
Race			<0.001
American Indian or Alaska Native	11 (4.6)	45 (0.6)	
Asian	64 (27.0)	145 (2.0)	
Black	3 (1.3)	553 (7.6)	
Native Hawaiian or Pacific Islander	0 (0.0)	7 (0.1)	
White	124 (52.3)	6,385 (88.3)	
Mixed Race	1 (0.4)	43 (0.6)	
Declined to Answer/Unknown	34 (14.3)	53 (0.7)	
Insurance Status			<0.001
Private	61 (25.7)	2,642 (36.5)	
Medicare	68 (28.7)	3,550 (49.1)	
Medicaid	53 (22.4)	787 (10.9)	
Unknown/Self Pay	55 (23.2)	252 (3.5)	
ED Disposition			0.307
Discharged	40 (16.9)	942 (13.0)	
Admitted/Transferred	196 (82.7)	6,267 (86.7)	
Died in the ED	0 (0.0)	6 (0.1)	
Against Medical Advice or Before Exam Complete	1 (0.4)	16 (0.2)	
Mode of Arrival			0.001
Self or Family/Friends	154 (65.0)	3,821 (52.8)	
EMS	81 (34.2)	3,342 (46.2)	
Other/Unknown	2 (0.8)	68 (0.9)	
Emergency Severity Index			0.219
1 (Resuscitation)	0 (0.0)	0 (0.0)	
2 (Emergent)	138 (58.2)	4,389 (60.7)	
3 (Urgent)	99 (41.8)	2,777 (38.4)	
4 (Less Urgent)	0 (0.0)	65 (0.9)	
5 (Nonurgent)	0 (0.0)	0 (0.0)	
First Heart Rate, mean (sd)	106.1 (19.9)	105.4 (20.0)	0.568

First Pulse Oxygen Percentage, mean (sd)	94.9 (5.9)	94.3 (5.2)	0.083
First Respiratory Rate, mean (sd)	22.6 (7.5)	22.0 (6.3)	0.152
First Systolic Blood Pressure, mean (sd)	135.0 (31.7)	132.4 (29.2)	0.177
First Diastolic Blood Pressure, mean (sd)	75.0 (15.4)	74.5 (15.7)	0.618
First Temperature > 100.4°F	119 (50.9)	3,065 (42.7)	0.016
Trigger for Alert			0.056
Staff Suspicion of Infection & Abnormal Vitals (manual)	93 (39.2)	3,307 (45.7)	
Fever & Abnormal Vitals (automatic)	144 (60.8)	3,924 (54.3)	
Minutes to Sepsis Alert, median (IQR)	33.0 (17.0, 88.0)	44.0 (18.0, 89.0)	0.124
Minutes to Administration of Antibiotics, median (IQR)	103.0 (66.0, 142.0)	99.0 (64.0, 134.0)	0.142
Hospital Length of Stay in days, median (IQR)	3.7 (1.7, 7.8)	3.8 (2.0, 7.0)	0.866
ICU Admission During Hospital Stay	32 (13.5)	1,037 (14.3)	0.788
Mortality During Hospital Stay	8 (3.4)	342 (4.7)	0.415

9.15 Cox Proportional Hazard Model for Time to Antibiotics Comparison between Patients with Non-English Language Preference and English Language Preference (7,468)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	0.91 (0.80, 1.04)	0.152	0.94 (0.82, 1.07)	0.335	0.93 (0.79, 1.09)	0.340
English Language Preference	reference	reference	reference	reference	reference	reference
Age Group			1.00 (1.00, 1.00)	0.078	1.00 (0.99, 1.00)	0.288
Sex						
Female			0.92 (0.88, 0.96)	<0.001	0.81 (0.69, 0.95)	0.009
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			1.00 (0.94, 1.07)	0.972	1.02 (0.84, 1.24)	0.817
Medicaid			1.04 (0.96, 1.13)	0.287	1.01 (0.84, 1.20)	0.954
Unknown/Self Pay			0.92 (0.81, 1.03)	0.129	0.98 (0.92, 1.16)	0.800
Emergency Severity Index						
2 (Emergent)			reference	reference	reference	reference
3 (Urgent), 4 (Less Urgent) or 5 (Nonurgent)			0.67 (0.64, 0.71)	<0.001	0.60 (0.51, 0.70)	<0.001

9.16 Cox Proportional Hazard Model for Time to Antibiotic Initiation Comparison between Patients with Non-English Language Preference and English Language Preference among Patients who had an Emergency Severity Index of 2 (n=4,527)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	0.94 (0.80, 1.12)	0.510	0.97 (0.81, 1.15)	0.690	1.02 (0.83, 1.25)	0.869
English Language Preference	reference	reference	reference	reference	reference	reference
Age			1.00 (1.00, 1.00)	0.548	1.00 (0.99, 1.00)	0.073
Sex						
Female			0.91 (0.86, 0.97)	0.002	0.89 (0.74, 1.07)	0.202
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			1.01 (0.93, 1.09)	0.860	1.32 (1.05, 1.65)	0.016
Medicaid			1.02 (0.92, 1.13)	0.745	0.99 (0.79, 1.24)	0.955
Unknown/Self Pay			0.838 (0.71, 0.99)	0.040	0.98 (0.75, 1.28)	0.879

9.17 Cox Proportional Hazard Model for Time to Antibiotic Initiation Comparison between Patients with Non-English Language Preference and English Language Preference among Patients who had an Emergency Severity Index of 3-5 (n=2,941)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	0.89 (0.72, 1.08)	0.233	0.88 (0.71, 1.08)	0.207	0.89 (0.71, 1.14)	0.360
English Language Preference	reference	reference	reference	reference	reference	reference
Age			1.00 (1.00, 1.05)	0.033	1.01 (1.00, 1.01)	0.124
Sex						
Female			0.93 (0.87, 1.00)	0.06	0.66 (0.51, 0.85)	0.002
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			0.98 (0.88, 1.09)	0.701	0.56 (0.79, 1.30)	<0.001
Medicaid			1.08 (0.95, 1.21)	0.237	1.01 (0.79, 1.30)	0.933
Unknown/Self Pay			1.02 (0.86, 1.21)	0.838	0.93 (0.73, 1.19)	0.566

9.18 Cox Proportional Hazard Model for Time to Sepsis Alert Comparison between Spanish-speaking Patients with Non-English Language Preferences and All other Patients with Non-English Language Preferences (n=237)

	Unadjusted Model		Covariate Adjusted Model		Covariate and PSW Model	
	HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Preferred Language						
Non-English Language Preference	0.84 (0.64, 1.10)	0.208	0.93 (0.66, 1.31)	0.672	0.94 (0.66, 1.36)	0.773
English Language Preference	reference	reference	reference	reference	reference	reference
Age Group			1.00 (0.99, 1.01)	0.477	0.99 (0.98, 1.00)	0.210
Sex						
Female			0.74 (0.57, 0.97)	0.028	0.67 (0.48, 0.92)	0.015
Male			reference	reference	reference	reference
Insurance Status						
Private			reference	reference	reference	reference
Medicare			0.97 (0.63, 1.52)	0.907	1.13 (0.75, 1.70)	0.571
Medicaid			1.05 (0.72, 1.53)	0.792	0.96 (0.62, 1.51)	0.870
Unknown/Self Pay			1.05 (0.72, 1.55)	0.786	1.04 (0.63, 1.70)	0.883
Emergency Severity Index						
2 (Emergent)			reference	reference	reference	reference
3 (Urgent), 4 (Less Urgent) or 5 (Nonurgent)			0.64 (0.48, 0.84)	0.001	0.61 (0.44, 0.85)	0.003