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ARAM V. CHOBANIAN & EDWARD AVEDISIAN SCHOOL OF MEDICINE

Thesis

THE IMPACT OF RACE, GENDER, AND PREFERRED LANGUAGE ON PAIN MANAGEMENT IN CHILDREN AND ADOLESCENTS WITH LONG BONE FRACTURES

by

ZOE WILLIAMS

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Approved by

First Reader ____

Beth C. Bragdon, Ph.D.
Assistant Professor, Orthopaedic Surgery

Second Reader ____

Paul A. Rufo, M.D., M.MSc
Assistant Professor of Pediatrics, Harvard Medical School
Associate Director for Inclusion, Fenwick Institute for Pediatric Health Equity and Inclusion

THE IMPACT OF RACE, GENDER, AND PREFERRED LANGUAGE ON PAIN MANAGEMENT IN CHILDREN AND ADOLESCENTS WITH LONG BONE FRACTURES

ZOE WILLIAMS

ABSTRACT

Thousands of children are treated for long bone fractures in emergency departments in the US, and forearm fractures are the most commonly observed in children. Pain management is essential to fracture management. Pain management options and treatment plans are available. While all children should receive the same approach to pain management, existing data demonstrates that this is not always the case, and disparities exist in the evaluation of pain and administration of analgesia in pediatric emergency departments in the US.

Race and ethnicity, gender, and language barriers impact if and when analgesia is administered. Patient demographics similarly impact decisions about opioid administration, and there are significant differences in the type (NSAID vs opioid) of analgesia administered to minority and White patients. There is little information about preferred language and gender-based disparities affecting analgesia administration in the pediatric emergency department. Therefore, more investigation is required to understand better why these disparities exist and what can be done to resolve them. The goal of the PEMA study is to understand better how patients feel about the care they or their children received while being treated in the Pediatric Emergency Department (PED) at Boston

Children’s Hospital and if they felt their race, ethnicity, gender, and language played a role.

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LIST OF ABBREVIATIONS

BU……………………………………………………..Boston University

ED……………………………………………………..Emergency Department

EMR…………………………………………………..Electronic Medical Record

ER……………………………………………………..Emergency Room

ISO……………………………………………………International Standards Organization

LBF…………………………………………………...Long Bone Fracture

NSAID………………………………………………..Nonsteroidal Anti-Inflammatory Drug

PED…………………………………………………..Pediatric Emergency Department

PEMA………………………………………………...Pain Equity Management Assessment

PRISMA…………Preferred Reporting Items for Systematic Reviews and Meta-Analyses

RSC…………………………………………………..Research Study Coordinators

INTRODUCTION

Children being evaluated in the emergency department should not anticipate that their care should be impacted by race, gender, economic or socioeconomic status. However, patient care involves many components, beginning the minute they walk through the doors and ending when they leave. A child can be taken to the children's emergency room for endless medical conditions. A patient's perception of their care in the pediatric emergency department (PED) can be impacted by patient (race, ethnicity, age, gender, and preferred language) and institutional (time of day, patient volume, clinician staffing) attributes.

A parent's decision to bring their child to the emergency room is based on concerns about their child's injury's perceived severity and degree of discomfort. They assume their child will receive expedient, compassionate, and appropriate medical care. However, the triage system in the PED is not generally transparent and is typically based on the severity of a patient's illness/injury, time of day, patient volume, and clinician staffing. Overcrowding in the PED generally increases the duration of a patient's hospital stay, the likelihood of a patient returning to the hospital, and the quality of the health services provided (Doan et al., 2019). The table below outlines available data about ED outcomes at PED centers across Canada:

Outcome	No. (%)*			
	Ontario	**Manitoba**	**Alberta**	**British Columbia**
No. of index visits† (2010–2014)	830 950	224 977	508 234	192 555
No. discharged at index visits	756 034	207 902	466 479	176 833
Index hospital admission	74 845 (9.0)	16 895 (7.5)	41 679 (8.2)	15 717 (8.2)
Hospital admission within 7 days of ED discharge	12 579 (1.5)	2018 (1.0)	4319 (0.8)	1957 (1.1)
Mortality within 14 days of ED discharge (per 100 000)	39 (4.7)	< 6‡	25 (4.9)	13 (7.4)
Return ED visit within 7 days of ED discharge	75 343 (9.1)	20 992 (10.1)	43 473 (8.6)	15 680 (8.9)

Table 1. "Outcomes of pediatric emergency department visits" (Doan et al., 2019) Note: ED = emergency department. *Unless stated otherwise. †Includes only the first visit within a 7-day period. ‡No rates reported for low counts. The table shows the number of hospital visits in PEDs across Canadian Provinces. The table also includes summary statistics regarding hospital visits/admissions, the number of people admitted and discharged, mortality after discharge, and return to the hospital. Doan, Q., Wong, H., Meckler, G., Johnson, D., Stang, A., Dixon, A., Sawyer, S., Principi, T., Kam, A. J., Joubert, G., Gravel, J., Jabbour, M., Guttmann, A., & for Pediatric Emergency Research Canada (PERC) (2019). The impact of pediatric emergency department crowding on patient and health care system outcomes: a multicentre cohort study. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne*, *191*(23), E627–E635. https://doi.org/10.1503/cmaj.181426

The data in the table above highlights the differences between the location of the hospital and how many pediatric patients they might see at a given time. There are also variances in the length of stay at a particular hospital, the interval between PED evaluation and subsequent admission/readmission, and hospital location. Manitoba had one of the highest percentages of patients returning to the PED despite having one of the lowest numbers of patient visits (Doan et al., 2019). On the other hand, Alberta had one of the lowest return rates to the PED despite having one of the highest patient visits (Doan et al., 2019). Could these disparities be driven by differences in health services and resources available? Did the patient and their parents feel all their questions were answered? Did they feel heard by the medical staff? Do they agree with the exit plan and treatment options? All these questions relate to a patient and their parent's perceptions of the care they received while being evaluated and treated in the PED.

Every patient who enters an emergency room or hospital setting should be treated equally and receive the same level of care. Unfortunately, that is not always the case. As a result, the quality of care the patient receives in the PED will uniformly be delivered most effectively to help the patient return to their optimal health (Riera & Walker, 2010). Shortcomings in the care that children receive in the PED places them at greater risk for further illness and injury and results in overburdening of the healthcare system through the need for frequent PED utilization. Patient-related factors, including race, ethnicity, and preferred language, can create barriers (perceived or real) between patients and healthcare providers. Efforts spent addressing these patient factors may impact the time available for a clinician to provide medical care in the PED.

Patient and parent-preferred primary language can impact the care they receive and the outcome of their pediatric emergency department visit (Lowe et al., 2022). If neither the patient nor parent speaks English as a preferred language, clinicians must rely on an interpreter to facilitate communication with their patients (Lowe et al., 2022). The interposition of an interpreter raises the possibility that the patient and their family might not fully understand all the details and information the medical staff gave them. This miscommunication and/or misunderstanding between the parties involved may lead to missed follow-up appointments with primary care or specialists, hindering the patient's treatment and recovery time. Perceived language discrepancies may also negatively impact a patient's perceived level of pain and anxiety. A child's visit to a PED can be overwhelming, and how the medical staff addresses them is important. When the doctor talks to the patient, their assessment, language, and explanation should be appropriate for the child's age and cognitive level (Young, 2017). Parental anxiety can impact their perception of child illness acuity and may cause some children to be evaluated in the PED unnecessarily. Instead, the medical issue could have been treated at their pediatrician's office or urgent care center (Pehlivanturk-Kizilkan et al., 2022).

Brief History of Long Bone Fractures

Long bone fractures include an injury to one of the long bones in a person's arms or legs (not including the wrist, ankle, or knee). Long bone fractures are common in childhood, and factors like age, gender, or where the child lives (urban vs rural area) can influence the likeliness of the child obtaining one. In the United States, it is estimated that, on average, children experience "12 to 36 fractures per 1000 children per year."

(Naranje et al., 2016). The likeliness of a child obtaining a bone fracture increases during the preteen and teenage years since children undergo rapid growth spurts. Various treatment options are available to treat a long bone fracture. Current treatment options include the following: splints, braces, casts, pain relief medications, and surgery (if conservative therapy is not indicated). The severity of the injury will determine what type of treatment is needed to facilitate the healing of the bone fracture.

Gender Influence on Long Bone Fractures

Boys have a higher susceptibility to obtaining a fracture than girls. By the age of sixteen, it is estimated that “42% of boys and 27% of girls” will have experienced a bone fracture (Shin et al., 2023). A lack of physical activity, risk-taking, and hormones all play a role in why boys have a high risk for bone fractures relative to their female counterparts. Certain sports and physical activities can increase a child’s risk of injury. Sports where bone fractures are common include football, basketball, winter sports (snowboarding or skiing), soccer, lacrosse, hockey, and many other sports (Lotan et al., 2023). Male sports are primarily contact sports, which explains why their injuries are related to trauma and not overuse injuries. Men and women naturally have different bone structures and growth patterns. Also, women naturally have less muscle mass compared to men. Testosterone is higher in males than females, contributing to bone growth and decreasing bone loss. On the other hand, estrogen is higher in females than males, which reduces bone growth and increases the rate of bone loss (Barhum, 2022). However, this is why, as adults, women have a higher chance of bone fractures compared to men due to hormones rather than sports-related injuries. Whereas in childhood, boys have a higher chance of bone fractures compared to girls due to sports and growth spurts rather than hormones. Gender is not the only socioeconomic issue that influences someone's susceptibility to experiencing a long bone fracture.

Race Influence on Long Bone Fractures

Everyone should be treated equally when receiving medical care in the emergency department, regardless of race. However, that is not always the case, and it is a big issue that needs to be addressed to achieve equality in the medical community. There are multiple questions people can ask themselves when trying to understand where the problem lies, what areas of improvement there are, and what can be done to resolve them. For example, does the medical profession helping the patient have systemic bias? Is the hospital located in a city or rural area? Does the doctor see and understand me? Is the medical staff diverse? Representation is important and creates a safe, inclusive environment. It allows for minorities to feel seen and heard by others. In addition, having a diverse team and environment brings together different perspectives, mindsets, and views to achieve a common goal. Everyone experiences the world differently and sees it through their own lens, and diverse representation allows patients to converse with people who look like them or understand them. In turn, the patient can feel more confident about voicing their concerns and feeling heard.

Although current research suggests there might not be differences in susceptibility for children of different races who experience a long bone fracture, there are likely disparities in the type of treatment they receive. For example, existing data suggest that minority patients are less likely to receive analgesia for out-of-hospital use compared to

White patients (Goyal et al., 2020). The table below illustrates data regarding pain management for long bone fractures stratified by race and ethnicity:

Race and Ethnicity	Process Measures				Clinical Outcomes			
	Any Analgesic		Opioid Analgesic		≥2-Point Pain Reduction		Optimal Pain Reduction[a]	
	%	aOR[b] (95% CI)	%	aOR[b] (95% CI)	%	aOR[b] (95% CI)	%	aOR[b] (95% CI)
NH white	84.6	Referent	53.2	Referent	88.4	Referent	64.8	Referent
NH African American	89.7	1.72 (1.51–1.95)	39.5	0.86 (0.77–0.95)	90.3	1.42 (1.14–1.76)	57.2	0.78 (0.67–0.90)
Hispanic	86.3	1.32 (1.16–1.51)	36.4	0.86 (0.76–0.96)	92.0	1.38 (1.04–1.83)	60.4	0.80 (0.67–0.95)
Other	85.2	1.06 (0.95–1.29)	46.5	0.90 (0.79–1.02)	89.5	1.09 (0.82–1.43)	62.2	084 (0.70–1.01)

Table 2. "Management of Pain by Race and Ethnicity" (Goyal et al., 2020) Note: [a]Optimal pain reduction is operationally defined as reduction of pain into the mild or no pain categories within 90 min of maximum pain score. [b] Outcome can be stratified by age, gender, insurance status, triage level, type of procedural sedation, fracture location, visit year, visit site, ED type, ED clinician, and provider type. Children with a moderate pain score or higher received at least one dose of an analgesic. Outcome data is stratified by the race and ethnicity of treated children, those who received any analgesic, and those treated with opioids. Categorical scoring assessed if the child's pain decreased by at least two points within 90 minutes of analgesic administration. Quantitative scoring assessed the overall reduction in the pain score (mild-to-no pain) within 90 minutes. Goyal, M. K., Johnson, T. J., Chamberlain, J. M., Cook, L., Webb, M., Drendel, A. L., Alessandrini, E., Bajaj, L., Lorch, S., Grundmeier, R. W., Alpern, E. R., & PEDIATRIC EMERGENCY CARE APPLIED RESEARCH NETWORK (PECARN) (2020). Racial and Ethnic Differences in Emergency Department Pain Management of Children With Fractures. *Pediatrics*, *145*(5), e20193370. https://doi.org/10.1542/peds.2019-3370

The table above shows the differences in outcomes experienced between minority and non-minority children concerning whether they received an analgesic to reduce their pain from their bone fracture. Initially, it seemed all children received the same amount of an analgesic in any form, irrespective of their race and ethnicity. Although there were no significant differences in the percentage of patients receiving an analgesic, it appears minority children received slightly higher doses. However, after adjusting for age, gender, insurance status, triage level, procedural sedation, fracture location, visit year, visit site, ED type, ED clinician, and provider type, disparities were identified between minority and non-minority children (Goyal et al., 2020). Minority children were less likely to receive an opioid analgesic. Most children noted their pain level decreased by at least two points after receiving analgesia. However, white children experienced a higher level of pain relief within ninety minutes of receiving an analgesic compared to minority children.

Several confounders can impact the assessment of pain management across studies, and this complicates any efforts to address disparities. These confounders include the specifics such as:

- How is pain measured in the Emergency Department
- The type of pain scale used and how it is presented to the patient and their parents
- Are pain assessments completed by the child and/or parent(s)
- How can we standardize care in the Emergency Department
- Does the initial triage score impact decisions about analgesia

- How healthcare access impacts a patient's treatment
- Is a child receiving their care in a city or a rural setting

Further investigation is necessary to understand better how we can resolve issues regarding how race, ethnicity, gender, and other socioeconomic factors impact the care that children receive in a Hospital and/or other medical settings.

Language Impact on Long Bone Fracture Care

The United States of America is a true melting pot of race, color, and ethnicity, and people from different backgrounds speak multiple languages. Although English is the primary language in the US, many people do not speak English or use it as their preferred language. Effective communication between two people who do not speak the same language requires access to someone who can serve as an interpreter. Interpreters can be drawn from a family member, friend, or a credentialed hospital interpreter. Technology has made interpretation services more accessible. For example, several phone apps enable individuals to converse in real-time. Currently, many hospitals outsource digital interpreter services to commercial vendors. This enables virtual interpretation with the interpreter present on a tablet and/or computer. This virtual flexibility ensures that hospitals have the resources to ensure that any patient, parent, and family member can converse with the members of their healthcare team. The figure below shows the different types of interpreter services available in a hospital during a patient's visit:

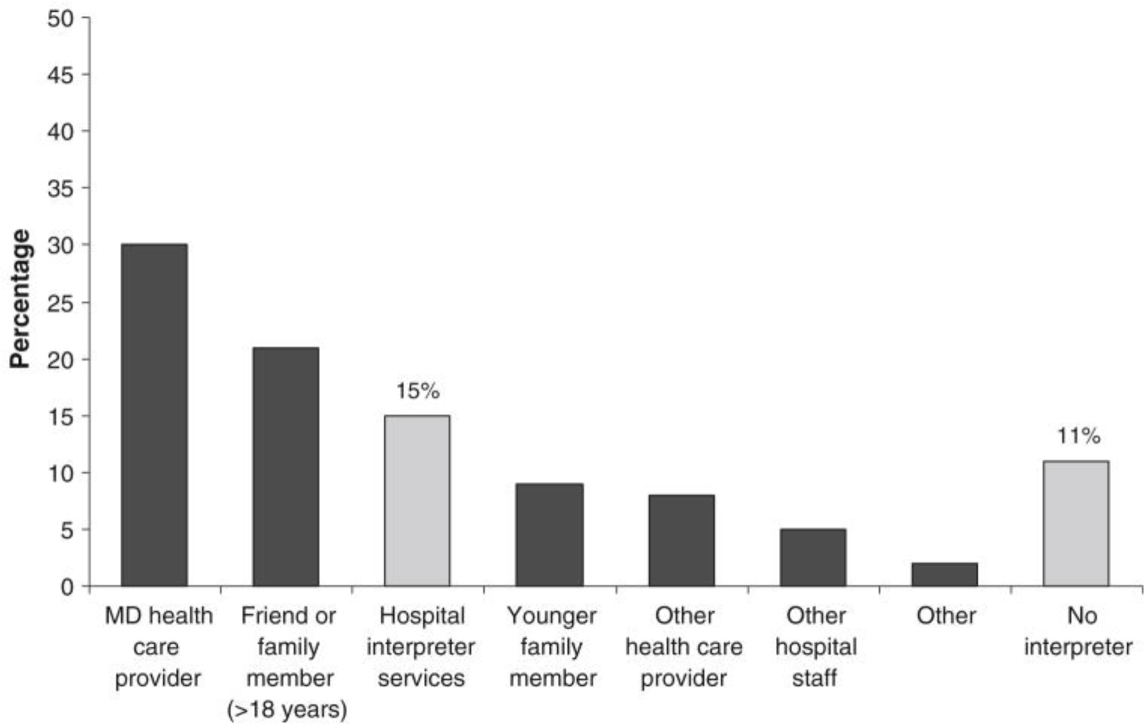


Figure 1. Type of Interpreter Service Used (Ginde et al., 2009) Note: The figure shows the type of interpreter used for patients with language barriers during their emergency room visit. Ginde, A. A., Clark, S., & Camargo, C. A., Jr (2009). Language barriers among patients in Boston emergency departments: use of medical interpreters after passage of interpreter legislation. *Journal of immigrant and minority health*, *11*(6), 527–530. https://doi.org/10.1007/s10903-008-9188-5

The figure above illustrates the most common types of interpreter services used by patients in the Emergency Department. The extent of interpreter services may vary from hospital to hospital, depending on where they are located and the demographics of the patients they see. Not having an available interpreter when a patient requires one can impact the patient's visit and length of stay in the emergency room. It is essential that patients can communicate with their healthcare team to provide the patient with accurate information on which to base their care plans. Interpreters must be properly trained to ensure they are confident in the terminology and can accurately translate what is being said. In the figure above, only 15% of patients who required an interpreter had access to professional interpreters; furthermore, 11% of patients did not use an interpreter (Ginde et al., 2009). Delays in communication due to a lack of interpreter services can result in frustration and/or anxiety between the patient and the doctor. The interpreter must facilitate communication (intake questionnaire, possible imaging, diagnosis) before any medical intervention can occur. For their part, hospitals need to assess and reassess their interpreter services to ensure that the resources available match the demographics of the populations they serve. Language is a socioeconomic issue that needs to be addressed. Although technology is helping tackle the issue, until services are implemented everywhere, additional solutions must be developed.

SPECIFIC AIMS

The goal of the research and paper was to investigate and address the following:

- Do race, ethnicity, and language impact on patient perception of care in the pediatric emergency department
- Do race, gender, and primary language impact pain management for children and adolescents with long bone fractures
- Is patient pain and anxiety addressed appropriately in the pediatric emergency department
- Do patients and their parents leave the pediatric emergency department feeling heard, having had all their questions answered, and understand their discharge plan and need for follow-up
- Can we improve pain management outcomes during and after the hospital visit by identifying any disparities arising from patient demographics, including race, ethnicity, gender, and preferred language, impacting the choice of pain medication, prescribed dosage, and treatment plans following discharge

METHODS

The research aims to understand better how a patient's demographics and socioeconomics, including race, ethnicity, gender, and primary language, impact child and parent experiences in the pediatric emergency room while being examined for a long bone fracture. To do this, the PEMA study will involve the following patient selection:

1. Inclusion Criteria:
   a. Patients aged 8-21 years old and their parents
   b. Long Bone Fracture (Humerus, Radius, Ulna, Femur, Fibula, Tibia) confirmed by a radiological image
   c. The child or young adult is primarily brought to the emergency room for evaluation of a bone fracture(s)
2. Exclusion Criteria:
   a. Patients admitted for inpatient level of care
   b. Patients with development or cognitive disability that may impact pain assessment or response to intervention
   c. Patients transferred from an outside hospital for management of long bone fractures
   d. Patient who visited a primary care physician before being referred to Boston Children's Hospital orthopedic clinic
   e. Patients' whose emergency department visit was over seven days before visiting the orthopedic clinic

f. Concerns for nonaccidental trauma as described by the managing team

g. Unstable concurrent psychological comorbidities (including severe anxiety, depression, or psychosis), documented in the EMR, as patients not at their baseline may find it difficult to assess pain severity and/or response to therapy

h. Active diagnosed substance use disorder as documented in the EMR

The potential study participants will be identified by the following:

1. Prospective:
    a. Research Study Coordinators working at the orthopedic clinic will be available daily from 9 am to 5 pm to identify and approach patients being treated for long bone fractures.
    b. Potential study participants will learn about the study aims and process
    c. If the patient consents to participate in the study, they will be informed they will be contacted by phone to schedule an interview to collect information that will help us better understand the care patients receive in pain in the emergency department.
    d. When possible, consent will be obtained in the orthopedic clinic
2. Retrospective:

a. Research Study Coordinators will also review PowerChart, Epic, and Boston Children’s Hospital 360 data to identify eligible patients treated for long bone fractures

The data collected for the research will be collected using the following methods:

1. Consent:
    a. Patients consenting to participate in the orthopedic clinic will be contacted 1-7 days after their ED visit
    b. The RSC will contact eligible patients who did not consent in the orthopedic clinic
        i. Eligible patients will be contacted via email twice to determine if they would be interested in participating in the study
        ii. A single phone call will be made to potential study subjects who are unresponsive to email notifications
    c. Eligible patients agreeing to participate will receive a consent form electronically. Patients will sign the consent form and:
        i. Return it through the secure MyChildren's patient portal
        ii. Return it in a prepaid envelope by regular mail if they do not have reliable internet/email
        iii. Patients opting out of the study will receive a tri-fold pamphlet outlining the study goals and objectives. Contact

information will be included should patients' parents change their minds about study participation

iv. Patients consenting to participate in the study will be scheduled to complete a 15–30-minute phone interview conducted by phone or Zoom

2. Quantitative Data (Primary Aim):
    a. Patients will be asked to complete a brief survey with questions about their recent experience concerning pain management in the emergency department
    b. Patients can opt out of answering any question for any reason
3. Qualitative Data (Primary Aim):
    a. Consenting subjects will complete a 15–30-minute phone interview conducted by phone or Zoom
    b. The interview will consist of open-ended questions to allow the participants to discuss what they consider important and to narrate their experiences without being tied to specific answers
4. All collected quantitative and qualitative data will be abstracted and entered into a secure REDCaP database that will be used for data analysis
5. Secondary Aim
    a. The EMR will be reviewed for all consenting patients to include demographics, dosage of pain medications, and discharge planning

The interview will include the following reminders and questions:

1. Reminders:
    a. The interview will be recorded to ensure we have an accurate record of our discussion. Only members of the research team will listen to the recording
    b. We will ask you only to use your first name during the interview as we want to protect your privacy
    c. If possible, we request that you do not mention specific names of doctors or nurses involved in your child's care in the emergency room
    d. There are no right or wrong answers, and you do not have to discuss anything you do not want to
    e. Please speak up since we are recording this interview. If you are talking too softly to be picked up by the recorder, I will ask you to speak a bit louder
2. Questions:
    a. Tell us about your/your child's experience with pain after the fracture
        i. How was the limb broken? Where was your child, and who were they with at the time? How did the child get to the emergency department? How was the pain on the way to the emergency department?

ii. How did the doctors and nurses respond to your/your child's pain while in the emergency department? Did anyone ask about how much pain you or your child were in? Did they ask whether you needed pain medications? Were you given information about medications, side effects, and reasons for using or not using certain medications?

b. Were any painful procedures done while in the emergency department? If so, did you feel that the procedure was explained to you/your child in a way that made sense so you understood?

   i. Did anyone engage your child during the procedure to distract or calm them? Were any medications given to manage your child's pain during the procedure? Were you offered ice or non-medications/interventions to help with the pain?

c. While in the emergency department, can you tell me about a time when you felt that your race, ethnicity, language, insurance, or anything else about you made a difference in how you were cared for?

   i. Can you tell me more about that?

   ii. In what way did it make a difference?

   iii. How did you feel when that happened?

1. Emotions, feelings, meanings

iv. What do you think was the reason that you felt those emotions and feelings at that time?

d. Did you feel that people cared about your child's pain?

i. Treated with dignity and respect

ii. Whether they got all the information they wanted and got all their questions answered

iii. Did they ever see some patients being treated differently and not understand why

e. Did you have the opportunity to express concerns about this to anyone at the hospital while you were there?

i. How did they respond to your concerns?

ii. How did they listen to you?

iii. To what extent did your voice/opinion matter to hospital staff?

f. Is there anything else you would like to share about your experience?

<u>REDCaP Survey Questionnaire:</u>

Please remember that this questionnaire concerns your most recent visit to the emergency department at Children's Hospital.

ARRIVAL

· What was your reason for choosing Children's Hospital for evaluation of your condition?

- o Children’s Hospital is the closest in my area
- o A friend or family member recommended Children’s Hospital
- o Children’s Hospital reputation
- o Previous familiarity with Children’s Hospital
- o Recommended by an outside provider
- o No choice, brought via ambulance

WAITING

· How long did you wait after registration before being evaluated by a clinician (doctor, physician assistant, nurse practitioner)?

- o Less than 10 minutes
- o 11-30 minutes
- o 31-60 minutes
- o More than 60 minutes
- o I don’t know / I can’t remember

EVALUATION

· When evaluated by the clinician, I felt that my concerns were heard.

- o Strongly Agree
- o Agree
- o Unsure
- o Disagree
- o Strongly Disagree

- While in the emergency department, I felt that my/my child's care was affected by my race, ethnicity, language, and/or insurance.
    - o Strongly Agree
    - o Agree
    - o Unsure
    - o Disagree
    - o Strongly Disagree

PAIN

- I feel like my/my child's pain was treated in a timely manner.
    - o Strongly Agree
    - o Agree
    - o Unsure
    - o Disagree
    - o Strongly Disagree
- My/my child's pain was well controlled while in the emergency department.
    - o Strongly Agree
    - o Agree
    - o Unsure
    - o Disagree
    - o Strongly Disagree

· I was given the opportunity to participate in my/my child's pain control treatment plan.

- o Strongly Agree
- o Agree
- o Unsure
- o Disagree
- o Strongly Disagree

DISCHARGE

· I was given clear discharge instructions upon leaving the emergency department.

- o Strongly Agree
- o Agree
- o Unsure
- o Disagree
- o Strongly Disagree

· Overall, I was satisfied with the care given to me/my child at Children's Hospital.

- o Strongly Agree
- o Agree
- o Unsure
- o Disagree
- o Strongly Disagree

· If needed, I would return to the Children's Hospital emergency department for additional care.

- o Strongly Agree
- o Agree
- o Unsure
- o Disagree
- o Strongly Disagree

To determine the impact of race, gender, and preferred language on pain management for children and adolescents with long bone fractures, a comprehensive review will be conducted. We planned to use data from the study to complete a preliminary analysis. However, operationalizing the project has moved more slowly than anticipated. As such, a decision was made to do a comprehensive review.

Comprehensive Review

The comprehensive review will consist of data from published studies, including Peer-reviewed research articles and reviews. PubMed and ScienceDirect will be used to find related articles, studies, and medical journals. Other databases may need to be used to further the search on the topic and find more references.

The key concepts for the comprehensive review are the following:

1. Pain Management for Long Bone Fractures
2. Pediatric Emergency Department
3. Impact of Race and Ethnicity on Treating Long Bone Fractures

a. Racial Disparities in Care/Treatment for Long Bone Fractures in the Pediatric Emergency Department

4. Impact of Gender on Pain Management for Long Bone Fractures
5. Language Barriers and Preferred Language impact on Long Bone Fractures Treatment

The search phrases used are the following:

1. "Issues with treating Long Bone Fractures in the Pediatric Emergency Department"
2. "Analgesia Use for Children with Long Bone Fractures"
3. "Managing acute pain in children"
4. "Racial discrepancies among Long Bone Fractures in the Pediatric ER"
5. "Racial Discrepancies in the Pediatric ER"
6. "Racial Disparities in health care access"
7. "Do minority groups leave the ER sooner than white patients?"
8. "Language cause issues in the Emergency Department"
9. "Enough Interpreters in the ER"
10. "Impact of sex on Long Bone Fracture treatment in the Emergency Department"

Combined search terms included the following:

1. "Pediatric Care" AND "Emergency Department"
2. "Pediatric Pain Management" AND "Long Bone Fractures"

3. “Pediatric Care Emergency Department” AND “Gender”
4. “Gender” AND “Pediatric Emergency Department”
5. “Race Disparities in Long Bone Fractures” AND “Pediatric Emergency Department”
6. “Race Disparities” AND “Long Bone Fracture Treatment”
7. “Language Barriers” AND “Pediatric Emergency Department”
8. “Language Barriers” AND “Long Bone Fracture Treatment”

Preliminary searches were made to understand better the issues that impact the care received in an Emergency Department. The search was then further narrowed to understand better the literature addressing discrepancies within the Pediatric Emergency Department. In addition, the preliminary searches helped determine if the current search terms produced relevant articles and studies that could be used for the research. After the search, the titles of the articles and/or studies were examined to see which stood out and were most relevant to the topic of interest. Focused on research articles and studies addressing the impact of race, ethnicity, gender, and language on the care of a patient with a long bone fracture in the emergency department. The factors can bring into mind other questions and further relate to other issues. Ultimately, this project aimed to identify potential initiatives that could mitigate the impact of disparity and bias in this acute healthcare setting.

RESULTS

Many studies found disparities in different healthcare system areas, including access to healthcare, ED utilization, triage score/system, analgesia use, and delivery of care by staff. Further investigation is required to determine if these disparities exist due to biases in the system or the hospital staff. In addition, do the disparities exist due to the patient's perception, or do the problems lie elsewhere? A meta-analysis and systematic review of racial and ethnic differences was performed to examine racial and ethnic differences for analgesic administration in US emergency departments (Lee et al., 2019). The figure below outlines how the study selected studies included in this research:

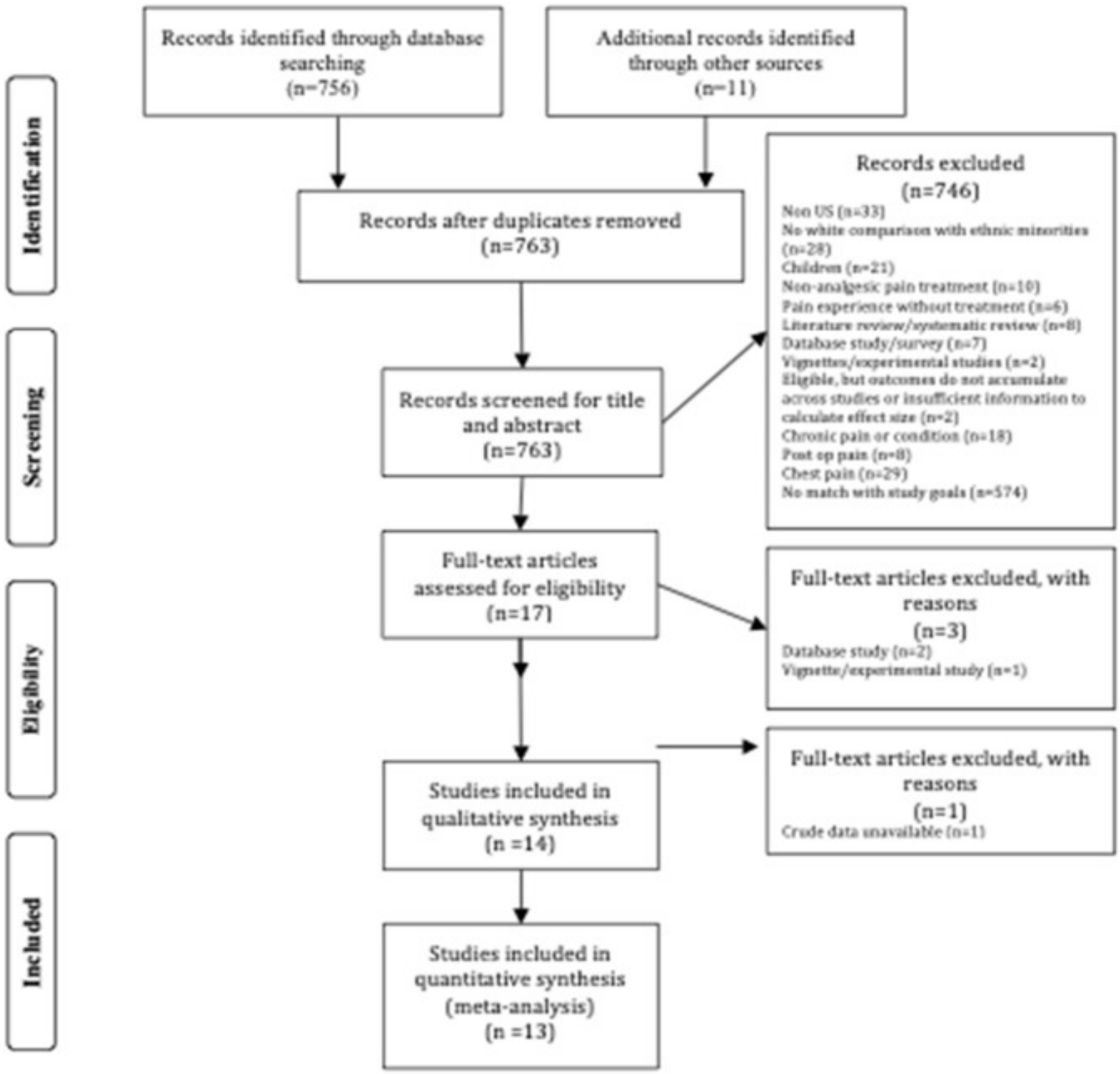


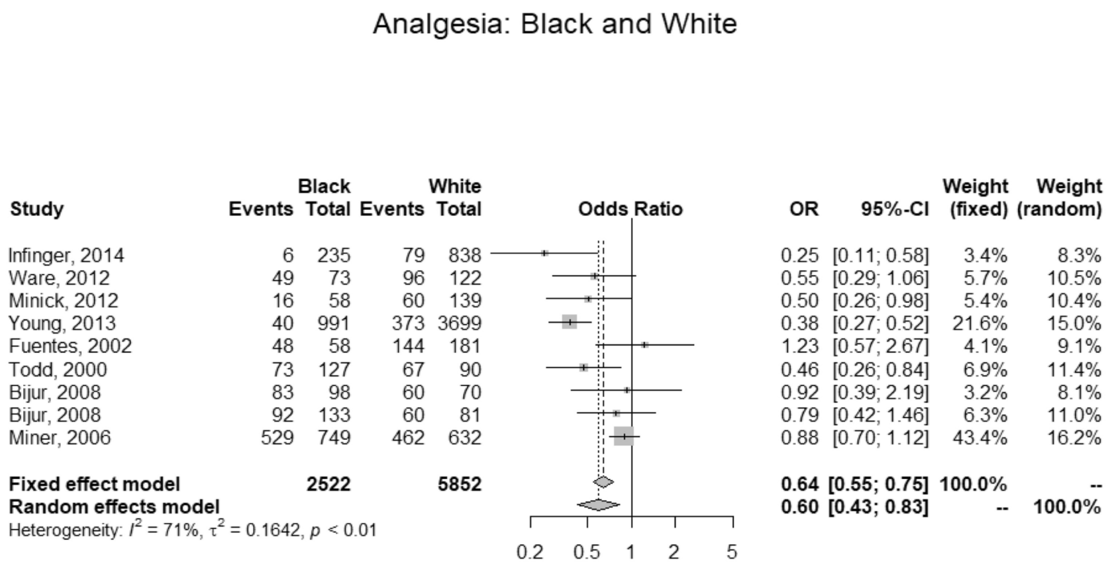
Figure 2. PRISMA Flowchart for Search Strategies (Lee et al., 2019) Note: The figure shows the PRISMA method used for the systematic review and meta-analysis. The Flowchart also shows which articles were included or excluded based on the inclusion and exclusion criteria. Lee, P., Le Saux, M., Siegel, R., Goyal, M., Chen, C., Ma, Y., & Meltzer, A. C. (2019). Racial and ethnic disparities in the management of acute pain in US emergency departments: Meta-analysis and systematic review. *The American journal of emergency medicine*, *37*(9), 1770–1777. https://doi.org/10.1016/j.ajem.2019.06.014

Out of the seventeen identified articles, fourteen met the inclusion criteria for qualitative analysis, and thirteen were used for quantitative analysis (Lee et al., 2019). The total study population based on the articles selected includes the following:

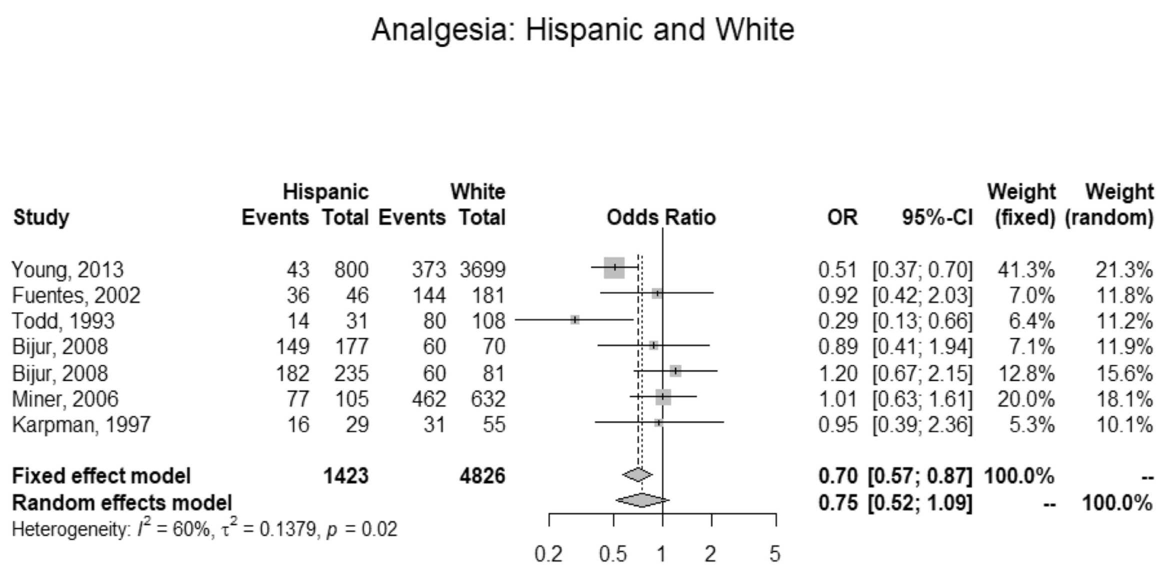
Race of the Patients	Number of Patients
White	7,070
Black	3,125
Hispanic	1,538

Table 3. Total Study Population (Lee et al., 2019) Note: The table shows the total study population based on the articles used for the meta-analysis and systematic review. Lee, P., Le Saux, M., Siegel, R., Goyal, M., Chen, C., Ma, Y., & Meltzer, A. C. (2019). Racial and ethnic disparities in the management of acute pain in US emergency departments: Meta-analysis and systematic review. *The American journal of emergency medicine*, *37*(9), 1770–1777. https://doi.org/10.1016/j.ajem.2019.06.014

Over eleven thousand patients were included in the study, and a little more than half were female. The study compared differences in both analgesic use and opioid use in white and minority racial groups. The figures below compare data regarding analgesia administration among minority and White patients being treated for their acute pain.



A

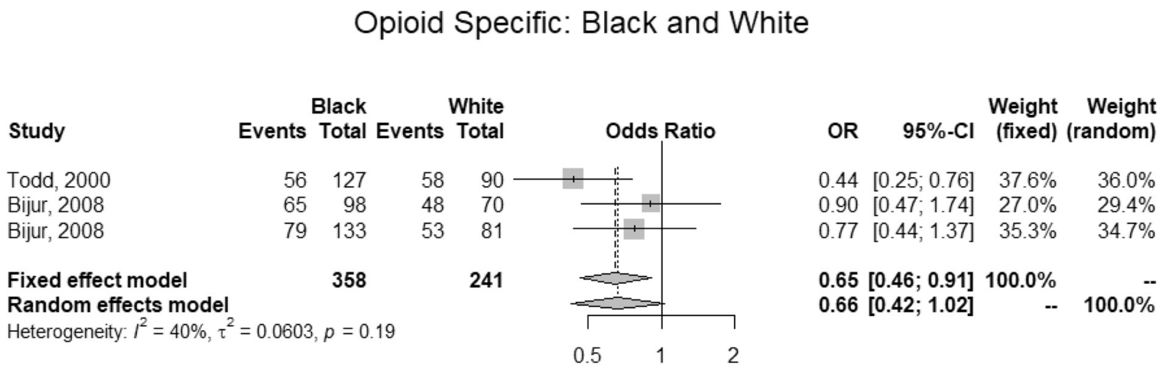


B

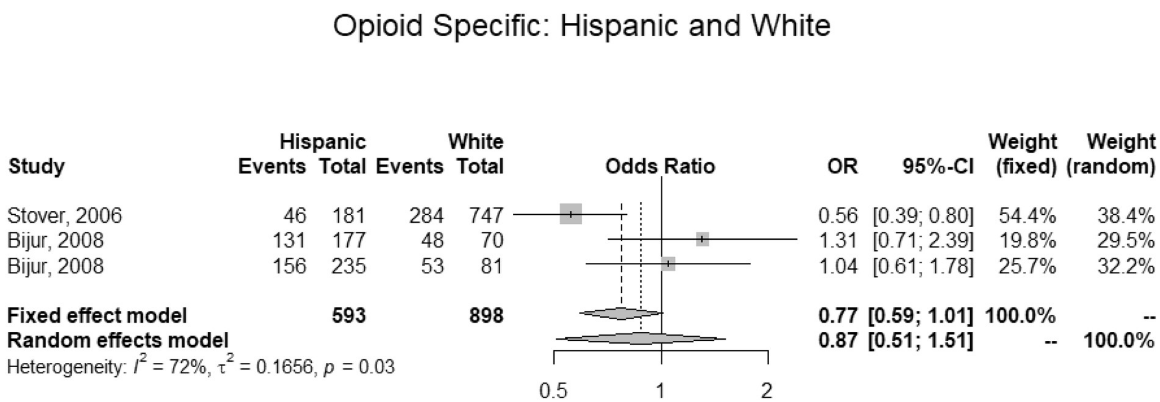
Figure 3. A. Analgesia: Black and White B. Analgesia: Hispanic and White (Lee et al., 2019)

Note: Figure A compares Black and White patients regarding receiving any form of analgesia for their acute pain. Figure B shows the comparison between Hispanic and White patients for any form of analgesia received for their acute pain. Lee, P., Le Saux, M., Siegel, R., Goyal, M., Chen, C., Ma, Y., & Meltzer, A. C. (2019). Racial and ethnic disparities in the management of acute pain in US emergency departments: Meta-analysis and systematic review. *The American journal of emergency medicine*, *37*(9), 1770–1777. https://doi.org/10.1016/j.ajem.2019.06.014

Minority patients were less likely to receive any form of analgesia than White patients. Black patients were thirty-six percent less likely to receive any form of analgesia for their acute pain compared to White patients in the fixed effect model (Lee et al., 2019). The difference increased to forty percent when a random effect model was performed. Hispanic patients were thirty percent less likely to receive any form of analgesia for their acute pain compared to White patients when the data were examined using a fixed effect model. However, unlike Black patients, the disparity for Hispanic patients dropped to twenty-five percent when analyzed using a random effect model (Lee et al., 2019). Although both Black patients and Hispanic patients were less likely to receive any form of analgesia compared to White patients, there were differences between the racial groups. Hispanic patients were more likely to receive analgesia compared to Black patients by six percent (fixed effect model) and fifteen percent (random effect model). The study further investigated if there are differences in how often opioid analgesia is given to minority patients and White patients.



A

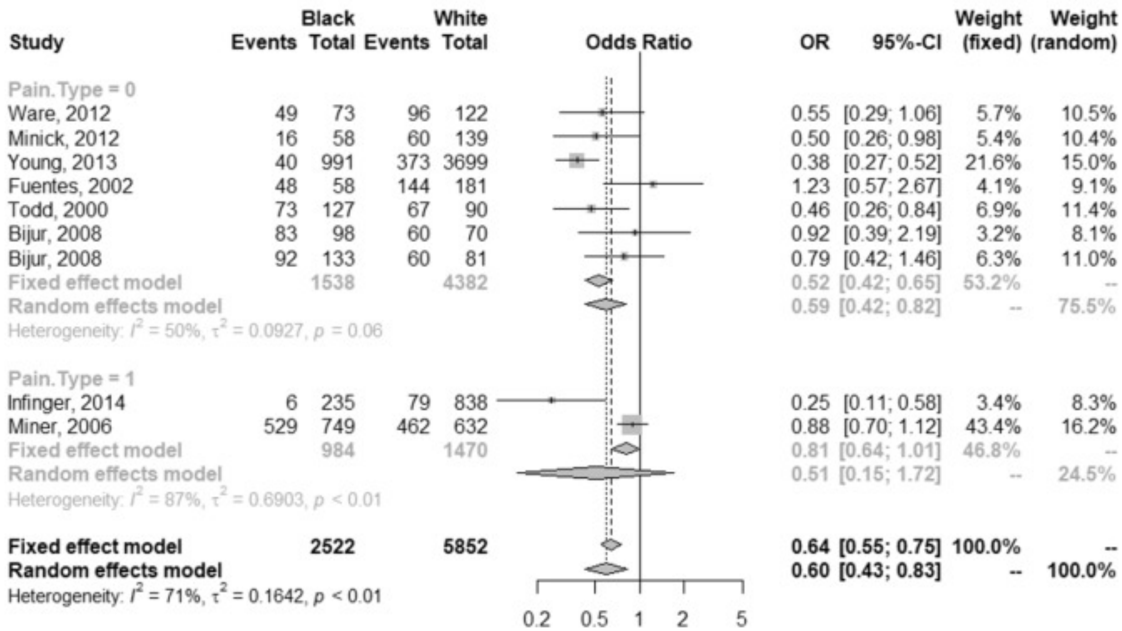


B

Figure 4. A. Opioid Analgesia: Black and White B. Opioid Analgesia: Hispanic and White (Lee et al., 2019) Note: Figure A shows the comparison between Black and White patients regarding receiving opioid analgesia for their acute pain. Figure B shows the comparison between Hispanic and White patients for opioid analgesia received for their acute pain. Lee, P., Le Saux, M., Siegel, R., Goyal, M., Chen, C., Ma, Y., & Meltzer, A. C. (2019). Racial and ethnic disparities in the management of acute pain in US emergency departments: Meta-analysis and systematic review. *The American journal of emergency medicine*, *37*(9), 1770–1777. https://doi.org/10.1016/j.ajem.2019.06.014

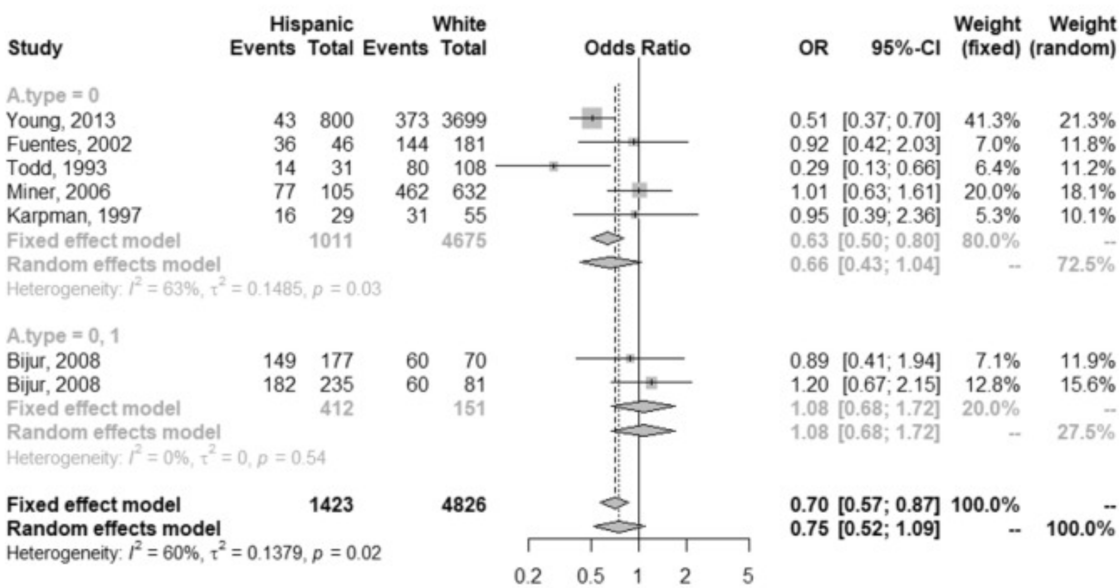
The investigators found that minority patients were still less likely to receive opioid analgesia compared to White patients for the management of their acute pain. Black patients were thirty-four percent less likely to receive opioid analgesia in a fixed-effect model and thirty-five percent less likely in a random-effect model compared to White patients (Lee et al., 2019). In contrast, there was a ten percent difference between the fixed and random effect models for Hispanic patients. Hispanic patients were also twenty-three percent less likely to receive opioid analgesia in a fixed-effect model and thirteen percent less likely in a random-effect model compared to White patients (Lee et al., 2019). Although Hispanic patients are less likely to receive analgesia than White patients, no matter the form, they are still more likely to receive one than Black patients. The study further broke down the causes of acute pain into the following categories: long bone fracture, traumatic incident/pain, no fracture, and non-traumatic pain (Lee et al., 2019).

Analgesia: Black and White



A

Analgesia: Hispanic and White



B

Figure 5. A. Acute Pain Defined Analgesia: Black and White B. Acute Pain Defined Analgesia: Hispanic and White (Lee et al., 2019) Note: Figure A compares Black and White patients regarding receiving any form of analgesia for their acute pain based on the category they fall into. Figure B shows the comparison between Hispanic and White patients for any form of analgesia received for their acute pain based on the category they fall into. Lee, P., Le Saux, M., Siegel, R., Goyal, M., Chen, C., Ma, Y., & Meltzer, A. C. (2019). Racial and ethnic disparities in the management of acute pain in US emergency departments: Meta-analysis and systematic review. *The American journal of emergency medicine*, *37*(9), 1770–1777. https://doi.org/10.1016/j.ajem.2019.06.014

When a Black patient's acute pain resulted from a long bone fracture and/or a traumatic incident/pain, they were significantly less likely to receive analgesics compared to White patients presenting with similar complaints (Lee et al., 2019). The same trend was true of Black patients presenting for management of non-traumatic (no fracture) pain. Hispanic patients were also less likely to receive analgesia compared to White patients across all four categories of acute pain. The investigators attempted to draw conclusions about disparities for other racial groups, including Asian patients and those patients identifying with two or more racial groups. However, there was insufficient sample size to draw conclusive statements. Race and ethnicity are not the only socioeconomic issues that drive disparities in analgesia administration in the Pediatric Emergency Department.

Gender is another area in which discrepancies exist between patients when receiving care for their pain, whether acute or chronic, in the Emergency Department. A study was done to identify differences in the administration of analgesia in the Emergency Department between female and male pediatric patients. Patients included in the study were at least five and no more than twenty-one years old. The study primarily looked at whether any form of analgesia was received in addition to whether an opioid analgesia was administered. The table below shows the initial study data before adjusting for other variables/factors.

Characteristic	**Female (n = 681)**	**Male (n = 406)**	**p-value**
	N (%) or Median (25th, 75th)	**N (%) or Median (25th, 75th)**	
Age (years)	17 [13,19]	14 [9,18]	0.0003
Non-White Race/Ethnicity	504 (74.0%)	272 (67.0%)	0.01
Non-English Language	71 (10.4%)	41 (10.1%)	0.86
First Pain Score [1–10][a]	7 [5,9]	6 [4,8]	<0.0001
Received Any Analgesic	371 (54.5%)	180 (44.3%)	0.001
Time to First Analgesic (mins)	123 (77, 201)	107 (73, 170)	0.036
Received Opioid Analgesic	132 (19.4%)	83 (20.4%)	0.67
Time to First Opioid (mins)	133 (69, 212)	91 (64, 171)	0.082

Continuous variables are reported as median (25th, 75th) and categorical and binary variables are reported as N (%).

a

n = 601 females and n = 313 males.

Table 4. “Baseline Characteristics” (Vastola et al., 2024) Note: The table compares female patients to male patients and provides the general data they found before making other

adjustments. The table also provides the different characteristics the study looked at for their female and male pediatric patients. Vastola, M. E., Mumma, B. E., Fine, J. R., Tancredi, D. J., Elder, J. W., & Jarman, A. F. (2024). Analgesia administration by sex among pediatric emergency department patients with abdominal pain. *JEM Reports*, *3*(1), 100062. https://doi.org/10.1016/j.jemrpt.2023.100062

The collected data demonstrated insignificant analgesia administration differences between the two sexes. Female patients had a higher average age and pain score than male patients. Over fifty percent of the female pediatric patients, compared to over forty percent of the male pediatric patients, received any form of analgesia for their pain (Vastola et al., 2024). Although female pediatric patients were more likely to receive any form of analgesia versus male pediatric patients, the two sexes were within six percent of each other. On the other hand, both female (nineteen percent) and male patients (20 percent) were equally likely to receive opioid analgesia (Vastola et al., 2024). However, female patients had longer waiting times for their first analgesia to be administered compared to male pediatric patients. There were no differences between the female and male patients based on their primary language. In addition, minority patients were thirty-two percent less likely to receive opioid analgesia for their pain compared to White patients in this study (Vastola et al., 2024).

The second table in the study focused on how long it took for a patient to receive analgesia and why.

	Receipt of Any Analgesia (n = 914∗)		Time to Any Analgesia (n = 518)		Receipt of Opioid Analgesia (n = 914)		Time to Opioid Analgesia (n = 205)	
	OR (95% CI)	p-value	GMR (95% CI)	p-value	OR (95% CI)	p-value	GMR (95% CI)	p-value
First Pain Score	1.22 (1.16, 1.29)	<0.01	0.98 (0.96, 1.01)	0.15	1.31 (1.21, 1.41)	<0.01	0.97 (0.92, 1.02)	0.17
Female Sex	1.30 (0.97, 1.74)	0.08	1.14 (1.00, 1.29)	0.04	0.74 (0.53, 1.05)	0.09	1.17 (0.94, 1.45)	0.16
Non-White Race/Ethnicity	0.98 (0.72, 1.33)	0.88	0.91 (0.80, 1.04)	0.15	0.68 (0.47, 0.97)	0.04	1.00 (0.81, 1.24)	0.99
Non-English Language	0.64 (0.40, 1.01)	0.06	1.18 (0.96, 1.46)	0.11	0.93 (0.52, 1.67)	0.81	1.04 (0.72, 1.49)	0.84
Age	1.01 (0.97, 1.04)	0.79	0.99 (0.97, 1.01)	0.20	1.04 (0.99, 1.09)	0.09	0.99 (0.97, 1.03)	0.84

OR = Odds Ratio; GMR = Geometric Mean Ratio; ∗Patients with missing data were excluded from the regression analysis.

Table 5. "Form of Analgesia Received and Timing of it Being Administered" (Vastola et al., 2024) Note: The table compares the different types of analgesia received and how long the patients were given their first dose. Vastola, M. E., Mumma, B. E., Fine, J. R., Tancredi, D. J., Elder, J. W., & Jarman, A. F. (2024). Analgesia administration by sex among pediatric emergency department patients with abdominal pain. *JEM Reports*, *3*(1), 100062. https://doi.org/10.1016/j.jemrpt.2023.100062

Female patients were more likely to receive analgesia. However, this difference did not prove to be statistically significant. The primary reason for analgesia to be given to female and male pediatric patients in the Emergency Department was based on their preliminary pain score when they first arrived at the hospital (Vastola et al., 2024). When the study adjusted for socioeconomic factors like sex, age, race and ethnicity, and language, the likelihood of a patient receiving analgesia increased by one percent for any pain score that also increased by a point. After the adjustments, some patients had a twenty-two percent greater chance of receiving any form of analgesia (Vastola et al., 2024). Data in Table 5. “Form of Analgesia Received and Timing of it Being Administered,” demonstrate no significant statistical difference in analgesia administration based on preferred primary language (English vs. non-English speaking patients). Regarding the timing of analgesia being administered to the patients, Female patients twelve and older in the ED had a fourteen percent longer wait time than the male pediatric patients on average to receive their first analgesia. When the patients were twelve and younger, female patients had to wait twenty-seven percent longer than male patients (Vastola et al., 2024).

When patients arrive at a hospital, their initial pain score is a primary factor that helps clinicians determine whether a patient will receive analgesia. Between female and male patients, there was no statistically significant difference regarding the rate of opioid analgesia being administered. Similarly, when the study data was adjusted for socioeconomic factors, including sex, age, race and ethnicity, and language, the likeliness of a patient receiving opioid analgesia increased for every point increase in the patient’s preliminary pain score. After these adjustments were made, patients had a thirty-one percent higher chance of receiving opioid analgesia (Vastola et al., 2024). Minority pediatric patients were less likely to receive opioid analgesia than White pediatric patients. Also, older pediatric patients were more likely to receive opioid analgesia compared to younger pediatric patients. However, these differences did not reach statistical significance. When the study made the same socioeconomic adjustments for the timing of the analgesia being administered, there was no significant difference between female and male pediatric patients (Vastola et al., 2024).

Another study looked at possible disparities that exist between male and female patients for the administration of analgesia. The data from this study similarly found no differences between male and female patients regarding the administration of any form of analgesia being received (Chen et al., 2008). Although male and female patients had similar pain scores, female patients were less likely to receive any form of analgesia. Sixty-seven percent of male patients, compared to sixty percent of female patients, received any form of analgesia (Chen et al., 2008). Female patients were less likely (Forty-five percent) to receive opioid analgesia than their male (fifty-six percent) counterparts (Chen et al., 2008). There was a higher difference in receiving opioid analgesia compared to receiving any form of analgesia between the female and male patients in the study. This is shown in the following table:

	Analgesia	Women (%)	Men (%)	Difference (95% CI)
All	None	257 (40)	112 (33)	7 (1.1, 13.6)
	Opioid	288 (45)	191 (56)	11 (4.1, 17.1)
	Nonopioid	94 (15)	39 (11)	–4 (–8.5, 1.3)
Age <50 yr	None	203 (42)	70 (33)	9 (1.4, 16.7)
	Opioid	203 (42)	118 (55)	13 (4.7, 20.6)
	Nonopioid	80 (16)	27 (12)	–4 (–10.1, 2.2)
No gender-specific diagnoses	None	207 (40)	110 (33)	7 (0.2, 13.4)
	Opioid	243 (47)	188 (56)	9 (2.5, 16.2)
	Nonopioid	70 (13)	36 (11)	–2 (–8.3, 1.8)

Table 6. Gender Differences in Opioid Analgesia (Chen et al., 2008) Note: The table shows the disparity between female and male patients regarding opioid analgesia being received during treatment. Chen, E. H., Shofer, F. S., Dean, A. J., Hollander, J. E., Baxt, W. G., Robey, J. L., Sease, K. L., & Mills, A. M. (2008). Gender disparity in analgesic treatment of emergency department patients with acute abdominal pain. *Academic Emergency Medicine*, *15*(5), 414–418. https://doi.org/10.1111/j.1553-2712.2008.00100.x

Male patients were more likely to receive opioid analgesia while in the Emergency Department. The study also looked to see if the gender of the doctor contributed to the disparity of opioid analgesia being administered to male and female patients. The following figure shows the data the study collected:

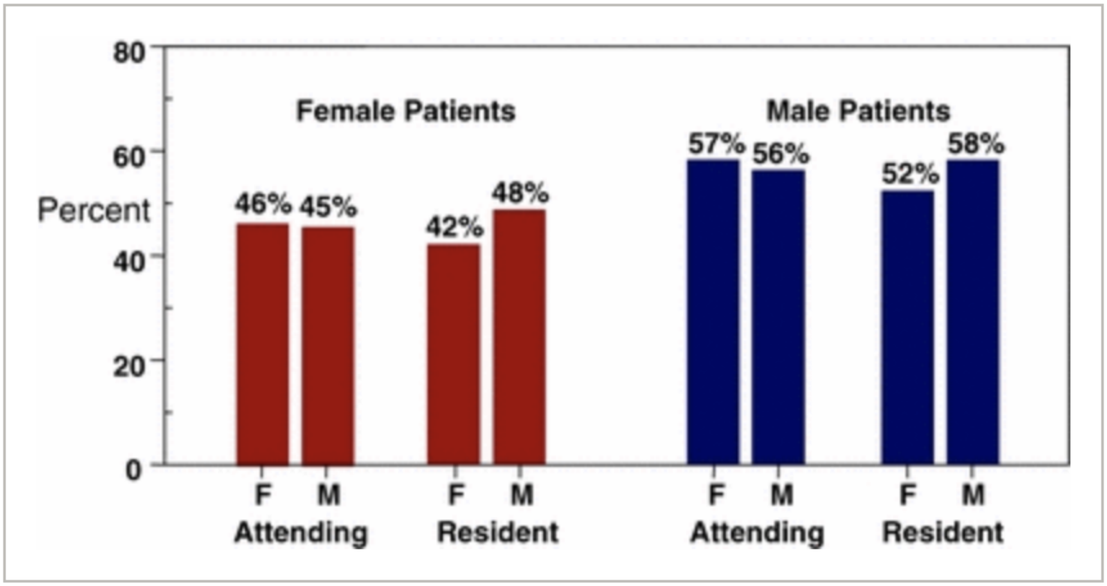


Figure 6. Opioid Analgesia by Doctor Gender (Chen et al., 2008) Note: The figure shows the disparity between female and male patients receiving opioid analgesia being treated by both male and female doctors. Chen, E. H., Shofer, F. S., Dean, A. J., Hollander, J. E., Baxt, W. G., Robey, J. L., Sease, K. L., & Mills, A. M. (2008). Gender disparity in analgesic treatment of emergency department patients with acute abdominal pain. *Academic Emergency Medicine*, *15*(5), 414–418. https://doi.org/10.1111/j.1553-2712.2008.00100.x

The study investigators note a continued disparity in the prescription of analgesics irrespective of the sex of the doctor providing treatment to the patients. Even after the study adjusted the data and controlled for age, race, triage class/score, and pain score, female patients were still less likely to receive opioid analgesia (Chen et al., 2008). Thirteen percent of female patients, compared to twenty-five percent of male patients, received opioid analgesia (Chen et al., 2008). The study also found female patients waited longer for analgesia than male patients. On average, female patients had to wait sixty-five minutes (compared to forty-nine minutes for male patients) to receive any form of analgesia (Chen et al., 2008). Female patients had to wait longer (sixty-three minutes compared to forty-eight minutes for male patients) to receive opioid analgesia (Chen et al., 2008). In addition to race, ethnicity, and gender, there are other socioeconomic issues likely driving the disparities existing for pediatric patients presenting to the Pediatric Emergency Department.

Although the primary language in the United States of America is English, multiple languages are spoken, and not everyone would choose English as their preferred language. Therefore, hospitals and other medical facilities must adapt to evaluating and managing patients from various cultures and languages. A study was performed to determine if there is a difference regarding pain management and delivery time between English- and non-English-speaking patients presenting for evaluation and management of Long Bone Fractures in a Pediatric Emergency Department. A retrospective cohort study was done to see if pain management disparities exist between the two groups. The figure below shows how the study selected the cases to be used and analyzed.

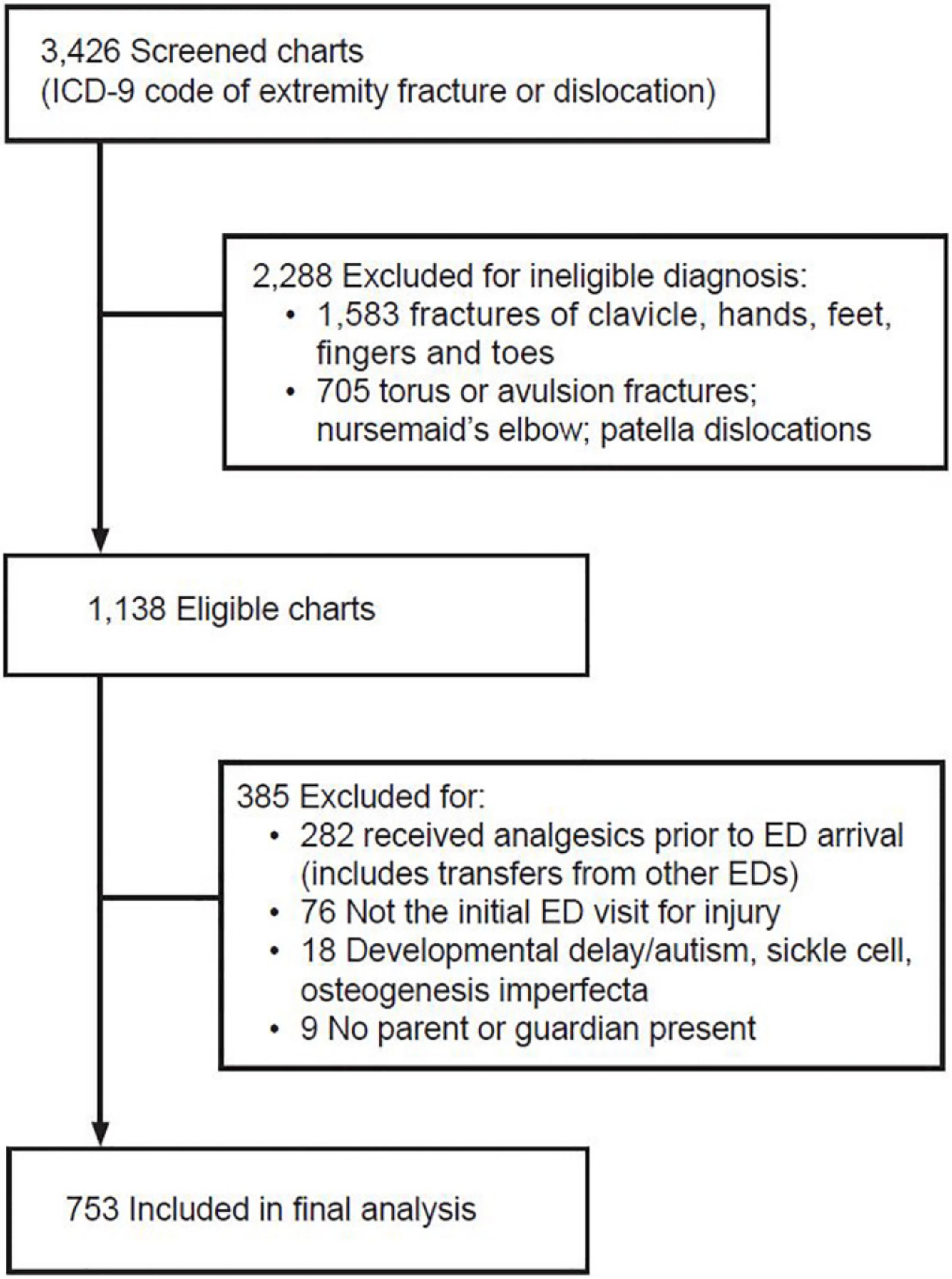

3,426 Screened charts
(ICD-9 code of extremity fracture or dislocation)
2,288 Excluded for ineligible diagnosis:
• 1,583 fractures of clavicle, hands, feet, fingers and toes
• 705 torus or avulsion fractures; nursemaid's elbow; patella dislocations
1,138 Eligible charts
385 Excluded for:
• 282 received analgesics prior to ED arrival (includes transfers from other EDs)
• 76 Not the initial ED visit for injury
• 18 Developmental delay/autism, sickle cell, osteogenesis imperfecta
• 9 No parent or guardian present
753 Included in final analysis

Figure 7. Cases Included in the Language Study for LBF Pain Management (Gaba et al., 2021) Note: The figure shows how the study selected the included and excluded cases. *ED*, emergency department, *ICD-9*, International Classification of Diseases, 9th revision. Gaba, M., Vazquez, H., Homel, P., Likourezos, A., See, F., Thompson, J., & Rizkalla, C. (2021). Language Barriers and Timely Analgesia for Long Bone Fractures in a Pediatric Emergency Department. *The western journal of emergency medicine*, *22*(2), 225–231. https://doi.org/10.5811/westjem.2020.9.48431

The table below shows the different characteristics of the subjects in the study.

	English speaking (N = 369)	Non-English speaking (N = 384)	*p*-value
Median age, years	7 (4–11.5)*	6 (3–11)*	0.111
Male gender	252 (68.3%)	277 (72.1%)	0.265
Type of insurance:			
Medicaid	201 (54.9%)	299 (78.3%)	<0.001
Self-pay	22 (6.0%)	32 (8.4%)	0.258
Commercial	143 (39.1%)	51 (13.4%)	<0.001
Ethnicity/Race:			
White	214 (58.8%)	118 (31.0%)	<0.001
Hispanic	45 (12.4%)	98 (25.7%)	<0.001
Asian	29 (8.0%)	117 (30.7%)	<0.001
Middle Eastern/Indian	32 (8.8%)	21 (5.5%)	0.088
Middle Eastern (other)	29 (8.0%)	27 (7.1%)	0.678
Black	15 (4.1%)	0 (0.0%)	<0.001
Median initial pain score	5 (2–8)*	5 (2–7)*	0.023
Pain scale Used			
FACES/Numeric	203 (64.4%)	179 (55.4%)	0.024
FLACC	112 (35.6%)	144 (44.6%)	
Admitted	38 (10.4%)	51 (13.4%)	0.216
Median triage level	3 (2–4)*	3 (2–4)*	0.849
Ambulance arrival	91 (24.7%)	90 (23.4%)	0.733

**IQR*, interquartile range.

FACES, Wong-Baker FACES pain scale; *FLACC*, behavioral pain scale with face, legs, activity, cry, consolability.

Table 7. Study Subjects' Characteristics (Gaba et al., 2021) Note: The table shows the different characteristics of the subjects in the study. Gaba, M., Vazquez, H., Homel, P., Likourezos, A., See, F., Thompson, J., & Rizkalla, C. (2021). Language Barriers and Timely Analgesia for Long Bone Fractures in a Pediatric Emergency Department. *The western journal of emergency medicine*, *22*(2), 225–231. https://doi.org/10.5811/westjem.2020.9.48431

The table above shows the different characteristics examined for all the patients in the two groups. Both English-speaking patients and non-English-speaking patients had an average pain score of five. However, there were differences in the timing between the two groups regarding the determination of pain score and the analgesia being administered. These differences are illustrated in the following table:

	English speaking (IQR)	Non-English speaking (IQR)	*p*-value
Median time to pain score	1 minute (0–94)	4 minutes (0–155)	< 0.001
Median time to initial analgesia	4 minutes (0–91)	13 minutes (0–891)	< 0.001
Median time to opioid analgesia	32 minutes (0–221)	115 minutes (12–423)	< 0.001

IQR, interquartile range.

Table 8. Time of Pain Management in Pediatric Patients (Gaba et al., 2021) Note: The table compares English-speaking pediatric patients to non-English-speaking pediatric patients concerning how long it took for their pain score to be recorded and analgesia to be delivered. Gaba, M., Vazquez, H., Homel, P., Likourezos, A., See, F., Thompson, J., & Rizkalla, C. (2021). Language Barriers and Timely Analgesia for Long Bone Fractures in a Pediatric Emergency Department. *The western journal of emergency medicine*, *22*(2), 225–231. https://doi.org/10.5811/westjem.2020.9.48431

The data in the table above shows a significant difference in the average time it takes for a pain score to be evaluated and for analgesia medications to be administered to English-speaking and non-English-speaking patients in the Pediatric Emergency Department (Gaba et al., 2021). While the differences in the evaluation of pain scores were modest (one minute for English-speaking patients and four for non-English-speaking patients), there were more significant differences (nine minutes for English-speaking patients vs. thirteen minutes for non-English-speaking patients) concerning when the first dose of analgesia medication was administered (Gaba et al., 2021). The most significant difference was observed concerning the timing of opioid analgesia. Non-English speakers waited almost two hours, compared to a little over thirty minutes for English-speaking (Gaba et al., 2021). The study also looked at other factors related to language barriers in pain management.

	English speaking (N = 369)	**Non-English speaking (N = 384)**	***p*-value**
Pain score performed in triage	335 (90.8%)	361 (94.0%)	0.100
Initial analgesia administered in triage	317 (85.9%)	344 (89.6%)	0.148
Opioid analgesia administered	87 (23.6%)	111 (28.9%)	0.099
Need for sedation	65 (17.6%)	52 (13.5%)	0.132
Opiate as initially administered analgesic	35 (40.7%)	27 (24.3%)	0.020

Table 9. "Quality of Pain Management Variables Related to Language Barriers" (Gaba et al., 2021) Note: The table shows secondary measures the study performed to evaluate the quality of pain management about language barriers. Gaba, M., Vazquez, H., Homel, P., Likourezos, A., See, F., Thompson, J., & Rizkalla, C. (2021). Language Barriers and Timely Analgesia for Long Bone Fractures in a Pediatric Emergency Department. *The western journal of emergency medicine*, *22*(2), 225–231. https://doi.org/10.5811/westjem.2020.9.48431

The data in the table did not reveal differences between how pain scores were scored in the Pediatric Emergency Department for English-speaking and non-English-speaking pediatric patients. Also, there was no significant difference in when the first dose of analgesia and/or opioid analgesia was administered (Gaba et al., 2021). There was no significant difference between English-speaking pediatric patients and non-English-speaking pediatric patients receiving opioid analgesia. English-speaking pediatric patients were more likely to receive opioid analgesia as their initial pain medication compared to non-English-speaking pediatric patients (Gaba et al., 2021). A small number of pediatric patients in the study did not receive pain medication. Thirty percent of the pediatric patients in the study received opioid analgesia as part of the management of their Long Bone Fracture (Gaba et al., 2021). Language is one of many socioeconomic factors contributing to disparities in pain management and treatment of Long Bone Fractures in the Pediatric Emergency Department.

DISCUSSION

All the studies reviewed concluded that there was a need to investigate further socioeconomic issues contributing to disparities in the pain management of patients presenting to the Pediatric Emergency Department for evaluation and management of Long Bone Fractures. There is currently little information on how race and ethnicity, gender, and language barriers individually impact the treatment and pain management of Long Bone Fractures in a Pediatric Emergency Department. Further investigation is also necessary to identify the reason(s) underlying the disparities that exist in pain management between minority patients and White patients regarding triage scores and analgesia (any form versus opioid form).

Analgesia was prescribed and administered less frequently to minority patients compared to White patients. The discrepancy was even more significant when comparing data for the administration of opioid analgesia in the management of Long Bone Fractures in Black and Hispanic patients compared to White patients (Lee et al., 2019). Black patients were particularly less likely to receive opioid analgesia. One possible reason for the disparity was that not all studies included patients who did not speak English. As such, disparities may be more apparent when language is included in addition to race and ethnicity in patient study demographics.

The reasons for the discrepancies in analgesia usage/administration are multifactorial and very complex. A pain scale can relate to how someone feels but does not assess the potential impact of other factors, including culture and psychology (Lee et al., 2019). Different cultures can view pain differently. In addition, different cultures use different language when discussing their experiences with pain. How someone was raised can influence their reaction, behavior, and pain perception. Patients may not appear to be in significant pain but still want pain medication to relieve their discomfort. Does the patient's anxiety play a role? There is no current evidence to suggest minority patients request analgesia any more or less than their White counterparts (Lee et al., 2019).

Disparities in pain management may not be driven solely by providers. The location of a hospital may impact pain management protocols. Providers at urban hospitals are likely to see patients with different (more ethnically, racially, and socioeconomically different) demographics compared to those staffing hospitals in rural settings. Differences in local health insurance can dictate what medications can be used and how diagnostic testing is chosen in a particular situation. Differences in the doctor's and medical staff's race and ethnicity could also influence the decision to administer analgesia (Lee et al., 2019).

More investigation needs to be conducted regarding how pain relief is measured and how many patients feel better after analgesia administration in the Emergency Department. Also, there needs to be more investigation regarding differences in analgesia administration between male and female patients being treated in the Emergency Department for the management of a long bone fracture. Although the patient's sex and gender are often recorded on their medical records, there is not much literature regarding how much the patient's gender influences analgesia administration for Long Bone Fractures. There is conflicting data about the differences in the treatment of acute pain resulting from a Long Bone Fracture based solely on the patient's sex (Vastola et al., 2024).

Female patients in this study reported a higher average pain score compared to their male counterparts. Cultural norms and gender stereotypes may explain some of the differences in how patients report and perceive pain (Vastola et al., 2024). One finding that was reproduced in multiple studies is that female patients wait longer for any form of analgesia to be administered compared to male patients. The disparity in wait time is even longer concerning the administration of opioid analgesia. There were also differences in the average wait times for different age groups. There was a longer wait time if the patient was twelve years or younger (Vastola et al., 2024). Studies focused on sex and gender discovered minority and non-English speaking patients were less likely to receive both analgesia in any form and opioid analgesia in particular.

There are not many published studies concerning the impact of language barriers on pain management for Long Bone Fractures in the Pediatric Emergency Department. Non-English-speaking patients had to wait longer for their injury/pain to be evaluated and analgesia to be administered than English-speaking patients (Gaba et al., 2021). Interpretation services exist in a hospital, but not all hospitals have the same availability and access for all patients who need one. If a bilingual staff member is not available, or there is a delay in obtaining an interpreter, this causes increased waiting time in the hospital and prolongs the treatment and pain management. Friends or family members often help translate. However, this is not always an option since some patients arrive at the hospital without English-speaking friends and family whom they can rely on as interpreters.

Technology has increased the accessibility and availability of an interpreter. Tablet-based virtual interpreters are available when in-person is not possible or when the language/dialect is more obscure. This helps ensure hospitals can provide interpreter services to any patient who requests and/or needs one without having a major delay. Interpreters can undergo training before they start working in a hospital setting. Still, not all states require an interpreter to take a professional medical interpreter course (Ginde et al., 2009). Communication between patients, their families, and doctors must be effective, and nothing is lost in translation. Hence, everyone is on the same page regarding the patient's next steps and treatment plan for their injury. Minority patients were less likely to receive analgesia in any form and opioid analgesia compared to White patients. Furthermore, minority patients and non-English speaking patients were less likely to receive opioid analgesia as their first dose of pain medication (Gaba et al., 2021). A possible explanation for the disparity is that English-speaking patients can better communicate with the doctors in the Emergency Department. Healthcare access and health insurance could be other contributing factors to the disparities in care outlined here. In the future, more investigation is required to determine areas in a medical setting where language barriers cause disparities and what can be done to resolve them.

There is a knowledge gap regarding our understanding of why disparities arose and are maintained in our healthcare system. The PEMA study aims to bring to light how race and ethnicity, gender, and preferred language impact one narrow area of the health landscape, the management of pain in children and adolescents with Long Bone Fractures in an Emergency Department setting. The infrastructure and personnel to collect data are being put in place now. Hope to begin recruiting patients and collecting patient survey and interview data to understand better how the patients felt about the care they received in the Emergency Department and if they felt any of their demographics impacted their treatment and pain management for their Long Bone Fracture. Look forward to reviewing this data and using it as a starting point to develop initiatives to ensure equal access to quality care, including Long Bone Fracture management, in the Emergency Department.

CONCLUSION

Disparities exist in treating pain and pain management for Long Bone Fractures in the Pediatric Emergency Department. These apply to minority patients and those who do not report English as a preferred language. Sex and gender disparities similarly exist concerning the treatment of pain. There is a need for further investigation into the patient-related factors associated with disparities in care. These data are necessary to understand these important issues better and consider how they can be resolved. Hospitals and healthcare systems need to recognize the potential for disparities in the care that they provide to disadvantaged, minority, and historically marginalized groups to ensure every patient is treated equally and receives the same care.

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