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


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# Disparities in Emergency Medical Services Care Delivery in the United States: A Scoping Review

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## ABSTRACT

**Background:** Emergency medical services (EMS) often serve as the first medical contact for ill or injured patients, representing a critical access point to the health care delivery continuum. While a growing body of literature suggests inequities in care within hospitals and emergency departments, limited research has comprehensively explored disparities related to patient demographic characteristics in prehospital care.

**Objective:** We aimed to summarize the existing literature on disparities in prehospital care delivery for patients identifying as members of an underrepresented race, ethnicity, sex, gender, or sexual orientation group.

**Methods:** We conducted a scoping review of peer-reviewed and non-peer-reviewed (gray) literature. We searched PubMed, CINAHL, Web of Science, Proquest Dissertations, Scopus, Google, and professional websites for studies set in the U.S. between 1960 and 2021. Each abstract and full-text article was screened by two reviewers. Studies written in English that addressed the underrepresented groups of interest and investigated EMS-related encounters were included. Studies were excluded if a disparity was noted incidentally but was not a stated objective or discussed. Data extraction was conducted using a standardized electronic form. Results were summarized qualitatively using an inductive approach.

**Results:** One hundred forty-five full-text articles from the peer-reviewed literature and two articles from the gray literature met inclusion criteria: 25 studies investigated sex/gender, 61 studies investigated race/ethnicity, and 58 studies investigated both. One study investigated sexual orientation. The most common health conditions evaluated were out-of-hospital cardiac arrest ( $n = 50$ ), acute coronary syndrome ( $n = 36$ ), and stroke ( $n = 31$ ). The phases of EMS care investigated included access ( $n = 55$ ), pre-arrival care ( $n = 46$ ), diagnosis/treatment ( $n = 42$ ), and response/transport ( $n = 40$ ), with several studies covering multiple phases. Disparities were identified related to all phases of EMS care for underrepresented groups, including symptom recognition, pain management, and stroke identification. The gray literature identified public perceptions of EMS clinicians' cultural competency and the ability to appropriately care for transgender patients in the prehospital setting.

**Conclusions:** Existing research highlights health disparities in EMS care delivery throughout multiple health outcomes and phases of EMS care. Future research is needed to identify structured mechanisms to eliminate disparities, address clinician bias, and provide high-quality equitable care for all patient populations.

## ARTICLE HISTORY

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## Introduction

Differences in access to care, treatments, and health outcomes by non-medical patient demographic characteristics are pervasive and often reflective of social inequalities.

Health disparities are defined by the Centers for Disease Control and Prevention as “preventable differences in the burden of disease, injury, violence, or opportunities to achieve optimal health that are experienced by socially

disadvantaged populations” (1). Prior research has overwhelmingly shown differences in health care management and outcomes related to patient gender identity, sexual orientation, race/ethnicity, perceived ability/inability, social status, and economic status (2). For example, prior studies performed in clinic and hospital settings have found under-represented racial and ethnic minorities receive less frequent analgesic administration (3, 4), and women with suspected acute coronary syndrome are less likely to receive timely invasive management (5, 6).

For many acutely ill or injured patients, emergency medical services (EMS) serves as the first medical contact and a key access point into the health care delivery continuum for medically underserved and vulnerable populations. A growing body of literature has highlighted disparities in prehospital care to include prehospital pain management (7–13), differences in diagnosis and treatment of chest pain in women (14–20), and inequalities in transport decision-making for patients belonging to racial/ethnic marginalized communities (21–23). Nevertheless, a comprehensive assessment of current disparities in EMS care delivery for patients by sex/gender, race/ethnicity, and sexual orientation is lacking.

In the context of the increasing diversity of the U.S. population, delivering high-quality prehospital care in a culturally competent and equitable manner is of the utmost importance. An understanding of the current state of health disparities within affected populations is a key step to decreasing associated medical inequities and poor health outcomes. Thus, the objective of this scoping review was to summarize the existing literature on disparities in EMS access and EMS care delivery for socially vulnerable groups.

## Methods

### Study Protocol

This scoping review followed the approach shared by Arksey and O’Malley in 2005 (24) and refined by Levac et al. in 2010 (25). The authors followed the PRISMA Extension for Scoping Reviews checklist (26) (Supplement 1). The study protocol was prospectively registered in the Open Science Framework Registries Network (27).

### Inclusion and Exclusion Criteria

EMS systems can influence community education related to the recognition and initial treatment of emergency conditions and community members’ knowledge of when to activate the 9-1-1 system. Therefore, we examined the treatment provided by EMS clinicians and professionals in the prehospital setting and the state of health literacy among community members with regards to emergent symptom recognition, layperson first aid, and need for EMS activation. We included studies that investigated differences in EMS access, pre-arrival care, EMS clinician diagnosis and treatment, response intervals, and transport decisions by patient characteristics. Given wide variation in EMS systems of care internationally, our search was restricted to studies in the

United States. We chose to begin our search in 1960, which was immediately prior to the initial development of organized EMS systems of care (Table 1).

### Search Strategy

Our strategy included a search of the peer-reviewed literature and of the non-peer-reviewed (“gray”) literature. For the peer-reviewed literature, a medical research librarian (MVI) searched PubMed, CINAHL, and Web of Science using a combination of database-specific subject headings and keywords related to EMS and racial, ethnic, sex, and gender disparities (Supplement 2). The original search was completed in April of 2021. Results were imported into Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia). Forward and backward citation trailing using Web of Science was performed for all included full text articles. These were also dual screened in Covidence.

Gray literature was identified through searches of Proquest Dissertations and conference abstracts via Scopus, professional organization websites, industry media, and Google for the following terms: diversity, equity, disparity, race, gender, sex, and LGBTQ from June 2021 to February 2022. Gray literature articles reviewing publications already included in the peer-reviewed literature were excluded.

### Data Charting, Extraction and Synthesis

To ensure consistency among reviewers, study authors were trained on the application of inclusion and exclusion criteria by screening a sample of 20 abstracts. Each abstract and full text of peer-reviewed studies and theses/dissertations were subsequently evaluated by two independent investigators using Covidence. Conflicts were resolved by the first author (AMF) in discussion with other reviewers (APJ, AH, JSR) as needed.

When voting to include a peer-reviewed article after reviewing its full text, authors were asked to extract relevant data via a standardized Google Form, which was tested by primary authors (AMF, APJ, JSR, AH) prior to use. Extracted data were verified from original studies by the lead author during charting. Data were charted by the lead author and entered into a spreadsheet that included key study identifiers, population, relevant demographic subgroups and size of study, methodology, and relevant outcomes or conclusions (Supplement 3). Evidence quality was informally assessed by charting the methodology and sample sizes of included items. The relevant size of studies was indicated where possible. In accordance with scoping methodology (24), a formal quality assessment was not conducted.

A qualitative thematic analysis was undertaken to categorize studies by phase of care focusing on health conditions within each phase and relevant outcomes. The phases of EMS care were divided as follows: access, pre-arrival care, diagnosis and treatment, response and transport.

Gray literature was also reviewed by two independent investigators using a spreadsheet. Conflicts were resolved by the first author. Data extraction for the gray literature was performed by AMF, KR, and ML. Data charting was

**Table 1.** Inclusion/exclusion criteria.

<b>Inclusion criteria</b>	
Population	Underrepresented groups of interest: race/ethnicity (Black, Latinx, Native American, Alaskan Native, Asian American, Pacific Islander), gender/gender expression (cisgender women, transgender men, transgender women), or sexual orientation (LGBTQ+)
Content	EMS-related encounters (or events) with stated objectives (or had significant results) of examining disparities in care for underrepresented groups
Time period	1960 to present
Study types	Peer-reviewed literature, theses/dissertations, non-journal professional publications, editorials/op-eds, media reports
<b>Exclusion criteria</b>	
Language	Non-English
Geographic location	Non-US setting
Content	If a disparity was noted but was not a stated objective or significant finding in the results or discussion

performed by entering key study identifiers and relevant outcomes or conclusions into a spreadsheet by AMF and KR.

### Terminology

We acknowledge that the interchangeable use of demographic terminology such as sex and gender, or race and ethnicity, and the use of vague categories such as “minorities,” complicate the application of evidence to diverse communities. Furthermore, such imprecise terminology may obfuscate the experiences of vulnerable populations such as transgender individuals or particularly underrepresented racial or ethnic groups. In this review, we elected to use the demographic language of the referenced studies in Supplement 3, while we elected to keep terminology consistent in Table 1, Supplements 4 and 5, and the Results section for the sake of brevity.

### Results

A total of 10,149 peer-reviewed studies underwent abstract/title screening (Figure 1). Of these, 384 were deemed eligible for full text review and 145 were ultimately included (Table 2). Most studies ( $n=102$ , 70.3%) were published in the last decade. Race/ethnicity was most commonly investigated ( $n=61$ , 42.1%), while 25 studies (17.2%) investigated sex/gender, 58 studies (40.0%) investigated both, and one study (0.7%) investigated sexual orientation. With regards to clinical themes, the following areas were most commonly identified: out-of-hospital cardiac arrest (OHCA;  $n=50$ , 34.5%), acute coronary syndrome (ACS;  $n=36$ , 24.8%), and stroke ( $n=31$ , 21.4%). Phases of EMS care represented in these studies included access ( $n=55$ ), pre-arrival care ( $n=46$ ), diagnosis and treatment ( $n=42$ ), and response and transport ( $n=40$ ), with 36 studies encompassing two or more phases. Additionally, 660 gray literature articles were identified and two were included. Both articles addressed public perception of prehospital care.

#### EMS Access

##### Sex/Gender

A total of 34 studies that investigated EMS access included sex/gender as a variable (17, 18, 20, 28–58), with 27

reporting findings regarding disparities for this social category (17, 18, 20, 28–30, 32–34, 36–38, 40–43, 45–51, 53, 54, 56, 58). Women were more likely to recognize heart attack (37, 46) and stroke symptoms (30, 40, 51) in general. Women were also more likely to access 9-1-1 when they experienced ACS symptoms themselves (34, 42, 43, 50, 53) or identified them in others (37); the findings for stroke were mixed with four studies finding women were more likely to access 9-1-1 when they recognized stroke symptoms in general (40, 49, 51, 58) and three studies finding no difference in 9-1-1 activation by gender when experiencing stroke symptoms themselves (28, 59) and when recognizing them in general (60). Women waited longer before seeking care when they experienced ACS (17, 18, 39, 45, 47) and stroke (54) symptoms. Compared to men, women had fewer EMS encounters for diabetic problems (31) and more EMS encounters for falls (20, 38). Women were less likely to be frequent users of EMS (56).

##### Race/Ethnicity

Forty-nine studies involving EMS access included race/ethnicity as a variable (17, 18, 28–37, 39, 41–46, 48, 49, 51, 52, 54–79) and 47 reported findings regarding disparities for this social category (18, 28, 30–37, 39, 41–46, 48, 49, 51, 52, 54–79). Non-White patients (33), and specifically Black (46, 52), Hispanic (37, 46, 52), and Asian (37, 52) patients, were less likely to recognize heart attack symptoms than White patients. This was also similar for stroke, with articles finding that non-White patients (33), specifically Black (51, 66, 67), Hispanic (51, 60, 66, 67), and Asian (30) patients, were less likely to recognize symptoms compared to their White counterparts. Findings on accessing 9-1-1 were mixed. Most studies found that non-White patients were less likely to access EMS care for ACS (34, 37, 43, 46, 61, 71) and stroke (48, 49, 51, 54, 55, 62, 65, 66, 70, 76) while others found that non-White patients were more likely to access EMS for ACS (42, 57, 75) and stroke (57, 73); some found no difference in EMS access patterns by race/ethnicity (28, 35, 58–60, 63). Non-White patients (69), specifically Black (39, 45, 75), Asian (71), and Hispanic (39, 71) patients, waited longer before seeking care for ACS. For stroke, one article found Black patients had longer delays in seeking care (55), while another found White patients had longer delays (41)

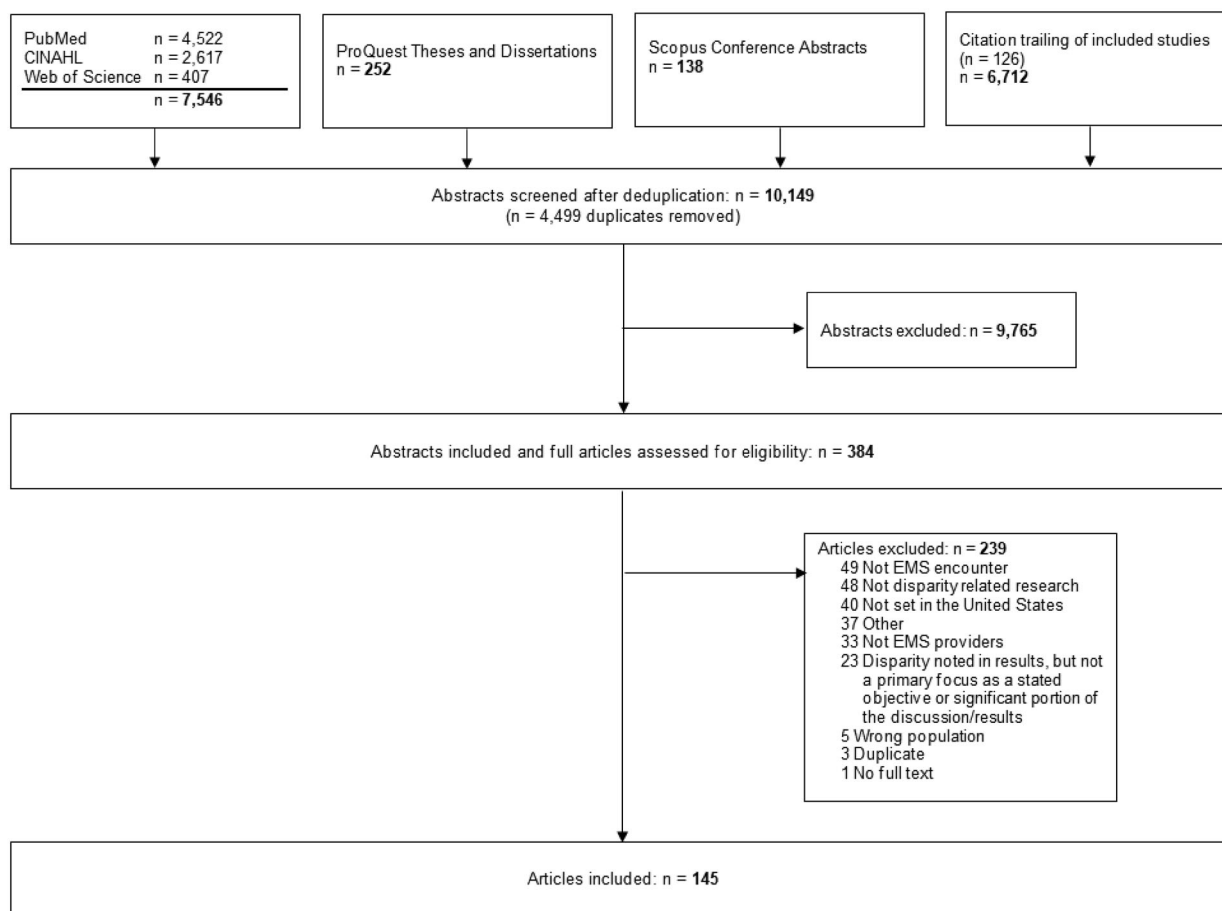


Figure 1. Inclusion/exclusion flowchart.

Table 2. Included full text articles by phase of care.

Phase of care	Number of articles
EMS Access (17, 18, 20, 28–79)	55
Acute coronary syndrome	22
Diabetic problems	1
Falls and trauma	3
Mental health and opioid overdose	1
Out-of-hospital cardiac arrest	1
Stroke	25
Multiple and other	5
Pre-arrival care (29, 78, 80–123)	46
Out-of-hospital cardiac arrest	45
Multiple and other	1
EMS Diagnosis/Treatment (7–20, 81, 82, 84, 89, 90, 100, 105, 109, 111, 112, 120, 122, 124–139)	42
Acute coronary syndrome	10
Falls and trauma	1
Mental health and opioid overdose	2
Out-of-hospital cardiac arrest	17
Pain	8
Stroke	4
Multiple and other	4
EMS Response/Transport (15, 17–19, 21–23, 38, 41, 59, 82, 89, 96, 100, 105, 106, 109, 113, 120, 121, 124, 127, 138–155)	40
Acute coronary syndrome	13
Diabetic problems	1
Falls and trauma	8
Out-of-hospital cardiac arrest	13
Stroke	4
Multiple and others	3

Categories are not mutually exclusive, with multiple articles reporting on multiple phases of care. Three articles reported on acute coronary syndrome and stroke (33, 57, 63) and two articles reported on acute coronary syndrome and out-of-hospital cardiac arrest (19, 152). One article reported on acute coronary syndrome, falls/trauma, out-of-hospital cardiac arrest, and multiple other health conditions (20).

and two articles found no difference by race (73) or ethnicity (77).

Non-Hispanic Black and non-Hispanic White patients had the highest rates of EMS activations for diabetic



problems (31). In examining calls for mental health, the proportions of Black residents and those classified as belonging to “Other” races/ethnicities in a neighborhood were inversely associated with the number of calls, while the proportions of Asian and Hispanic resident were not associated with the number of calls (72). For overall activations, studies reported Black patients were more likely to access EMS (44, 56, 79) and Asian patients were less likely (56), while the findings for Hispanic patients were mixed, with one study reporting higher usage than White patients (44) and another reporting Hispanic patients with limited English proficiency were less likely to access due to concerns relating to inability to communicate with 9-1-1 telecommunicators (79). Additional barriers to accessing EMS among Hispanic patients included distrust of law enforcement, cost and language issues, and concerns about immigration status (64, 78, 79). Cost concerns were also reported as an access barrier for Black patients (64).

### **Sexual Orientation**

There was one study that addressed disparities in EMS access by sexual orientation. This study reported that while sexual minority men and women of non-White race had lower awareness of heart attack and stroke symptoms than White heterosexuals, gay men in general were more likely than heterosexual men to access 9-1-1 in the event of a heart attack (33).

### **Pre-Arrival Care**

#### **Sex/Gender**

There were 18 studies that investigated care provided before EMS arrival that included sex/gender as a variable (29, 80–96), and 14 of these reported findings regarding disparities for this social category (29, 80, 82–84, 87, 89–96), all of which focused on OHCA. There was no consensus on CPR training: one study found women were more likely to be CPR trained (83), another found women were less likely to have had training in the last 2 years (29), and a third found no difference (80). There was also no clear consensus on disparities in likelihood of receiving bystander CPR: four studies found women were less likely (80, 84, 93, 94), one study found female pediatric patients were more likely (92), and five studies found there was no difference in bystander CPR by gender (82, 89–91, 96). Female OHCA patients were less likely to have AEDs placed by bystanders (87, 94) and to receive shocks prior to EMS arrival (90).

#### **Race/Ethnicity**

There were 40 studies that investigated care provided before EMS arrival that included race and/or ethnicity as a variable (29, 78, 80, 81, 83–86, 88, 91–93, 95, 97–123), and 39 of these reported findings regarding disparities for this social category (29, 78, 80, 81, 84–86, 88, 91–93, 95, 97–123). These studies focused on OHCA, with the exception of one that found Black patients encountered by EMS in public locations were less likely to receive bystander support for

conditions such as bleeding, seizures, and respiratory issues compared to White patients (123). Findings on CPR training disparities by race/ethnicity were not clear-cut: two studies found non-White individuals were less likely (80, 116) and two found non-White individuals were more likely to be trained in CPR (29, 115). At the population level, predominance of Black (99, 118) and Hispanic (118) residents correlated with lower rates of CPR (99) and AED (118) training. Hispanic individuals expressed more discomfort performing CPR in public compared to non-Hispanic individuals (101), with barriers to performing CPR including immigration status, language, and fear of touching someone (78).

While six studies found no difference in bystander CPR and/or AED use by race (93, 107, 112, 117, 122), most studies found that Black (80, 84, 88, 91, 92, 100, 102, 104–106, 109, 111, 114, 119), Hispanic (80, 91, 92, 102, 104, 114, 119, 121), and patients belonging to other races/ethnicities (91, 114, 119) were less likely to receive bystander CPR and/or AED placement. Patients experiencing OHCA in neighborhoods with higher proportions of non-White residents had less bystander CPR than patients in predominantly White neighborhoods (81, 103, 108, 110, 113, 114, 120).

### **EMS Diagnosis and Treatment**

#### **Sex/Gender**

Out of the 29 studies that investigated EMS diagnosis and treatment and included sex/gender (9–20, 81, 82, 84, 89, 90, 124–135), 28 reported results regarding disparities based on this social category (9–20, 82, 84, 89, 90, 124–135). There was no clear consensus on disparities by sex/gender in pre-hospital interventions such as ECGs, aspirin, or nitroglycerin for ACS: two studies found female patients were less likely to receive standard ACS interventions (15, 20), three studies found no difference (124, 127, 134), and three studies found mixed results based on the specific intervention (14, 16, 19). In OHCA, findings were similarly mixed: three studies found female patients were less likely to have interventions such as CPR, defibrillation, and medications (19, 20, 84), one study found no difference (89), and two studies found mixed results based on specific interventions (90, 128). Female patients had a longer interval from arrival to defibrillation compared to male patients (82, 130).

Studies on prehospital pain management were mixed: two studies found female patients received less analgesia than male patients (9, 10), one study found female patients receive more analgesia (12), one found differences depending on the type of complaint (132), and three found no difference based on sex/gender (11, 13, 20). In opioid overdose, female patients were less likely to receive naloxone than male patients (125, 133).

EMS clinicians had a lower rate of correct diagnosis of stroke (129) and other health conditions (135) when the patient was female compared to male. Female patients were less likely to receive epinephrine than male patients for anaphylaxis (20). There was no difference in the rate of glucose checks in patients with seizures by sex/gender (126).

### **Race/Ethnicity**

Out of the 29 studies that investigated EMS diagnosis and treatment and included race/ethnicity (7–9, 11–13, 17–19, 81, 84, 100, 105, 109, 111, 112, 120, 122, 124, 126, 129, 131, 133–139), 28 reported results regarding disparities based on this social category (7–9, 11–13, 17, 18, 81, 84, 100, 105, 109, 111, 112, 120, 122, 124, 126, 129, 131, 133–139). There was no clear consensus on disparities by race/ethnicity in ACS management: one study found White patients were more likely to have interventions such as nitroglycerin and oxygen (20), and another found White patients were less likely to be administered aspirin (134). Similarly, there were mixed findings for OHCA, with four studies identifying disparities based on race/ethnicity (81, 84, 112, 120), four finding no differences (100, 105, 109, 122), and one with variable findings for specific measures like compression rate compliance or duration of resuscitation (138).

Naloxone administration for suspected opioid overdose did not differ by race/ethnicity (133). Overwhelmingly, studies of prehospital analgesia administration showed racial/ethnic disparities with Black (7, 8, 11–13), Hispanic (8, 11, 13), Asian (8), and American Indian/Alaska Native (7) patients less likely to receive analgesia.

EMS clinicians had a lower rate of correctly diagnosing stroke in Asian and Hispanic patients compared to White patients (129). Pre-arrival stroke notification was less likely for Black patients (137) compared to White patients. EMS diagnosis in other health conditions was also less likely to be correct when the patient was Black or Hispanic (135). In calls for seizures, non-White race and Hispanic ethnicity were associated with lower likelihood of glucose testing (126).

### **EMS Response and Transport**

#### **Sex/Gender**

Out of the 23 studies that investigated EMS response and transport and included sex/gender as a variable (15, 17–19, 23, 38, 41, 82, 89, 96, 124, 127, 140–150), 20 reported findings regarding disparities for this social category (15, 17–19, 23, 38, 82, 89, 96, 127, 140, 141, 143–150). Studies looking at prehospital intervals for ACS generally found longer intervals (including overall prehospital, on-scene, and scene-to-hospital) for female patients (15, 17, 18, 127, 140, 143–145), although two studies found no difference compared to male patients (19, 149). There was no difference in response intervals for OHCA for female compared to male patients (19, 82, 89, 96), but response intervals were longer for female patients with stroke (150).

Compared to male patients, female patients with diabetic problems (148) and falls/trauma (23, 38) were more likely to be transported; however, injured female patients were less likely to be transported to trauma centers (141, 146).

#### **Race/Ethnicity**

Out of the 30 studies that investigated EMS response and transport and included race/ethnicity as a variable (17–19,

21–23, 41, 59, 100, 105, 106, 109, 113, 120, 121, 124, 138, 139, 141–145, 147, 150–155), 25 reported findings regarding disparities for this social category (21–23, 41, 59, 100, 105, 106, 109, 113, 120, 121, 124, 138, 139, 141, 142, 144, 145, 150–155). Studies looking at prehospital intervals for ACS had varied findings: one study found shorter transport intervals for non-White patients (124); one study found shorter on-scene intervals for Hispanic patients, Asian patients, and patients belonging to other races/ethnicities (155); two studies found longer EMS encounter intervals for Native American and Asian/Pacific Islander patients (143, 144); and three studies found no differences in various EMS intervals between Black and White patients (144, 145, 155). Similarly, studies looking at prehospital intervals for OHCA also had varied results, with two studies finding longer response intervals (100, 138), two studies finding shorter response intervals (106, 109), and two studies finding no difference in response intervals (105, 152) for Black patients compared to White patients. Findings were similarly varied for response and transport intervals in patients with strokes (41, 59, 150, 154).

For EMS encounters related to falls and trauma, Black patients were less likely to be transported than White patients (23). When transport was initiated, Black patients were more likely to be transported to trauma centers (141) and more likely to be transported by ground than by air without controlling for urban versus rural location (22). In general, more Black and Hispanic patients were transported to safety net emergency departments than White patients, with mean transport distance being similar between racial/ethnic groups (21).

Supplement 4 contains a summary of all peer-reviewed article findings organized by phase of care and health condition. Tables 3 and 4 present the balance of articles that found disparities with those that found no disparities by sex/gender and race/ethnicity, respectively.

#### **Gray Literature**

Both gray literature articles that met inclusion criteria addressed public perceptions. One surveyed respondents on perceptions of prehospital care and found different racial/ethnic minority groups had varied desires for cultural competency in EMS, with Black respondents emphasizing feelings of prejudice and the need for being treated with respect and dignity, while Vietnamese, Lao, Khmu, and Mien respondents emphasized importance of understanding cultural variation in verbal and nonverbal communication (156). Another surveyed EMS clinicians and transgender people and found that while a majority of EMS clinicians felt confident caring for transgender patients, a majority of transgender respondents did not feel confident in EMS clinicians' ability to deliver knowledgeable care (157). Details of these studies can be found in Supplement 5.

### **Discussion**

In this scoping review, we identified evidence of disparities based on social categories across the prehospital health care

Table 3. Articles reporting sex/gender disparities by phase of care and health condition.

	Acute coronary syndrome	Diabetic problems	Falls and trauma	Mental health and opioid overdose	Out-of-hospital cardiac arrest	Pain	Stroke	Multiple and other
EMS access	14	2	3	0	0	0	9	1
Pre-arrival care	7	6	1	2	7	4	1	0
EMS diagnosis/Treatment	8	2	5	0	0	2	1	2
EMS response/Transport								

Orange indicates articles that reported disparities, green indicates articles that reported a lack of disparities, and yellow indicates no articles reporting on disparities for that category.

continuum, ranging from access to the 9-1-1 system to EMS clinician treatment and transport destinations. Importantly, gaps in research related to prehospital care disparities were also identified, including a paucity of investigations related to care for patients by sexual orientation or gender identity and expression. While many studies highlighted marked differences over a variety of process measures and health outcomes by patient demographic characteristics, few focused on strategies for reducing disparities in prehospital care.

### EMS Access

Early access to emergency care is key for reducing morbidity and mortality from time-sensitive conditions like ACS, stroke, and OHCA. This scoping review identified differences in EMS activation for women and racial/ethnic minorities. Women were more likely to recognize the signs and symptoms of these life-threatening conditions, but they waited longer to access the EMS system after symptom onset compared to men. Phenomenological analyses suggest that women’s interpretation of and response to symptoms are influenced by experiences of marginalization and trivialization of their medical complaints by clinicians, which provide disincentives for seeking care (158). Future work to further explore and address underlying barriers is warranted.

Conversely, racial/ethnic minorities were less likely to recognize signs of ACS or stroke compared to their White counterparts. This finding is important, as racial and ethnic minorities have a disproportionate number of deaths due to heart disease (159) and other major medical conditions (160–162). While the causes underlying these lower rates of recognition have not been thoroughly investigated, education and health literacy may play a role (163). Targeted culturally competent outreach within communities should be considered by EMS to improve symptom recognition, increased timely access to appropriate care, and better patient outcomes.

Beyond recognition, additional barriers to accessing the EMS system for racial and ethnic minorities included limited English proficiency, distrust, immigration status, and financial concerns. Professional language interpretation services have been shown to improve diagnostic accuracy; however, these services are infrequently accessed in the prehospital setting, representing an opportunity for communication improvement (164). Meanwhile, community trust may be fostered further by increasing community engagement activities (165). Collectively, these findings suggest that EMS systems may reduce disparities by building trust through increased education and outreach to the populations they serve, including emphasizing lack of ties with immigration services, importance of recognition of time-critical conditions, and urgency of early EMS activation.

### Pre-Arrival Care

Nearly all studies that investigated disparities in care provided by bystanders prior to EMS arrival focused on cardiac arrest. There is no clear consensus on disparities in CPR



Table 4. Articles reporting race/ethnicity disparities by phase of care and health condition.

	Acute coronary syndrome	Diabetic problems	Falls and trauma	Mental health and opioid overdose	Out-of-hospital cardiac arrest	Pain	Stroke	Multiple and other
EMS access	20	1	1	0	1	0	25	5
Pre-arrival care	3	0	0	0	36	9	10	1
EMS diagnosis/Treatment	4	0	5	1	5	6	3	2
EMS response/Transport	4	0	0	0	7	2	3	2

Orange indicates articles that reported disparities, green indicates articles that reported a lack of disparities, and yellow indicates no articles reporting on disparities for that category.

provision based on gender or sex; however, female patients were less likely to have AEDs used than male patients. The reasons behind this finding have not been thoroughly investigated. One study found that survey respondents listed fears about inappropriate touching and accusations of sexual assault as barriers to performing bystander CPR in female patients (166), which may also limit AED application. Education directly addressing this anticipated discomfort during CPR and AED training may help mitigate some of this hesitation.

Our findings also demonstrated that in general, those from racial and ethnic minority backgrounds were less likely to receive bystander interventions for OHCA. Black individuals have higher rates of out-of-hospital cardiac arrest and lower survival rates than White counterparts based on EMS data in various cities (100, 167), making addressing the disparity in bystander CPR and AED use a high-priority area. Although the reasons for these disparities are likely multifactorial, this highlights a clear need for intervention in community training and education. EMS systems should invest in combating these disparities, specifically in Black and Hispanic communities, with development of training programs that are sensitive to differences in demographics, language, education level, and culture.

The literature related to pre-arrival care is limited by its near sole focus on OHCA. Bystander interventions can affect outcomes for a number of medical and trauma-related emergencies. Areas of future interest for researchers may include treatment of respiratory distress, hypoglycemia, choking, provision of naloxone for suspected opioid overdose, or hemorrhage control in the setting of trauma. Without investigating other conditions within the purview of EMS care, disparities in education and provision of pre-arrival care cannot be well addressed.

### EMS Diagnosis and Treatment/EMS Response and Transport

When it comes to EMS treatment, pain management represents one of the most heavily explored areas for disparities by sex/gender and race/ethnicity. These findings are similar to those of studies investigating analgesia administration in the emergency department (168, 169). Underlying reasons for disparities in pain management warrant further investigation, as pain presents frequently during EMS encounters (170). Unconscious (or implicit) bias may, in part, be a driver of observed differential treatment in pain. Strategies to effectively mitigate the effects of unconscious bias in EMS are needed.

For EMS transport, while female patients recognize symptoms of time-critical conditions such as ACS and stroke more often than male patients and activate 9-1-1 for these symptoms more frequently, female patients have longer on-scene and transport intervals. The reasons for these longer prehospital intervals are unclear but suggest an area for improvement.

## Overall

A number of important differences in access and prehospital care delivery by patient demographic characteristics were identified in this review, as well as important gaps in knowledge requiring further study. Collectively, this review highlights a critical need for EMS systems to intentionally monitor their local data and investigate any inequities to ensure systematic high quality of care is provided to all patients. Robust EMS quality improvement programs should take into account variabilities in performance by patient demographics and their effects on outcomes.

The underlying causes of disparities observed in this review are complex and multifactorial. Closely entwined with race and ethnicity, social determinants of health have an important influence on comorbidities, severity of conditions, and access to primary or preventative care, which influences EMS utilization. Additionally, clinician biases, whether deliberate or unconscious, likely play a role in prehospital care disparities. The National EMS Education Standards (2021) were recently updated to include cultural humility and awareness of implicit bias (171). However, there is not yet a standardized framework rooted in evidence for how to effectively teach cultural humility and measure change in behavior to mitigate clinician implicit bias. Evidence suggests that having a workforce representative of the population served can decrease communication barriers and improve patient outcomes (172–175). Nevertheless, the EMS workforce remains far from representative of the diversity in the US population (176, 177). Intentional efforts are needed to recruit and retain a workforce reflective of the diversity within the communities served to drive increases in equitable prehospital care for all patients.

## Limitations

This scoping review is inherently limited by the quality of the existing literature that was reviewed and the scoping methodology. As the aim of a scoping review is to be broadly inclusive (24), our objective was not to assess quality but instead to describe existing research and gaps.

The authors acknowledge that race is a social construct and many individuals in these studies did not fit into one racial or ethnic category. In addition, multiple studies use different wording or representations of racial groups, which make the data difficult to compare and limits interpretability. We also acknowledge that combining sex and gender, as well as race and ethnicity, into non-distinct categories is imprecise and has potential for marginalization and limitation of data applicability. Most studies that focused on race/ethnicity tended to limit the categories to Black, White, and Hispanic. Fewer studies addressed individuals who identify as Asian American/Pacific Islander, Alaska Native, Native American, multiracial, or other categories that do not fit into the above-mentioned. This also applies to the studies and results that combine non-White individuals into one group. Many such studies rely on EMS clinician estimates or guesses of their patients' races and ethnicities. Given the

magnitude of different races and ethnicities, it was not feasible to include all in this scoping review.

Additionally, when addressing sex/gender, additional gender identities beyond male/female were not addressed. Lack of data may be due in part to patient care records and limited ability to document non-binary gender appropriately.

The majority of studies have subtleties in their findings, such as disparities in one aspect of EMS access but not another. We strived to reflect that in the text of the results as much as possible while also sometimes making generalizations in order to condense the information. [Supplements 3 and 4](#) better represent these subtleties. Additionally, transnational studies, such as those from the Resuscitation Outcomes Consortium, were excluded when they incorporated international data, which represents potentially missed important information. This highlights that there are likely differences between certain EMS agencies or geographic locations and that it is important for EMS agencies to analyze data in their own systems to identify the presence of disparities among their patient populations.

We recognize that dividing studies into phases of EMS care is not always precise, and that these different phases interact and influence each other in different ways. However, we selected this categorization schema to identify areas of possible future intervention, such as community education, quality improvement initiatives, and broader systems design and policy approaches.

## Conclusion

This scoping review identified many areas of disparities experienced by marginalized social groups throughout the continuum of prehospital care and highlighted important knowledge gaps. Important differences in prehospital care for women and racial and ethnic minorities were observed for time-sensitive conditions including acute coronary syndrome, out-of-hospital cardiac arrest, and stroke, while differences in care by sexual orientation were rarely investigated. Studies exploring strategies for reducing prehospital care inequities were limited and highlight a critical area for future work related to design of effective interventions for achieving more equitable prehospital care.

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No potential conflict of interest was reported by the authors.

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