Original Article

Impact of Emotions on Communication and Outcomes in OHCA-Related Emergency Medical Services Calls: A Scoping Review

Sara Mendes[1]*, Patrícia Duarte[1]

[1]*Department of Public Health Nursing, Faculty of Medicine, University of Coimbra, Coimbra, Portugal.*

Abstract

This scoping review set out to locate and integrate the current body of research concerning emotional expressions and reactions during emergency telephone contacts with Emergency Medical Services (EMS) for out-of-hospital cardiac arrest (OHCA). The review sought to identify studies that (1) described emotional features present in OHCA-related emergency calls; (2) outlined any tools or procedures used to evaluate or measure emotions; and (3) explored links between emotional factors and call or patient outcomes. Searches were performed on 18 November 2021 across five databases: Medline, Embase, PsycInfo, CINAHL, and the Cochrane Review Database. To be eligible, studies had to address all three core concepts: emotions, EMS emergency calls, and OHCA. Calls also needed to be initiated by a second-party caller, and each study had to meet at least one of the three predefined objectives. The review followed the Joanna Briggs Institute methodology for scoping evidence syntheses. Thirteen studies fulfilled the inclusion criteria. All addressed Objective 1; six satisfied Objective 2; and seven met Objective 3. One publication noted a fatal patient outcome associated with intense emotional expression and resulting communication breakdown between the caller and the call-taker. The synthesis reveals a substantial lack of evidence regarding emotional dynamics during OHCA-related EMS calls and emphasizes the need for better frameworks to identify and evaluate such emotions. Further high-quality research is required to clarify how emotional states—both expressed and perceived—interact with call processes and patient outcomes.

Keywords: Emotion, Emergency medical service, Emergency calls, Out-of-hospital cardiac arrest, OHCA, Emergency dispatch

Introduction

Rationale
Out-of-hospital cardiac arrest (OHCA) constitutes an emergency in which every second matters [1]. Therefore, communication during Emergency Medical Services (EMS) calls must function efficiently to minimize delays. Essential information—such as the exact location of the incident, the patient's consciousness level, and breathing status—must be obtained rapidly to ensure immediate ambulance dispatch and prompt recognition of OHCA, enabling early bystander cardiopulmonary resuscitation (CPR). Each step performed without delay can improve survival chances [2]. Evidence indicates that a caller's emotional intensity and degree of cooperation may affect whether bystander CPR is initiated and how quickly it begins [3-5]. Moreover, the call-taker's interaction style can alter the caller's emotional state—sometimes positively, sometimes negatively—across both OHCA-specific situations and other emergency contexts [6, 7]. A systematic review published in 2021 [8] summarized features that help or hinder call-taker recognition of OHCA and identified "emotional distress" as a major contributing factor. However, no prior review has specifically focused on emotions within emergency OHCA calls.

Objectives
This scoping review aims to map the literature concerning emotional content in OHCA emergency calls made to EMS. The specific objectives are to gather, evaluate, and synthesize studies that:
• (a) explored emotional aspects during emergency calls made by a bystander for a patient experiencing OHCA—this may encompass caller emotions, call-taker emotions, and how either party perceives or responds to the other's emotional cues; AND/OR
• (b) presented an instrument or methodological approach for identifying or evaluating emotions in these calls; AND/OR
• (c) investigated how emotional expressions during the call relate to subsequent call outcomes (both process-related and/or patient-related outcomes).

Methods

Protocol and registration
The review was carried out using the methodological framework set out in the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis for Scoping Reviews [9]. The review protocol was preregistered on the Open Science Framework (OSF) under DOI 10.17605/OSF.IO/3CJH8, with restricted-access viewing available at https://osf.io/ewhj3/?view_only=322a9bb5ad4a4b6e84fee312ddc52c38.

Eligibility criteria
Inclusion criteria
Participant/Population
Eligible material involved emergency calls to EMS in which the patient was undergoing an OHCA. The term "OHCA" encompasses both cases ultimately affirmed by EMS teams and incidents interpreted or managed as OHCA during the call itself. Only situations with *second-party callers*—individuals close enough to potentially deliver CPR or guide another bystander to do so—were included.

Concepts
Studies were required to address emotional aspects within EMS calls linked to OHCA. Inclusion depended on the presence of all three elements—emotion, EMS call, and OHCA—in the same study. Research comparing emotional features between OHCA and non-OHCA calls was also acceptable.

Context
Only emergency calls placed to EMS on a patient's behalf in the setting of an OHCA event were considered.

Types and sources of evidence
The review included peer-reviewed original studies and review papers that examined how emotions were displayed, influenced the call process, or were measured during EMS interactions involving OHCA.

Exclusion criteria
Any record that did not fit the inclusion framework was excluded. Additional exclusions covered: work involving animals, simulation-only research, commentary-based publications, papers lacking an English abstract, and grey literature.

Information sources
Five databases—Medline, PsycInfo, CINAHL, Embase, and the Cochrane Review Database—formed the core search sources. No limits were placed on the time of publication.

Search strategies
A preliminary scan using web search tools and manual checking confirmed the absence of previous reviews on the topic, supporting the need for the current scoping review.
The authors then applied the JBI's three-step search procedure [9].
• **Step 1:** The first author performed an exploratory search in Medline(R) via OVID and CINAHL via EBSCO. This stage used multiple combinations of keywords, including: "emotions," "emotion assessment," "cardiac arrest," "heart arrest," "OHCA," "cardiopulmonary resuscitation," "CPR," "emergency," "ambulance," "emergency medical services," "emergency medical dispatch," "EMS," and "dispatcher" [10]. Terms identified in titles, abstracts, and keyword lists were used to refine the vocabulary for the next step.
• **Step 2:** The revised keywords were then applied systematically across all five databases. This second stage was completed on 18 November 2021. **Table 1** outlines the PsycInfo strategy, noting the use of "exp" (explode) and "mp" (multiple purpose).

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Table 1. Example of search strategy (step 2) using PsycInfo database

Step	Search term / Combination	Results
1	("cardiac arrest*" OR "heart arrest*" OR "cardiopulmonary arrest*" OR "CPR*" OR asystole* OR OHCA*).mp.	2,576
2	exp heart disorders/	15,152
3	1 OR 2	17,187
4	emotion*.mp.	449,139
5	exp emotions/	385,599
6	4 OR 5	639,497
7	((call* OR phone* OR cell*) ADJ5 (emergenc* OR dispatch* OR EMS OR ambulance* OR "911" OR 9-1-1 OR "000" OR 0-0-0 OR "999" OR 9-9-9)).mp.	1,361
8	exp emergency services/ OR telephone systems/ OR mobile phones/ OR smartphones/	17,493
9	7 OR 8	18,554
10	3 AND 6 AND 9	17

exp: explode
mp: multiple purpose

• **Step 3:** Reference lists from all studies found in step 2 were screened to capture any missing published work, supplemented by additional incidental manual searches.
A Curtin University librarian contributed to the development and adjustment of search terms throughout the process. All search outputs were transferred into Rayyan [11] for the screening phase.

Study selection
The initial screening was performed by the first author, who reviewed all search outputs in Rayyan by checking Titles and Abstracts and categorizing each record as *Include*, *Exclude*, or *Maybe*. Full-text assessment was then undertaken jointly by the first two authors for all studies not excluded during the first pass. At this stage, decisions favoured inclusion rather than exclusion, while still following the previously defined eligibility criteria. If the two reviewers had encountered unresolved disagreements, a third independent reviewer would have been consulted. Final selections were organized and archived in EndNote.

Data extraction (Charting)
A preliminary charting template was created to guide data extraction by the review authors (HN and TB). The template included the following fields:
(i) authors and study title;
(ii) publication year;
(iii) country or region of origin;
(iv) stated aims;
(v) sample details and population;
(vi) study design, methods, and comparison groups (if any);
(vii) measured outcomes;
(viii) primary findings; and
(ix) which review objectives were addressed.

Synthesis of results
Evidence meeting the inclusion standards was organized according to the three objectives presented in the Introduction. Descriptive summaries of the extracted data were first compiled into tables structured similarly to the charting tool. These summaries were then integrated into a narrative synthesis, with concepts grouped according to their relevance to the three review aims.

Results

Selection of sources of evidence
The database search across all five platforms produced 183 records. After removing duplicates, 160 citations remained. Author HN screened these 160 items by Title and Abstract and retained 10 studies [3-5, 12-18] for full-text review. An additional four papers [6, 19-21] were located through manual or post-hoc searches and were also reviewed in full **(Figure 1)**. These four studies did not surface in the formal search because each lacked at least one of the required concepts in their indexed keywords. For example, Clark *et al.* [19] did not include *emotion* as an indexed term, and the other three lacked *cardiac arrest* in their keyword lists.
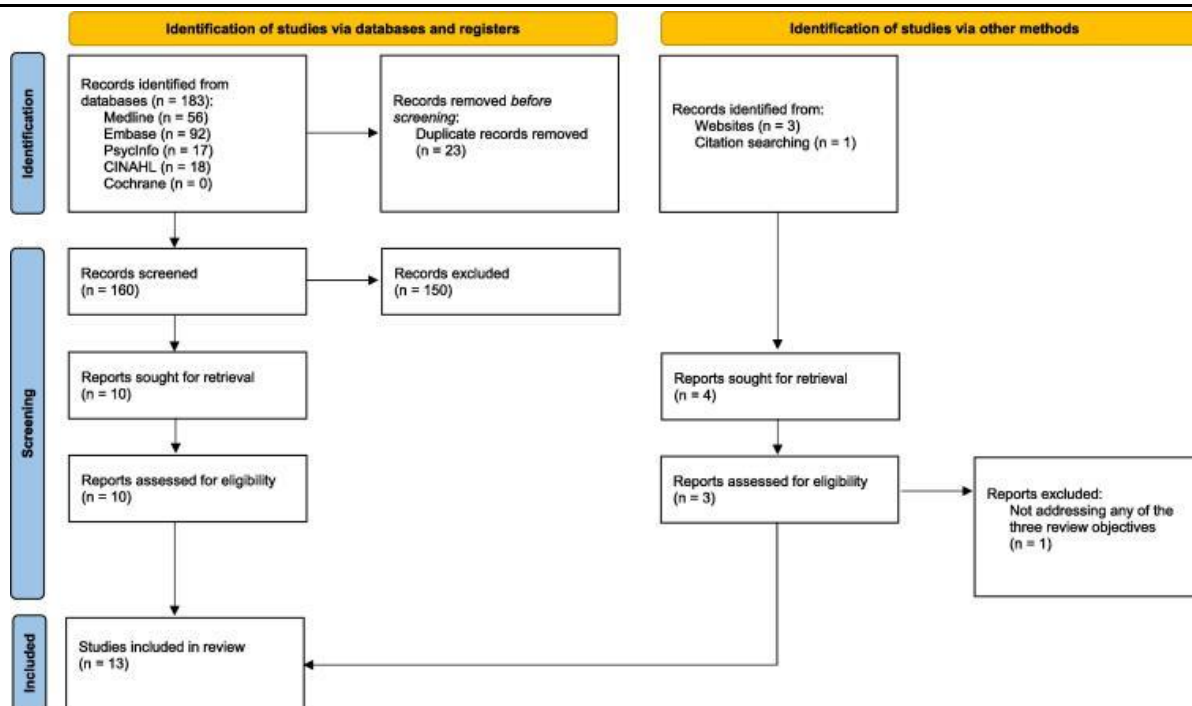
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Figure 1. PRISMA 2020 flow diagram for the search process. Adapted from Page *et al.*

Characteristics of sources of evidence

The two primary reviewers were able to resolve all minor discrepancies during the screening phase, so arbitration by another author was unnecessary. **Table 2** outlines key characteristics of the 14 studies examined in full, of which 13 were ultimately included. One study [19] was excluded because, although it addressed OHCA and EMS calls, its reference to emotional content was minimal ("hysterical") and did not satisfy any of the review objectives. Each included article was treated as a unique study.

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Table 2. Description of 14 studies retained for full-text review

Author & Year	Title	Country	Aims	Population & Sample	Intervention / Method	Comparison
Alfsen *et al.*, 2015 [12]	Barriers to recognizing out-of-hospital cardiac arrest during emergency calls: a qualitative inductive thematic study	Denmark	To explore factors influencing dispatchers' ability to identify OHCA during emergency call interactions	EMS callers reporting OHCA	Qualitative approach; inductive thematic analysis with investigator triangulation	8 OHCA calls versus 13 non-OHCA calls
Bang *et al.*, 2003 [13]	Interaction between dispatcher and caller in suspected OHCA calls, with emphasis on agonal breathing: review of 100 verified cardiac arrest recordings	Sweden	Mainly to evaluate dispatchers' success in gathering key information, confirming OHCA, dispatching specialized units, and giving DA-CPR guidance; also to examine callers' breathing descriptions and caller–	100 EMS recordings	Qualitative assessment of call audio	Not indicated / NA

				dispatcher communication	
Case et al., 2018 [3]	Identifying obstacles to bystander CPR in high-risk communities: qualitative evaluation of emergency calls	Australia	To determine factors that prevent bystander CPR in areas with low CPR participation	Total dataset: 1423 adult OHCA calls; 1253 recognized as OHCA; thematic analysis on a subsample of 139	Qualitative thematic content analysis	None
Chien et al., 2019 [4]	Influence of callers' emotions and cooperation on OHCA recognition and dispatcher-assisted CPR	Taiwan	To examine how emotion levels and caller cooperation affect OHCA identification and DA-CPR provision	367 EMS calls involving non-traumatic OHCA	Review of recordings; ECCS categorized as 1–3 vs 4–5	336 (92%) calmer callers (ECCS 1–3) vs 31 (8%) distressed/uncooperative (ECCS 4–5)
Chin et al., 2021 [14]	Early detection of caller emotion in OHCA dispatching using an AI-based method	Taiwan	To classify caller emotional state during OHCA calls	337 OHCA EMS calls	Manual rating versus AI-based sound-feature classification aligned with ECCS; manual scoring treated as reference	Stable (ECCS 1–3): 312 (93%) vs Unstable (ECCS 4–5): 25 (7%)
Clark et al., 1994 [19] †	Accuracy of emergency dispatcher determinations of cardiac arrest	US	To assess correct/incorrect decisions related to providing or performing DA-CPR in calls potentially involving cardiac arrest	Total 358 calls: 185 confirmed CA, 154 possible CA, 19 respiratory issues	Audio review	Actual cardiac arrest vs "potential" OHCA presentations
Clawson 2001 †	Emotional Content and Cooperation Score in emergency dispatching	US	To analyze ECCS ratings across 6449 calls from two centers, and evaluate links with caller identity, incident type, time of day, and location	3019 calls from British Columbia (358 suspected CA) and 3430 from Monroe County (681 suspected CA)	ECCS scoring; descriptive and correlation analyses	Compared across variables: caller role, nature of event, time, and geographic area
Dami et al., 2010 [15]	Reasons for refusal of telephone CPR by bystanders	Switzerland	To quantify refusal rates and reasons for declining tCPR	264 calls in which CPR guidance was offered	Audio review; descriptive stats	NA
Eisenberg et al., 1986 [16]	Recognition of cardiac arrest by emergency dispatchers	US	To determine characteristics of calls likely representing cardiac arrest	516 CA calls vs 146 non-CA calls	Audio review; emotional intensity rated using ECCS	Cardiac arrest vs non-cardiac arrest calls

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Hauff *et al.*, 2003 [17]	Factors preventing dispatcher-assisted telephone CPR	US	To investigate elements that hinder the initiation of telephone CPR	404 cardiac arrest calls	Review of call recordings	Not provided
Lerner *et al.*, 2008 [5]	Bystanders infrequently administer chest compressions before EMS arrival despite DA-CPR availability	US	To measure the proportion of OHCA patients receiving chest compressions and identify barriers to following DA-CPR guidance	343 OHCA calls reviewed; 168 eligible for DA-CPR	Retrospective case series across three dispatch centers	NA
Ma *et al.*, 2007 [18]	Assessment of emergency dispatch performance for OHCA in Taipei	Taiwan	To examine caller ECCS ratings and evaluate dispatch system performance	199 calls: 131 second-party callers (close relation), 50 third-party (nearby individuals), 18 fourth-party (public agencies)	Audio review	NA; comparisons across caller categories and ECCS levels
Svensson & Pesämaa, 2012 [20]†	Being heard in emergency calls: escalation of hostility in a fatal case	Norway	To analyze the development of conflict and hostility in a triplet of calls regarding one fatal OHCA	3 calls tied to one OHCA event	Qualitative audio review	None
Svensson *et al.*, 2018 [22] †	Effects of caller anger, fear, and sadness on operator decision-making	Sweden	To evaluate how operators' interpretations of emotional cues influence emergency assessments	146 EMS calls; evaluated by seven operators (41% labeled "acute")	Prospective ratings of first call every 30 minutes; 11-point scales for emotion intensity (0–10) and 8-point scale for perceived help-need (1–8)	Emotion categories (Fear vs Anger vs Sadness) and different expression intensities

DA-CPR: Dispatcher-Assisted Cardiopulmonary Resuscitation. EMS: Emergency Medical Service. NA: Not Applicable. OHCA: Out-of-Hospital Cardiac Arrest.

† indicates studies found through manual searching; the remaining 10 were retrieved from database searches.

The 13 included publications appeared between 1986 [16] and 2021 [14]. Countries represented were the United States [5, 6, 16, 17], Taiwan [4, 14, 18], Sweden [13, 21], Australia [3], Denmark [12], Norway [20], and Switzerland [15].

Descriptions of emotional features in OHCA calls varied considerably. Several studies examined broader determinants that influence dispatcher recognition of OHCA or initiation of bystander CPR, with emotional expression functioning as one of multiple influencing elements [3, 5, 12, 17]. Only a few papers explained or detailed the tools used to evaluate emotions during calls [6, 14, 21].

All included research involved analysis of EMS call audio recordings. Most studies—except for Chin *et al.* [14] and Svensson and Pesämaa [21]—used consecutive or opportunistic sampling from a defined time interval. In contrast, Svensson & Pesämaa [21] prospectively sampled the *first* EMS call occurring in every 30-minute period. Chin *et al.* [14] used call recordings mainly to support the calibration or validation of newly developed artificial intelligence models.

Specific Objective 1: Examination of emotions in emergency calls involving OHCA

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All 13 studies contributed data relevant to this objective (Table 3). Emotional states expressed during OHCA calls were described using terms such as *calm* [3, 12, 13], *hysteria* [3], *emotional distress* [15, 17], *fear*, *sadness*, *anger* [21], *high emotional state* [4], or simply *emotional* [16]. In a number of studies, emotional expression was intertwined with perceived attitudes or behaviours—e.g., cooperation, resistance, resignation, or aggression—shown by the caller from the perspective of the call-taker [3, 4, 6, 18, 20].

Table 3. Descriptions of the 13 included studies according to the three objectives

Author & Year	Findings	Met Objective 1 (Emotions Described)	Met Objective 2 (Approach to Assessing Emotions)	Met Objective 3 (Emotion–Outcome Link)
Alfsen *et al.*, 2015 [12]	In confirmed OHCAs, call-takers communicated in a composed, concise, and straightforward manner. Callers complied with guidance, evaluated the patient, and contributed to successful call handling.	Yes	No	Yes
Bang *et al.*, 2003 [13]	Reported that most callers were calm, and tended to be even calmer by the call's conclusion.	Yes	Yes	No
Case *et al.*, 2018 [3]	Identified three categories of obstacles; one category—"personal factors"—included emotional responses such as hysteria/panic (20%) and passive calmness/reluctance (39%).	Yes	No	Yes
Chien *et al.*, 2019 [4]	Concluded that heightened caller emotionality did *not* hinder OHCA detection, though it may reduce DA-CPR provision rates, and may actually speed initiation of the first compression.	Yes	Yes	Yes
Chin *et al.*, 2021 [14]	Reported that the AI system demonstrated less-than-ideal sensitivity, but acceptable PPV, and strong specificity and NPV.	Yes	Yes	No
Clawson 2001 †	ECCS values were notably low. (i) Overall: 1.05 in British Columbia, 1.2 in Monroe County. (ii) For calls labelled as cardiac arrest: 1.22 in British Columbia (n = 358) and 1.44 in Monroe County (n = 681). Although ECCS rose significantly in arrest cases vs non-arrest calls, the magnitude of difference remained modest.	Yes	Yes	No
Dami *et al.*, 2010 [15]	Emotional strain was mentioned as a factor in rejecting or not carrying out DA-CPR. Acceptance of DA-CPR was 62% (163/264), and 134 cases (51%) actually received DA-CPR.	Yes	No	No
Eisenberg *et al.*, 1986 [16]	When callers were emotional and the patient was over 50 years old, the likelihood of cardiac arrest was higher.	Yes	No	No
Hauff *et al.*, 2003 [17]	Emotional distress was *not* frequently identified as a barrier to DA-CPR delivery.	Yes	No	Yes
Lerner *et al.*, 2008 [5]	Caller emotionality contributed to 14% of situations where DA-CPR instructions were not executed.	Yes	No	Yes
Ma *et al.*, 2007 [18]	ECCS remained low overall (mean score 1.42), corresponding to the findings from Clawson (2001).	Yes	Yes	No
Svensson & Pesämaa, 2012 [20]†	The study showed that difficulties in forming shared understanding caused participants to perceive one another as uncooperative or antagonistic.	Yes	No	Yes
Svensson *et al.*, 2018 [22] †	Fear and Sadness were more strongly linked to perceived need for help than Anger. Greater intensity—especially Fear—correlated with higher need levels, making Fear the most reliable indicator of required assistance.	Yes	Yes	Yes

DA-CPR: Dispatcher-Assisted Cardiopulmonary Resuscitation. ECCS: Emotional Content and Cooperation Score. EMS: Emergency Medical Service. OHCA: Out-of-Hospital Cardiac Arrest.

Using the Emotional Content and Cooperation Score (ECCS), created by the U.S. National Academy of Emergency Medical Dispatch, Clawson and Sinclair [6] reported that callers involved in OHCA emergencies tended to be far more composed than expected when compared with earlier research by Eisenberg *et al.* [16]. They

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noted that the "demeanor, voice tone, empathy, and attitude of the dispatcher have an effect on the caller" [6], suggesting that enhanced dispatcher training over time might account for callers' increased calmness. More information on the ECCS appears under Objective 2.

Specific Objective 2: Description of methods or approaches to measuring/assessing emotions in emergency calls involving OHCA
A total of six studies (46%) [4, 6, 13, 14, 18, 21] detailed the approaches used to evaluate or quantify emotions. Bang *et al.* [13], Clawson and Sinclair [6], Ma *et al.* [18], and Chien *et al.* [4] all employed the ECCS instrument [6]. The ECCS measures the emotional intensity and cooperation level of the caller, not the dispatcher. It features five categories:
1 = normal conversational tone;
2 = anxious but cooperative;
3 = moderately distressed but cooperative;
4 = uncooperative, shouting, and not following instructions;
5 = highly uncontrolled or hysterical.
Because caller emotions often fluctuate across a call, Chien *et al.* [4] analysed the *highest* ECCS score reached in each recording. Ratings were made by a registered nurse and a paramedic, then reviewed by a physician, with inter-rater reliability reported as *good* ($\kappa = 0.63$) [4].
In Bang *et al.* [13], ECCS scoring was performed at both the beginning and end of the call by the physician overseeing medical responsibility, together with the dispatch centre's operational leader. In Clawson and Sinclair [6], a certified "case review professional" assigned the ECCS score, capturing only the rating at call initiation. Ma *et al.* [18] did not state whether the rating applied to the entire call or specific portions; two investigators completed the ECCS scoring, achieving good reliability ($\kappa = 0.65$) [18].
Chin *et al.* [14] developed a two-step method incorporating artificial intelligence (AI) for emotion detection. First, human raters scored calls using ECCS; disagreements were re-evaluated until agreement was reached. Second, the AI component utilized mel-frequency cepstral coefficients and a support vector machine. The authors explained that mel-frequency coefficients align frequency scales with human auditory perception and are widely used in automated speech analysis, while support vector machines are robust classifiers used to detect "emotionally unstable callers" [14]. When compared with human ECCS ratings, the AI model demonstrated 39% sensitivity, 73% PPV, 98% specificity, and 93% NPV. Similar or slightly improved performance occurred when only the first 10 seconds of calls were analysed, leading the authors to propose the tool as a rapid detector of callers with high emotional instability [14].
Svensson and Pesämaa [21] categorized caller emotions into three basic groups—fear, sadness, and anger. Dispatchers rated the intensity of each on an 11-point scale (10 = very pronounced, 0 = none) and assessed perceived caller need for assistance on an 8-point scale (1 = no assistance, 8 = severe need). Only the first one minute of each call was used for these ratings. Additional information is presented under Objective 3.

Specific Objective 3: Links between emotional expression and call outcomes in OHCA-related emergency calls
Seven of the 13 studies (54%) 12., 17., 20., 4., 5. addressed this objective, although they explored different patient and call outcomes and reported inconsistent associations.
Chien *et al.* [4] examined the broadest collection of predetermined call-process and patient variables in relation to caller emotional expression. They reported that varying ECCS emotion levels (1–5; 'calm' to 'yelling/hysteria') did not correspond to differences in how accurately callers reported consciousness or breathing. Likewise, higher emotional arousal (higher ECCS) did not hinder OHCA identification. Instead, stronger emotional expression appeared to assist call-takers in recognising OHCA, possibly because callers' distress signalled the urgency of the situation. In contrast, greater emotional distress was linked to lower agreement to perform DA-CPR. Interestingly, distressed callers initiated the first chest compressions sooner than calmer callers once instructions were given. [4]
Findings on whether emotions affected DA-CPR implementation were contradictory. Lerner *et al.* [5] noted that caller emotion accounted for 14% of failures to complete DA-CPR instructions. Conversely, Case *et al.*³ observed that both "hysteria/panic" and "calm resignation" appeared among 20% and 39% of calls, respectively, where OHCA was recognised but DA-CPR did not occur, implying that both heightened distress and disengaged calmness might obstruct DA-CPR. In contrast, Hauf *et al.* [17] concluded that emotional distress was not a frequent reason for DA-CPR omission. All three studies [3, 5, 17]. focused on calls where DA-CPR was *not* delivered, but without parallel analysis of a comparison group in which DA-CPR was successfully carried out, which limits the certainty of these findings.
Through qualitative thematic analysis of two small datasets (unrecognised OHCA, n = 13; recognised OHCA, n = 8), Alfsen *et al.* [12] identified "emotional distance" (i.e., maintaining composure) as a notable theme in the recognised-OHCA group. They suggested that calmer callers were better able to collaborate with call-takers, thereby supporting OHCA recognition. [12]

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Svennevig [20] undertook an in-depth conversational analysis of three calls that ended in a fatal OHCA. Hostility developed rapidly between callers and call-takers, was not resolved, and ultimately resulted in no DA-CPR instructions, no attempts at DA-CPR, and delayed EMS dispatch. [20]

Svensson and Pesamaa [21] reported that fear and sadness were more likely than anger to signal that the caller required assistance. Fear was considered more intense than sadness and was perceived as indicating the highest need for help. [21] They proposed that such perceptions could influence call-taker decisions (e.g., dispatching an ambulance or initiating DA-CPR instructions). [21] Unlike most studies in the review, this investigation did not specifically target OHCA calls; rather, OHCA incidents were part of a broader analysis of emotional expression. Nevertheless, it was included due to its relevance to emotional content in OHCA-related calls.

Only one study [20] evaluated how emotions affected *patient* outcomes, examining fatality alone. Other outcomes—such as return of spontaneous circulation during CPR or survival to hospital discharge—were not assessed in relation to caller emotional expression.

Discussion

Summary of evidence

This scoping review identified a limited set of studies examining emotions during OHCA-related emergency calls, with only a few detailing how emotional states were quantified. Many studies explored how emotions related to call-process metrics, although the extent and specificity of these analyses varied considerably. According to Chien *et al.* [4] and Hauff *et al.* [17], emotional distress did not obstruct OHCA recognition or DA-CPR. In contrast, Case *et al.* [3] reported that both high distress and subdued resignation were frequently noted in cases without DA-CPR, whereas Alfsen *et al.* [12] suggested that emotional neutrality (calmness) improved caller cooperation and thereby aided recognition. Only one study [20] linked intense emotions during OHCA calls with mortality, attributing the outcome to deteriorating caller–call-taker interaction, delayed assistance, and ultimately the patient's death. No study evaluated other survival indicators, such as return of spontaneous circulation or discharge survival.

Marked heterogeneity was evident among the included studies, spanning methodological approaches (quantitative, qualitative, mixed methods), study design (mainly retrospective, often without control groups), sample sizes (from n = 3^{20} to n = 6449^6 calls), aims, and outcome variables.

Very few investigations described the method used to classify emotions in OHCA-related EMS calls. The Emotional Content and Cooperation Scale (ECCS) [6] was the most frequently adopted tool. Another study [14] applied artificial intelligence to build a new model capable of identifying the caller's emotional state early in the call, proposing that this could help call-takers tailor their communication for callers experiencing heightened distress.

Given the complexity, variability, and intensity of emotional expression, emotions remain challenging to evaluate and predict in time-critical OHCA situations. This review highlights the potential impact of how caller emotions are interpreted by call-takers, which may influence OHCA recognition and the rapid initiation of DA-CPR.

Strengths and limitations of this scoping review

This work represents the first systematic scoping review specifically examining emotional expression in emergency calls involving OHCA. The three guiding objectives shaped the review process and enabled a consolidated overview of current evidence, while also drawing attention to gaps requiring further investigation.

The review has limitations

First, a manual supplementary search conducted after the main database search located three additional eligible studies that had not been retrieved earlier. Likewise, the paper by Lewis *et al.* [22], which noted that a small proportion of cases showed associations between caller "emotional states," lack of DA-CPR instruction delivery, and/or delays in initiating initial chest compressions, may also have been inadvertently overlooked. Such occurrences are not uncommon and are generally considered acceptable within systematic and scoping review methodologies.

Second, this review did not undertake a critical evaluation of the methodological quality of the included studies. This omission aligns with typical scoping review practices, as formal appraisal is not usually viewed as a core requirement [23].

Where to from here

Drawing on the findings of this scoping review, three main recommendations emerge for future investigations. Studies exploring emotions during OHCA-related emergency calls—and their relationships with process or patient outcomes—should: clearly articulate the research question and predetermined outcome measures; include an appropriate comparison group; and, for quantitative work, ensure sufficient sample size.

Emotions are inherently multifaceted, with variable expressions, triggers, and subtleties. In several studies, emotional descriptors also overlapped with interpretations relating to attitudes, behaviours, or perceptions, further

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complicating analysis—especially within the high-pressure context of OHCA emergency communication. A robust measurement tool for this setting must account for these complexities. Although the ECCS [6] appeared most frequently in the reviewed literature, it does not reflect the evolving nature of emotional expression, nor does it incorporate contextual influences. Moreover, as previously indicated, confusion among similar emotional categories can occur, indicating the need for a more precise instrument for evaluating emotions in OHCA calls.

The work of Svennevig [20] and Svensson and Pesamaa [21] demonstrates the value of linguistic approaches in tracing how emotional dynamics develop and escalate throughout a call. A recent editorial authored by members of the present review team has also emphasized the importance of such research directions [24].

Building on insights from Chin *et al.* [14], Clawson and Sinclair [6], Svennevig [20], and Svensson and Pesamaa [21], two additional questions arise for future inquiry and practical application:

1. What forms of training should be provided to EMS call-handlers to better support effective management of caller emotional states?

2. Would it be beneficial to educate the public about the structure and expectations of the emergency-calling process, so that callers are more prepared for required questions and better able to contribute to life-saving actions?

Conclusion

This scoping review identified a limited body of literature addressing emotional expression during emergency OHCA calls, with only 13 studies meeting inclusion criteria. Emotional assessment varied widely, and only six studies fully explained how emotions were evaluated. Several studies examined links between emotional expression and call outcomes, though findings lacked consistency. Only one investigation considered the effect of caller emotions on OHCA patient survival. Overall, this review highlights a substantial research gap with important implications for advancing both future studies and clinical practice.

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Ethics statement: None. Studies involving humans and animals must have been performed with the approval of an appropriate ethics committee and provide the reference number.

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