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Factors Influencing Bystander CPR Initiation, Continuation, and Quality in OHCA Emergency Calls: A Scoping Review

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Abstract

Survival outcomes for individuals experiencing out-of-hospital cardiac arrest (OHCA) improve when bystanders deliver uninterrupted, effective cardiopulmonary resuscitation (CPR) until professional help arrives. This review sought to map existing evidence on the factors—both hindering and enabling—that arise during interactions between emergency callers and call-takers and influence whether bystander CPR (B-CPR) is started, sustained, and performed with adequate quality during OHCA calls. Included studies examined emergency callers and call-takers, explored psychological, physical, or communication-related influences on the initiation or delivery of B-CPR, and analysed recordings or transcripts of OHCA emergency calls. Comprehensive searches of Medline, CINAHL, Cochrane CENTRAL, Embase, Scopus and ProQuest were undertaken from database inception through 9 March 2022. Relevant study details were collected and synthesised descriptively, supported by summary tables. Across the 30 included studies, numerous elements were reported to influence whether B-CPR was initiated or carried out during the call. Twenty-eight studies highlighted obstacles to giving CPR instructions and to beginning CPR, with frequently cited issues including caller hesitation, limitations in physical ability, and callers disconnecting before receiving guidance. Only a small number of studies examined factors affecting the continuation (n = 2) or quality (n = 2) of CPR once started. By analysing emergency call interactions, this review outlines key challenges to delivering CPR instructions and achieving timely initiation of B-CPR. There remains a significant gap in understanding what promotes or impedes maintaining CPR and ensuring high-quality performance during the call. Further work is needed to evaluate call-taker techniques aimed at supporting callers in providing effective B-CPR.

Keywords: Bystander cardiopulmonary resuscitation, Out-of-hospital cardiac arrest, Emergency medical dispatch, Barriers, Facilitators, Initiation, Continuation, Quality

Introduction

Out-of-hospital cardiac arrest (OHCA) is a medical emergency in which rapid intervention is essential for survival [1]. The Chain of Survival outlines a series of time-sensitive actions—early recognition of arrest, initiation of bystander cardiopulmonary resuscitation (B-CPR), early defibrillation, provision of advanced life support, and high-quality post-resuscitation care—that collectively improve the likelihood of favourable outcomes [2, 3]. Each minute that passes without CPR or defibrillation significantly reduces a patient's chance of survival [4]. As laypersons are often first to witness an OHCA, they play a critical role in delivering basic life support until Emergency Medical Services (EMS) arrive. Dispatcher-assisted CPR (DA-CPR) was introduced to increase the frequency of B-CPR during emergencies [5]. In this approach, also known as telephone CPR or telecommunicator CPR, call-takers guide bystanders through CPR procedures in real time [6, 7].

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Evidence indicates that DA-CPR improves B-CPR rates, reduces the interval to defibrillation, and enhances survival following OHCA [8–11]. Despite these benefits, global B-CPR rates remain low, with estimates as low as 19% [12].

Research has demonstrated that barriers exist across the early components of the Chain of Survival. For instance, detecting cardiac arrest can be challenging when agonal breathing is present, occurring in 40–60% of cases and often delaying recognition [13]. Once cardiac arrest is identified during an emergency call, call-takers must motivate callers to begin B-CPR. Substantial efforts have focused on understanding and mitigating obstacles to cardiac arrest recognition and CPR initiation [14–17]. However, survival also depends on the continuous delivery of high-quality CPR from the moment of recognition until EMS arrival [1]. Existing studies on CPR continuity and quality often rely on simulation-based methods to measure performance metrics [18, 19]. To date, no reviews have specifically investigated barriers or facilitators to the initiation, maintenance, or quality of B-CPR as revealed through emergency call data. This gap prompted us to conduct a scoping review mapping the available literature that uses emergency call audio or transcripts to explore factors influencing the initiation, continuation, and quality of B-CPR. A scoping review approach was selected to allow broad exploration and mapping of the evidence base.

Methods

This review was conducted following Arksey and O'Malley's methodological framework [20] and in accordance with the PRISMA-ScR reporting guidelines [21]. Results are presented narratively with complementary summary tables. The search strategy was guided by a predefined protocol registered on the Open Science Framework [22].

Eligibility criteria

This review included studies that focused on: population—individuals directly involved in ambulance emergency calls, namely bystanders/callers and the call-takers responding to these calls; concept—factors influencing bystander CPR (B-CPR), including psychological, physical, and communication-related barriers and enablers affecting its initiation, maintenance, and quality; and context—ambulance OHCA calls where the cardiac arrest was not witnessed by EMS and bystander CPR could potentially be provided before EMS arrival. Only studies using emergency call audio recordings or transcripts as the primary data source were considered. Studies primarily addressing cardiac arrest recognition were excluded; however, where recognition was also examined, only data relevant to CPR initiation, continuation, or quality were extracted. Articles were restricted to those with English-language abstracts, and grey literature or conference abstracts were not included.

Search strategy and information sources

A structured three-stage approach, guided by the Joanna Briggs Institute framework for scoping reviews [23], was employed: (1) initial database searches to identify relevant terms through text analysis, (2) comprehensive keyword searches across six databases (Medline, Scopus, CINAHL, Cochrane, EMBASE, and ProQuest), and (3) review of reference lists from included studies to locate additional articles. The search strategy was developed in collaboration with an information specialist at Curtin University Library and customised for each database. Searches were conducted on 9 March 2022, with no restriction on publication year; databases were searched from their inception.

Study selection

Search outputs were uploaded into Rayyan [24] to remove duplicates and facilitate screening. Titles, abstracts, and full texts were independently assessed by EA and NP against the inclusion criteria. Any disagreements were resolved through discussion and consensus or, if necessary, by consultation with a third author (JF).

Data extraction and charting

Given the high volume of included studies, we modified our originally registered protocol: a single author (EA) conducted the initial data extraction, which was subsequently verified by a second author (NP). Extracted study details were recorded in a Microsoft Excel spreadsheet [Microsoft, Redmond, NY, USA] and included: authors, year of publication, country, study design, population, setting, sample size, identified barriers, identified facilitators, and any strategies implemented. Consistent with standard scoping review methodology, no formal assessment of risk of bias was performed [23].

Synthesis of results

Findings were organised into four a priori categories: psychological, physical, communication, and other barriers and facilitators influencing CPR performance, as defined in our protocol. These categories were derived from preliminary literature exploration and classified as follows: psychological factors encompassed elements affecting mental or emotional states of the bystander or call-taker; physical factors included attributes of the patient, bystander, or environment impacting CPR; communication factors covered verbal interactions, comprehension,

and responses during the emergency call; and other factors captured elements that did not fit the preceding categories. Each factor was discussed and assigned to a category by consensus. Ambiguous or overlapping factors were allocated to the most appropriate category to avoid duplication.

To clarify which components of B-CPR were influenced by these factors, we applied standardised definitions: CPR initiation referred to the delivery of dispatcher-assisted CPR (DA-CPR) instructions and the bystander's first compression as documented by the call-taker; CPR continuation described the sustained performance of compressions, with or without rescue breaths; and CPR quality encompassed any mention of compression rate, depth, recoil, or pauses between compressions. Each identified barrier or facilitator was assigned to one of the four categories (psychological, physical, communication, or other) and synthesised narratively. Subgroup analyses were then conducted to indicate which specific aspect of B-CPR (initiation, continuation, or quality) was affected by each factor.

Results

The database search yielded 15,776 records across the six databases **(Figure 1)**. Following title and abstract screening against the eligibility criteria, 165 articles were assessed at full text. Of these, 134 were excluded for not meeting the inclusion criteria, leaving 31 articles for data extraction and synthesis [25–55]. Among the included publications, 29 represented individual studies [25–52, 55], while two articles reported on the same study [53, 54]. Consequently, a total of 30 unique studies were incorporated into this review.

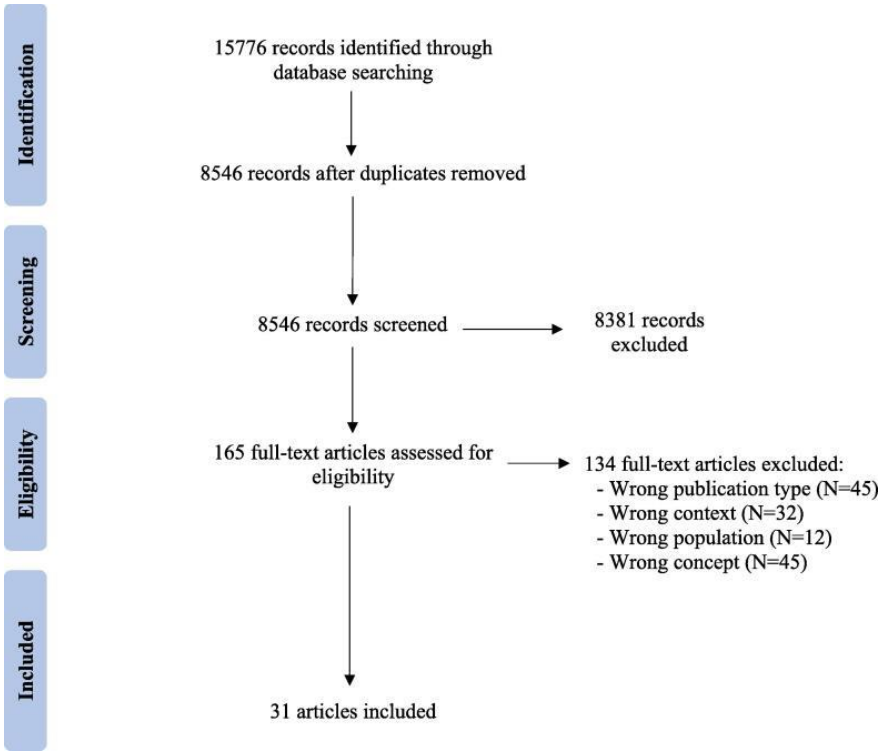

Figure 1. PRISMA flowchart

Study characteristics

A summary of the included study characteristics is presented in **Table 1**. The 30 studies were conducted across 12 countries, with the majority originating from the United States. Sample sizes varied considerably, ranging from 21 participants [35] to 3,000 participants [43]. Four studies [26, 36, 53, 55] specifically examined the implementation or impact of dispatcher-assisted CPR (DA-CPR), whereas the remaining 27 studies focused on factors influencing bystander CPR (B-CPR) initiation and performance [25, 27–52, 53]. All studies were conducted within systems using a standardised DA-CPR script for OHCA calls.

Fifteen studies included cases in which OHCA was suspected by the call-taker at the time of the emergency call [26, 27, 29, 33-36, 40, 41, 43, 44, 49, 50, 51, 55], while 14 studies included only cases where OHCA was confirmed or treated by EMS [25, 28, 30–32, 38, 39, 42, 45–48, 53, 54]. In two studies, it was unclear whether OHCA cases were confirmed by EMS upon arrival or merely suspected by the call-taker [37, 52].

Regarding CPR status, two studies limited inclusion to cases where CPR had not been initiated [25, 32]. Twelve studies examined cases in which DA-CPR was applied exclusively [29, 34, 36-38, 45, 47–51, 55], 15 studies

included OHCA cases regardless of whether CPR was performed [26–28, 30, 31, 33, 35, 39–41, 43, 44, 52–54], and two studies considered only cases in which either B-CPR or DA-CPR was performed [42, 46].

Table 1. Article characteristics

Author, year	N	Country	Study design	Data source	Study population	CPR focus
Bang *et al.*, 2000 [41]	99	Sweden	Prospective cohort	Emergency medical service (EMS) call recordings	Suspected out-of-hospital cardiac arrest (OHCA)	Calls with and without bystander CPR
Case *et al.*, 2018 [25]	139	Australia	Qualitative study	EMS call recordings	EMS-confirmed OHCA	CPR not started
Cheng *et al.*, 2019 [40]	367	Taiwan	Cross-sectional	EMS call recordings	Suspected OHCA	Calls with and without bystander CPR
Chocron *et al.*, 2021 [42]	428	United States	Cohort study	EMS calls + EMS/hospital records	EMS-treated OHCA	Bystander CPR & dispatcher-assisted CPR
Clegg *et al.*, 2014 [43]	50	United Kingdom	Cohort study	EMS call recordings	Suspected OHCA	Calls with and without bystander CPR
Culley *et al.*, 1991[26]	267	United States	Cohort study	EMS call recordings	Suspected OHCA	Calls with and without bystander CPR
Dami *et al.*, 2015 [29]	1,254	Switzerland	Cohort study	EMS calls + dispatcher forms	Suspected OHCA	Dispatcher-assisted CPR
Deakin *et al.*, 2010 [27]	42	United Kingdom	Cohort study	EMS calls + patient record forms	Suspected OHCA	Calls with and without bystander CPR
Fukushima, *et al.* 2016 [28]	1,850	United States	Cohort study	EMS call recordings	EMS-confirmed OHCA	Calls with and without bystander CPR
Hardeland *et al.*, 2021 [44]	716	Denmark, Norway, Sweden	Cohort study	EMS calls + OHCA database + national registry	Suspected OHCA	Calls with and without bystander CPR
Hauff *et al.*, 2003 [30]	404	United States	Cohort study	EMS call recordings	EMS-treated OHCA	Calls with and without bystander CPR
Heward et al, 2004 [31]	100	United Kingdom	Cohort study	EMS call recordings	EMS-confirmed OHCA	Calls with and without bystander CPR
Ho *et al.*, 2016 [32]	1,157	Singapore	Cohort study	EMS call recordings	EMS-confirmed OHCA	CPR not initiated
Huang *et al.*, 2020 [55]	2,404	Taiwan	Cohort study	EMS calls + OHCA database	Suspected OHCA	Dispatcher-assisted CPR
Langlais *et al.*, 2017 [45]	802	United States	Cohort study	EMS calls + first-care & hospital records	EMS-treated OHCA	Dispatcher-assisted CPR
Leong *et al.*, 2021 [49]	506	Singapore	Cohort study	EMS call recordings	Suspected OHCA	Dispatcher-assisted CPR
Lerner *et al.*, 2008 [33]	343	United States	Case series	EMS call recordings	Suspected OHCA	Calls with and without bystander CPR
Lewis *et al.*, 2013 [34]	476	United States	Cohort study	EMS call recordings	Suspected OHCA	Dispatcher-assisted CPR
Linderoth *et al.*, 2021 [50]	52	Denmark	Cohort study	Video-assisted emergency calls	Suspected OHCA	Dispatcher-assisted CPR
Linderoth*et al.*, 2021 [35]	21	Denmark	Cohort study	EMS calls + CCTV footage	Suspected OHCA	Calls with and without bystander CPR
Martinage *et al.*, 2013 [36]	38	France	Cohort study	EMS call recordings	Suspected OHCA	Dispatcher-assisted CPR
Michiels *et al.*, 2020 [37]	123	Belgium	Cohort study	EMS call recordings	Population not clearly specified	Dispatcher-assisted CPR

Nuño *et al.*, 2017 [51]	39	United States	Cohort study	EMS calls + computer-aided dispatch records	Suspected OHCA	Dispatcher-assisted CPR
O'Neil and Deakin, 2007 [46]	145	United Kingdom	Cohort study	EMS calls + ambulance records	EMS-confirmed OHCA	Bystander CPR & dispatcher-assisted CPR
Pek *et al.*, 2019 [52]	31	Singapore	Cohort study	EMS calls + ambulance records	Population not clearly specified	Calls with and without bystander CPR
Riou *et al.*, 2021 [47]	422	Australia	Cohort study	EMS call recordings	EMS-confirmed OHCA	Dispatcher-assisted CPR
Riou *et al.*, 2020 [48]	65	Australia	Cohort study	EMS call recordings	EMS-confirmed OHCA	Dispatcher-assisted CPR
Riou *et al.*, 2018 [16]	424	Australia	Cohort study	EMS call recordings	EMS-confirmed OHCA	Dispatcher-assisted CPR
Sanko *et al.*, 2020 [54]	597	United States	Cohort study	EMS call recordings	EMS-confirmed OHCA	Calls with and without bystander CPR
Sanko *et al.*, 2021 [53]	61	United States	Cohort study	EMS call recordings	EMS-confirmed OHCA	Calls with and without bystander CPR
Siman-Tov *et al.*, 2021[39]	2,310	Israel	Cohort study	EMS call recordings	EMS-confirmed OHCA	Calls with and without bystander CPR

B-CPR initiation, continuation, and quality

Among the included studies, 28 examined factors influencing the initiation of bystander CPR (B-CPR) [25–32, 34–41, 43, 45–49, 51–55]. Only two studies explored determinants affecting the ongoing performance of B-CPR [36, 55], while another two specifically assessed the quality of B-CPR and the associated influencing factors [42, 50] **(Table 2)**. A comprehensive summary of all identified barriers and facilitators across the review is provided in **Tables 3 and 4**.

Table 2. Topics examined by each study

Author, year	Providing instructions	Initiating CPR	Continuing CPR	Maintaining CPR quality	Psychological factors	Physical factors	Communication factors
Bang *et al.*, 2000 [41]		•			•	•	
Case *et al.*, 2018 [25]	•	•			•	•	•
Cheng *et al.*, 2019 [40]	•	•			•	•	•
Chocron *et al.*, 2021 [42]				•	•	•	
Clegg *et al.*, 2014 [43]		•			•	•	
Culley *et al.*, 1991[26]		•			•	•	•
Dami *et al.*, 2015 [29]	•	•			•	•	•
Deakin *et al.*, 2010 [27]		•			•	•	•
Fukushima, *et al.* 2016 [28]	•	•			•	•	•
Hardeland *et al.*, 2021 [44]	•	•			•	•	
Hauff *et al.*, 2003 [30]	•	•			•	•	•

Heward et al, 2004 [31]	•	•			•	•	•
Ho *et al.*, 2016 [32]	•	•			•	•	•
Huang *et al.*, 2020 [55]	•	•	•			•	
Langlais *et al.*, 2017 [45]		•			•	•	
Leong *et al.*, 2021 [49]	•	•					•
Lerner *et al.*, 2008 [33]	•	•			•	•	•
Lewis *et al.*, 2013 [34]	•	•			•	•	•
Linderoth *et al.*, 2021 [50]				•	•	•	•
Linderoth*et al.*, 2021 [35]		•					•
Martinage *et al.*, 2013 [36]		•	•		•	•	•
Michiels *et al.*, 2020 [37]		•			•	•	•
Nuño *et al.*, 2017 [51]	•	•					•
O'Neil and Deakin, 2007 [46]		•			•	•	
Pek *et al.*, 2019 [52]	•	•					•
Riou *et al.*, 2021 [47]		•			•	•	•
Riou *et al.*, 2020 [48]		•			•		
Riou *et al.*, 2018 [16]		•			•		
Sanko *et al.*, 2020; 2021 [53, 54]		•					•
Siman-Tov *et al.*, 2021[39]		•			•	•	•

Table 3. Barriers identified, main themes are in bold

Category	Specific barrier	Referenced studies
Psychological barriers	Emotional distress (panic, hysteria)	25-30, 32-37, 40, 41
	Fear (general, of contact with patient, of causing harm, of dead body, medicolegal concerns, apprehension)	25, 29, 33, 36, 38
	Perceived patient already dead or obviously deceased	Multiple studies (common theme)
	Perception that CPR is inappropriate or futile	Multiple studies (common theme)
	Belief that the patient did not wish resuscitation (terminal illness, advance directives)	Multiple studies (common theme)
	Reluctance or outright refusal by caller	25, 28- 31, 33-38, 43, 46, 47
	Lack of confidence in own abilities	25, 35, 36, 38, 48

Physical barriers	Bystander's own physical limitations or incapacity	25, 28-31, 33, 34, 36-40, 43, 44, 45, 46
	Patient difficult to access or move	25, 27, 28, 32, 36, 41, 55
	Caller not physically present at the scene	26, 28, 29, 30-32, 35, 36, 39, 41, 44
	Single bystander (no one else to help)	42
	Caller using a landline (fixed location)	55
	Repulsion or emotional aversion to performing CPR	Multiple studies (common theme)
	Difficulty or unwillingness to perform ventilations	Multiple studies (common theme)
Communication barriers	Language barriers	Multiple studies (common theme)
	Caller relaying instructions to another person	27, 35
	Poor, inadequate, or overly technical wording of instructions	38, 49, 53, 54
	Caller providing insufficient or unclear information	35
	Telecommunication/technical problems	25, 32, 33, 36
	Caller hung up or call disconnected prematurely	32-34, 36, 38-40
	Dispatcher hung up	35
	General communication failure between dispatcher and caller	37, 52
Protocol & process barriers	Deviations from dispatcher protocol	26, 27, 32, 33, 35, 37, 52
	Instructions not offered at all	Multiple studies (common theme)
	Late recognition of cardiac arrest	25
	Establishing exact location delayed	27
	Caller required significant persuasion	27
	Caller asked to perform competing tasks	35
	Dispatcher showed lack of ownership of resuscitation process	35
Factors influencing CPR initiation	Unwitnessed cardiac arrest	Multiple studies (common theme)
	Patient age, sex, or relationship to caller	Multiple studies (common theme)
	Obvious signs of death	Multiple studies (common theme)
Factors affecting CPR quality/continuation	Use of audio-only telephone (no video)	50
	Overall difficulty maintaining CPR once started	–

Table 4. Facilitators identified, main themes are in bold

Category	Specific facilitator	Referenced studies
Psychological facilitators	Bystander characteristics (e.g., younger age, relationship as son/daughter rather than spouse, unrelated to patient)	30, 36
	Witnessed cardiac arrest	Multiple studies (common theme)
	Public location of OHCA	28
	Prior CPR training in bystanders	36
	Bystander adheres to dispatcher-assisted CPR (DA-CPR) protocol	36
Physical facilitators	Callers using a mobile phone (greater mobility and ability to act)	55
	Calls transferred from landline to mobile phone	Multiple studies (common theme)
	Multiple bystanders present at the scene	Multiple studies (common theme)
Communication facilitators	Providing clear DA-CPR instructions	26, 36, 39, 53, 55
	Use of simple, non-technical language	49
Factors influencing CPR initiation	Overall support through dispatcher-assisted CPR	Multiple studies (common theme)
Factors affecting CPR quality/continuation	Multiple bystanders (allows task sharing and sustained effort)	42
	Video-assisted emergency calls (improves guidance and monitoring)	50

	Mobile phone use by caller (facilitates hands-free and movement)	55

Psychological factors

Psychological influences were frequently reported, appearing in 24 studies **(Table 2)**. These factors were grouped into four main themes: reluctance or unwillingness, emotional distress, confidence, and fear or apprehension [25–48]. Within these themes, 22 distinct psychological barriers [25–48] and two facilitators [36, 40] were identified. Psychological factors were found to primarily affect the provision of CPR instructions and the initiation of B-CPR following dispatcher guidance. There was little evidence of psychological barriers impacting the continuation or quality of CPR, although two facilitators supporting CPR continuation were noted [36].

Psychological factors: Provision of instructions and CPR initiation

Reluctance to intervene was the most frequently reported psychological barrier affecting both the delivery of dispatcher-assisted CPR (DA-CPR) instructions and the initiation of bystander CPR (B-CPR) [25–48]. This reluctance was often influenced by perceptions of the patient's condition, with bystanders less likely to act if the patient appeared deceased or had a terminal illness [29, 35, 47]. However, reluctance was also observed even when the bystander believed the patient to be alive [29]. Riou *et al.* [48] noted that individuals resisting CPR due to perceptions of the patient's status were harder to persuade than those whose resistance stemmed from doubts about their own ability to perform CPR. Other factors such as disagreeable patient characteristics [30, 33], bystander aversion [36], patient age [47], and male sex [42] were also linked to delays or failure in CPR initiation. Additionally, DA-CPR protocols requiring mouth-to-mouth ventilation rather than compression-only CPR inhibited bystander engagement [46]. One study reported that callers for unwitnessed arrests were less likely to receive CPR instructions (13% vs. 26% for witnessed arrests) [25], and another found that unknown patients reduced bystander willingness to act [33]. Bystanders sometimes questioned the potential benefit or appropriateness of CPR, contributing to further delays [25, 34, 35, 38, 43]. Lack of motivation was cited in 44% of calls as a barrier, despite call-taker encouragement [37].

Emotional distress, including hysteria and panic, was another common impediment to instruction delivery and CPR initiation [25-30, 32–34, 37, 40, 41]. Panic was more pronounced in unassisted female callers who doubted their ability to move the patient or when arrests occurred in public with multiple bystanders [25].

Bystanders' confidence and prior experience with CPR or OHCA influenced their likelihood of initiating CPR [25, 35, 36, 38]. Perceived lack of skill or ability, whether due to actual skill deficits [25, 38] or self-perceived incompetence [36], was a major deterrent to B-CPR initiation. Insufficient CPR knowledge or training consistently limited bystander engagement [26, 29, 30, 33, 36].

Fear was also reported as a barrier, including concerns about causing harm [38], contracting infectious diseases [37], or legal repercussions [30, 33]. Apprehension about performing CPR was associated with a reduced likelihood of action, even when DA-CPR instructions were provided [36].

Psychological factors: Continuation of CPR

Among the two studies that examined ongoing B-CPR performance [36, 55], no psychological barriers were reported. One study found that bystanders with prior CPR training were more likely to continue compressions until EMS arrival [36]. Additionally, continuation was more likely when the bystander was not related to the patient [36].

Physical factors

Physical influences on B-CPR were reported in 23 studies, with 17 unique factors identified [25–46, 55]. Barriers most commonly affected the delivery of CPR instructions and initiation of compressions, while fewer factors were associated with CPR quality, and none were reported for CPR continuation. Facilitators were described for initiation, continuation, and quality, with initiation being most frequently supported.

Physical Factors: Provision of instructions and CPR initiation

Physical barriers to initiating CPR were frequently observed. Caller proximity to the patient was a common obstacle, either because the caller was not physically present [26, 28, 31, 32, 36, 39, 41, 44] or the patient was difficult to access [32, 36, 45]. Calls made from landlines were associated with longer delays to CPR initiation, likely reflecting greater distance from the patient [55]. Even when present, bystanders' physical capabilities sometimes limited CPR initiation [25, 28–30, 32–34, 36–39, 44–46]. Difficulties in positioning the patient, due to weight or awkward positioning (e.g., wedged between surfaces), occurred in up to 49% of calls [25, 28–32, 34, 36–38, 45, 46], while inability to compress the chest was a frequently cited barrier [25, 28, 30, 33, 36, 37, 39, 44, 45].

Facilitators for CPR initiation were more commonly reported than for psychological or communication factors. Mobile phone use was associated with shorter intervals to first compression, higher DA-CPR rates, and faster

CPR instruction [55]. Transfers from landlines to mobile phones improved DA-CPR performance (73% vs. 29%). Additional positive factors included younger bystanders, being a son or daughter rather than a spouse, witnessing the arrest, multiple bystanders present, and arrests occurring in public locations [28, 30].

Physical factors: Continuation of CPR
Neither study examining ongoing CPR [36, 55] reported physical barriers; however, two facilitators were identified: use of a mobile phone to call EMS [55] and immediate adherence to DA-CPR instructions [36].

Physical factors: CPR quality
Two studies assessed CPR quality [42, 50]. Chocron *et al.* [42] found that having only one bystander hindered compression quality, whereas two or more bystanders improved performance. Linderoth *et al.* [50] demonstrated that video-assisted EMS calls, which enabled real-time guidance, enhanced perceived B-CPR quality and acted as a facilitator for high-quality performance.

Communication factors
Communication influences were reported in 21 studies, encompassing 16 themes related to 17 unique barriers [25–38, 39, 40, 49–54] and two facilitators [39, 49, 53, 54] affecting B-CPR initiation and performance. Barriers predominantly impacted the delivery of CPR instructions and initiation, with 18 studies describing obstacles at this stage [25–27, 29, 32-34, 36, 37, 38, 40-42, 49, 51, 52]. Only one study reported a communication barrier affecting CPR quality [35]. Facilitators were mainly linked to CPR initiation, with four studies highlighting positive effects [39, 49, 53, 54]. No communication factors were reported for CPR continuation.

Communication factors: Provision of instructions and CPR initiation
The most common communication barriers were telecommunication issues, such as dropped calls [29, 32-34, 36, 40] or poor connections [33, 36], which disrupted instruction delivery. Deviations from DA-CPR protocols by call-takers also led to misunderstandings or breakdowns in the caller–dispatcher interaction [26, 31, 33, 35, 37, 41, 46, 52]. Other barriers included asking irrelevant or excessive questions [26, 46], failing to ask key questions [41], not providing DA-CPR instructions [31, 37], omitting words, or giving instructions at inappropriate times [26, 35]. The phrasing of prompts influenced bystander compliance; for instance, bystanders were more likely to act when told CPR "needed to happen" rather than being asked if they were willing [38].
Complex or technical language delayed CPR initiation [27, 32, 49], as did confusion over instructions [36] or overly detailed scripts requiring clarification [42]. Lack of call-taker leadership reduced the likelihood of CPR being performed [35]. Communication breakdowns also occurred when the caller relayed instructions to other bystanders [35, 46] or failed to pass on information, delaying CPR initiation [35]. Language barriers between caller and dispatcher were frequently reported and significantly slowed instruction delivery [25, 26, 28, 30, 31, 32, 34, 51, 53], with one study noting substantial delays in CPR initiation in such cases [51].
Communication facilitators included DA-CPR itself [26, 36, 39, 53, 55] and the use of simplified language, such as "push hard and fast" [49]. A modified dispatcher script (Los Angeles Tiered Dispatch System, LA-TDS) was shown to increase B-CPR rates by 57% and improve first-compression times under two minutes compared to the standard Medical Priority Dispatch System (MPDS). The modified script also improved initiation rates among non-native English speakers [53, 54].

Communication factors: CPR quality
Communication barriers to CPR quality were less frequently reported. One study found that failure to confirm bystander understanding led to suboptimal chest compressions, as observed via CCTV [35]. When multiple bystanders were present, call-takers did not always prompt rotation of providers during poor-quality CPR, impacting performance [50].

Other factors
No additional barriers or facilitators beyond psychological, physical, and communication factors were identified in the included studies.

Discussion

This scoping review synthesised evidence from 30 studies examining barriers and facilitators identified through emergency calls that influence bystander CPR (B-CPR) initiation and performance [25–55]. The literature predominantly addresses obstacles to the delivery of dispatcher-assisted CPR (DA-CPR) instructions and the initiation of CPR, with the most commonly reported barriers being bystander reluctance (psychological) [25, 29, 30, 33–36, 38, 46, 48], limitations in physical ability (physical) [25, 28–30, 32–34, 36–40, 44–46], and callers disconnecting before instructions could be provided (communication) [26, 28–30, 32–34, 36, 38–40]. Among

these, bystander reluctance emerged as the most frequently cited psychological barrier. Facilitators were less frequently reported but were primarily physical in nature, such as the presence of multiple bystanders, younger bystanders, witnessed arrests, and use of a mobile phone to contact EMS.

The successful initiation and performance of B-CPR is inherently dependent on timely OHCA recognition. Delays in recognition prolong the interval before CPR instructions are delivered, while CPR becomes unnecessary if the patient achieves return of spontaneous circulation (ROSC) before instructions are provided or before EMS arrival. The review also highlights a substantial gap in the literature regarding CPR continuation and quality until EMS arrival, as well as strategies that call-takers might use to coach callers effectively. No single study addressed factors influencing all three components of B-CPR (initiation, continuation, and quality); however, the factors affecting initiation are well characterised in the literature. Limited evidence suggests that CPR continuation is less likely when the bystander is unrelated to the patient or lacks first aid training [36]. Real-time visual feedback via video calls has been shown to improve CPR quality [50]. While visual assessment of CPR may be subjective [56], video-enabled emergency calls offer the best practical means to monitor performance and provide guidance when formal measuring equipment is unavailable. Video support may also motivate bystanders to persist with CPR in challenging circumstances [50].

Several barriers identified during OHCA emergency calls are potentially modifiable, presenting opportunities to improve B-CPR rates. For example, Riou *et al.* [48] suggest that when callers show hesitation, call-takers could provide additional context about the importance of CPR and OHCA outcomes to encourage action. Minimising deviations from standardised scripts, which can create communication barriers [26, 31, 33, 35, 37, 41, 46, 52], may be facilitated by providing call-takers with a repertoire of prompts to guide hesitant bystanders. Training programs have also been shown to enhance call-taker recognition of OHCA and timely initiation of DA-CPR [57, 58]. Given that OHCA calls are infrequent for individual dispatchers, ongoing training is essential to ensure call-takers can effectively support bystanders in performing CPR.

Public education is similarly important in preparing lay responders to perform B-CPR. Education can increase willingness and confidence, equipping bystanders to act effectively in emergencies [59, 60]. School-based programs, for instance, have been shown to improve willingness to perform CPR [61]. Evidence also indicates that bystanders with recent formal CPR training are more likely to intervene than those without or with outdated training [62]. Widespread, targeted public education initiatives can therefore strengthen community readiness and improve B-CPR performance when needed [59, 60].

Limitations

This review was restricted to studies examining factors influencing B-CPR initiation and performance within the context of emergency calls, aiming to capture real-world bystander responses rather than hypothetical scenarios. Assessing components of CPR performance in this setting is inherently challenging, as high-quality measurement typically requires defibrillators or real-time feedback devices capable of accurately recording compression depth, rate, and recoil—tools not commonly available at the scene. Future research could explore wider deployment of such devices or leverage existing technologies, such as smartwatches, to provide real-time feedback and support high-quality B-CPR.

Additionally, our focus on caller–dispatcher interactions meant including only studies that analysed EMS call audio recordings or transcripts. Consequently, the review reflects a subset of the broader literature on factors affecting B-CPR performance. Some included studies provided limited detail on individual barriers or facilitators, which may have constrained the depth of synthesis.

Conclusion

This scoping review demonstrates that most studies have concentrated on barriers to DA-CPR instruction provision and CPR initiation, with limited evidence on facilitators or obstacles affecting CPR continuation and quality. A more comprehensive understanding of factors influencing each phase of B-CPR—initiation, continuation, and quality—can inform the development of evidence-based strategies to support bystanders and enhance the likelihood of high-quality CPR until EMS arrival.

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