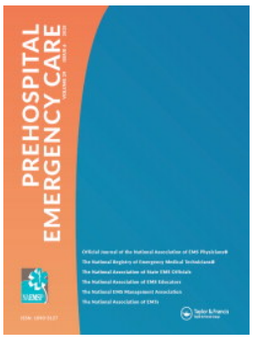

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2024 Systematic Review of Evidence-Based Guidelines for Prehospital Care

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ABSTRACT

Objectives: Evidence-based guidelines (EBGs) are widely recognized as valuable tools to aggregate and translate scientific knowledge into clinical care. High-quality EBGs can also serve as important components of dissemination and implementation efforts focused on educating emergency medical services (EMS) clinicians about current evidence-based prehospital clinical care practices and operations. We aimed to perform the third biennial systematic review of prehospital EBGs to identify and assess the quality of prehospital EBGs published since 2021.

Methods: We systematically searched Ovid Medline and EMBASE from January 1, 2021, to June 6, 2023, for publications relevant to prehospital care, based on an organized review of the literature, and focused on providing recommendations for clinical care or operations. Included guidelines were appraised using the National Academy of Medicine (NAM) criteria for high-quality guidelines and scored using the Appraisal of Guidelines for Research and Evaluation (AGREE) II Tool.

Results: We identified 33 new guidelines addressing clinical and operational topics of EMS medicine. The most addressed EMS core content areas were time-life critical conditions ($n = 17$, 51.5%), special clinical considerations ($n = 15$, 45%), and injury ($n = 12$, 36%). Seven (21%) guidelines included all elements of the National Academy of Medicine (NAM) criteria for high-quality guidelines, including the full reporting of a systematic review of the evidence. Guideline appraisals by the Appraisal of Guidelines for Research and Evaluation (AGREE) II tool demonstrated modest compliance to reporting recommendations and similar overall quality compared to previously identified guidelines (mean overall domain score 67%, SD 12%), with Domain 5 ("Applicability") scoring the lowest of the six AGREE II domains (mean score of 53%, SD 13%).

Conclusions: This updated systematic review identified and appraised recent guidelines addressing prehospital care and identifies important targets for education of EMS personnel. Continued opportunities exist for prehospital guideline developers to include comprehensive evidence-based reporting into guideline development to facilitate widespread implementation of high-quality EBGs in EMS systems and incorporate the best available scientific evidence into initial education and continued competency activities.

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Introduction

Clinical and operational guidelines are valuable tools to decrease practice variation and improve the quality of care through translation of scientific knowledge into practice, if developed using a rigorous and transparent approach (1). Incorporating new science into evidence-based guidelines (EBGs) for emergency medical services (EMS) has been widely supported, including by the National Academy of Medicine (NAM), the National EMS Advisory Council, the Federal Interagency Committee on EMS, and many national EMS organizations (2–4). The creation of EBGs for EMS is an area of ongoing effort, with 146 prehospital EBGs identified and independently appraised in two previous systematic reviews (5, 6).

Recognizing the importance of evidence-based prehospital care, in 2016 the National Registry of Emergency Medical Technicians (NREMT) incorporated education on EMS research and EBGs into its National Continued Competency Program (1). Subsequently in 2023, the NREMT, in collaboration with multiple stakeholders, published a consensus standard for evidence integration into EMS education and testing (7). This effort developed a framework to evaluate and incorporate new source material into EMS education and competency assessments, differentiating levels of evidence and whether sources aimed to

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provide recommendations. This framework identified EBGs meeting criteria adapted by the Prehospital Guidelines Consortium (PGC) from the NAM and the Agency for Healthcare Research and Quality (AHRQ) for the National Guideline Clearinghouse as the highest-level source providing recommendations for care (5). These documents represent a natural target for focused dissemination and implementation efforts across EMS agencies to inform the incorporation of scientific evidence into clinical care and operations. Yet two previous systematic reviews of prehospital EBGs identified varying levels of quality in their evidence evaluation, with only about one third meeting the NAM/AHRQ "high-quality" criteria (5, 6). This makes ongoing efforts to identify high quality EBGs and continually improving the quality of future prehospital EBGs critically important to facilitating the incorporation of high-quality guidelines into practice (1).

To facilitate this ongoing effort, the PGC, in collaboration with the NREMT, is engaged in biennial systematic reviews of prehospital EBGs, most recently published in 2022 (6). Herein we report the third systematic review of prehospital EBGs. We sought to first identify all guidelines that are relevant to prehospital clinical care or operations based on a systematic review of the literature. We evaluated the quality of evidence evaluation and specific reporting criteria established by the NAM and AHRQ, as well as by the Appraisal of Guidelines for Research and Evaluation (AGREE) II tool. Through this work our overarching goal is to inform the EMS community of the latest EBGs that should inform dissemination, education, and implementation efforts across EMS systems.

Methods

Study Design and Search Strategy

We performed a systematic review and structured appraisal of published guidelines related to prehospital care. A research librarian searched Ovid MEDLINE and EMBASE for articles published between January 1, 2021, and June 6, 2023, excluding EMBASE conference abstracts. The search was completed on June 6, 2023. Search terms incorporated those used for the 2022 systematic review of prehospital EBGs with some exceptions (6). We removed certain search terms that were identified as having a poor contribution to identifying new prehospital EBGs not identified by other search terms: the MeSH heading "Patient Transfer" and the (title, abstract or keyword) terms *emergency health service**, *emergency mobile unit**, *para-medic**, *patient transport**, and *transport** *medicine*. We also removed the terms *interhospital*, *inter-hospital*, *interfacility*, *inter-facility*, *intrafacility*, or *intra-facility* adjacent to the terms *transfer* or *transport*. We added the following search terms: "Emergency Medical Dispatch" and "Emergency Medical Dispatcher" MeSH headings and *emergency services* and *field triage* terms.

Additionally, we added MeSH terms and keywords for *ambulance*, *first aid*, *resuscitation*, *stroke*, and *advanced or basic life support*. The final search strategy and keywords are described in Supplementary Tables 1 and 2. Records that were screened in the prior systematic reviews, non-English language publications, and duplicates were excluded both electronically from the initial search and manually during the screening process. We overlapped dates with the prior systematic review for the first four months of 2021 to also address any potentially missing guidelines based on date of database indexing or date of online publication. Because of differences in publication online versus in print as well as indexing, articles that were identified using the revised search terms identified above within the date-specific search but not included in the prior systematic review were retained.

Guideline Selection and Categorization

Articles were included if they met three inclusion criteria for our definition of a "prehospital evidence-based guideline": the publication (1) addressed a clinical or operational topic relevant to prehospital care or EMS medicine, (2) provided recommendations/guidance for clinical care or operations, and (3) described performance of an organized review of the literature as the basis for forming those recommendations (e.g., systematic, narrative, rapid, or scoping review; or simply stating that a "literature review" was performed). Guidelines addressing multiple phases of care (e.g., prehospital and in-hospital) were retained if at least one section of the guideline providing recommendations was relevant to prehospital care. Records were excluded if the entire guideline was not in English or if they had already been included in a prior systematic review from the PGC. Review articles whose primary objective was not the development of new recommendations, such as the article by King et al. that summarized previously published recommendations for wilderness first responder medical clearance, were not retained (8). Guidelines on topics of potential relevance to EMS clinicians but not specifically addressing the EMS environment, such as the suicide first aid guidelines by Setiyawati et al. or the airway suctioning guidelines by Blakeman et al. that do not specifically address interventions by EMS clinicians were also excluded (9, 10).

Two investigators (AJM and BTP) independently screened records (titles and abstracts) for articles that met the inclusion criteria. Screeners were trained first by review of guidelines retained in the 2022 systematic review and then using the first approximately 100 records/articles from the new searches to identify how to systematically apply review criteria during the screening process as described by Ng et al. (11). Screening was conducted using DistillerSR (Evidence Partners, Ontario, Canada) and articles were retained if they met all three criteria. Conflicts were resolved by discussion of two senior investigators (REC and CMG). Retained articles underwent full-text review with adjudication of conflicts by discussion. The final decision for including or excluding a guideline was based on consensus of four co-investigators (REC, CMG, PDP, and CTR).

We categorized each guideline into categories using the American Board of Emergency Medicine 2019 Core Content of EMS medicine (12). Guidelines addressing content in multiple categories were included within multiple topic areas.

Table 1. Adapted National Academy of Medicine criteria for clinical practice guidelines.

Criteria	Description
1. Systematically Developed Recommendations	The clinical practice guideline contains systematically developed statements including recommendations intended to optimize patient care and assist physicians and/or other health care practitioners and patients to make decisions about appropriate health care for specific clinical circumstances.
2. By an Association or Similar Organization	The clinical practice guideline was produced under the auspices of a medical specialty association; relevant professional society; public or private organization; government agency at the Federal, State, or local level; or health care organization or plan. A clinical practice guideline developed and issued by an individual(s) not officially sponsored or supported by one of the above types of organizations does not meet the criteria.
3. Systematic Review	The clinical practice guideline is based on a systematic review of evidence as demonstrated by documentation of each of the following features in the clinical practice guideline or its supporting documents.
a. Statement	An explicit statement that the clinical practice guideline was based on a systematic review.
b. Search Strategy	A description of the search strategy that includes: - A listing of database(s) searched, - A summary of search terms used, and - The specific time period covered by the literature search including the beginning date (month/year) and end date (month/year)
c. Study Selection	A description of the study selection that includes: - The number of studies identified, - The number of studies included, and - A summary of inclusion and exclusion criteria.
d. Synthesis of Evidence	A synthesis of evidence from the selected studies, e.g., a detailed description or evidence tables.
e. Summary of Evidence Synthesis	A summary of the evidence synthesis (see 3d above) included in the guideline that relates the evidence to the recommendations, e.g., a descriptive summary or summary tables.
4. Assessment of Benefits/Harms and Alternative Care Options	The clinical practice guideline or its supporting documents contain an assessment of the benefits and harms of recommended care and alternative care options.
5. English and to the Public	The full text guideline is available in English to the public upon request (for free, or for a fee).
6. Current	The guideline is current and the most recent version.

*Reproduced from Turner S, Lang ES, Brown K, Franke J, Workun-Hill M, Jackson C, Roberts L, Leyton C, Bulger EM, Censullo EM, et al. Systematic Review of Evidence-Based Guidelines for Prehospital Care. Prehosp Emerg Care. 2021;25(2):221–34.

Table 2. Appraisal of guidelines for research and evaluation (AGREE) II instrument.

Domain	No.	Item
1. Scope and Purpose	1	The overall objective(s) of the guideline is (are) specifically described.
	2	The health question(s) covered by the guideline is (are) specifically described.
	3	The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.
2. Stakeholder Involvement	4	The guideline development group includes individuals from all relevant professional groups.
	5	The views and preferences of the target population (patients, public, etc.) have been sought.
	6	The target users of the guideline are clearly defined.
3. Rigor of Development	7	Systematic methods were used to search for evidence.
	8	The criteria for selecting the evidence are clearly described.
	9	The strengths and limitations of the body of evidence are clearly described.
	10	The methods for formulating the recommendations are clearly described.
	11	The health benefits, side effects, and risks have been considered in formulating the recommendations.
	12	There is an explicit link between the recommendations and the supporting evidence.
	13	The guideline has been externally reviewed by experts prior to its publication.
	14	A procedure for updating the guideline is provided.
4. Clarity of Presentation	15	The recommendations are specific and unambiguous.
	16	The different options for management of the condition or health issue are clearly presented.
	17	Key recommendations are easily identifiable.
5. Applicability	18	The guideline describes facilitators and barriers to its application.
	19	The guideline provides advice and/or tools on how the recommendations can be put into practice.
	20	The potential resource implications of applying the recommendations have been considered.
	21	The guideline presents monitoring and/or auditing criteria.
6. Editorial Independence	22	The views of the funding body have not influenced the content of the guideline.
	23	Competing interests of guideline development group members have been recorded and addressed.

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Guideline Appraisal

We appraised the evidence evaluation, development, and reporting of each guideline using the NAM criteria for clinical practice guidelines as previously adapted (Table 1) (5, 6). Adaptations that have been previously described include retaining operational guidelines not otherwise described as "clinical practice guidelines" and accepting medical specialty associations, professional societies, public or private organizations, government agencies, or health care organizations for the criterion, "produced under the auspices of an association or similar entity." We similarly differentiated systematic reviews that formed the basis for recommendations as distinct from other literature reviews as part of a guideline's background literature search. The latter did not meet the criterion for having performed and reported a systematic review for the development of recommendations; the guideline by Heo et al. is such an example (13). All retained guidelines met the additional NAM criteria of being published in English, available to the public (for free or for a fee), and being the most recent version of a guideline.

We also evaluated guidelines based on the AGREE II tool and the AGREE Reporting Checklist (14, 15). Guidelines were appraised across the 23 items and six AGREE II domains summarized in Table 2. Appraisals were performed using the My

AGREE PLUS platform (AGREE Collaboration, available at www.agreetrust.org/resource-center/agree-plus). We averaged the reviewers' scores for each item within domains and displayed this as the proportion of the maximum score available for each domain. We then averaged these totals across all domains to provide an overall proportional score for each guideline. For Domain 6 (Editorial Independence) and the reporting of conflicts of interest, we assumed the recommendations were developed by the listed authors if no technical expert panel or separate group was identified as developing the recommendations.

All appraisals were performed independently by full-text review of three co-investigators (REC, PDP, and CTR), with review of disagreements and final consensus of four investigators (REC, CMG, PDP, and CTR). Supplementary content that was cited or linked to within the guideline as part of the evidence evaluation or reporting (e.g., a separate systematic review of the literature that was directly linked to the guideline's recommendations) was considered as part of the guideline for NAM and AGREE II scoring.

Analysis and Reporting

Descriptive statistics were calculated to describe the guidelines and appraisals. Categorical variables are reported as frequency and percentage, and continuous variables are reported as mean and standard deviation (expressed as ± SD). Findings are presented in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA; Supplementary Table 3).

Results

Guideline Search

Our search strategy yielded 2,850 articles after electronically excluding non-English language publications (Figure 1). Following electronic removal of duplicates and previously screened articles, a total of 2,006 articles were retained for screening by title and abstract. Inclusion and exclusion

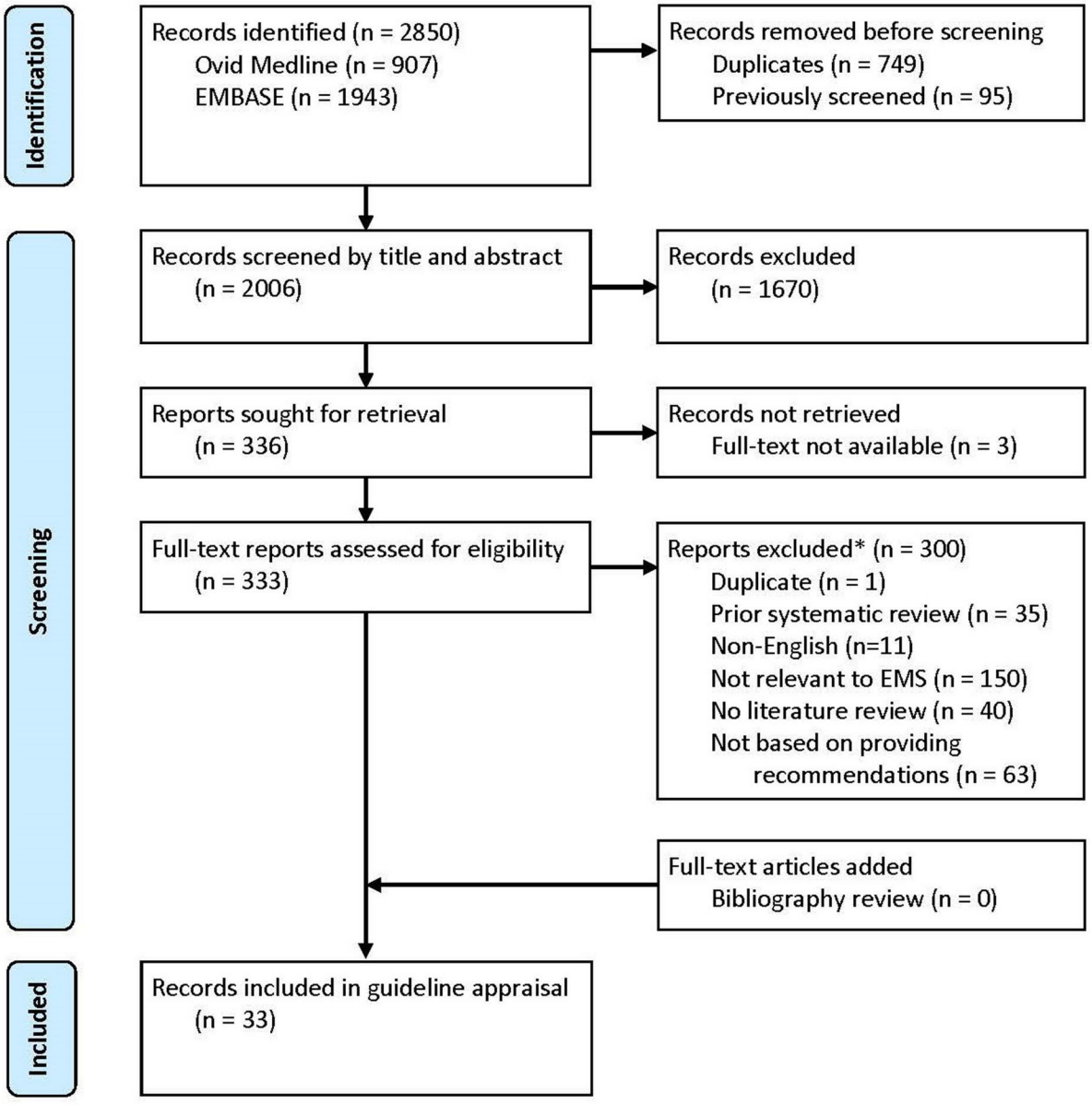

Figure 1. Preferred reporting items for systematic reviews and meta-analyses (PRISMA) diagram.
*Exclusion reasons adjudicated sequentially

criteria were applied with substantial inter-rater agreement (kappa = 0.63) and 336 records were retained for full-text review. After exclusions for reasons identified in Figure 1, 33 guidelines were retained for appraisal (13, 16–47).

Guideline Topics

Almost all included guidelines ($n = 32$, 97.0%) addressed at least one clinical aspect of the core content of EMS medicine (Supplementary Table 4). The single guideline that did not focus on clinical content addressed education science related to cardiopulmonary resuscitation (18). Time-life critical conditions were commonly addressed by included prehospital guidelines ($n = 17$, 51.5%). The next most addressed ABEM core content clinical topics were special clinical considerations ($n = 15$, 45%) and injury ($n = 12$, 36%). Non-clinical topics such as medical oversight, quality management, and special operations were addressed in 14 guidelines (42%). Six guidelines (18%) focused on pediatric patient care.

Guideline Appraisal

The guideline appraisals based on NAM criteria or AGREE II scoring are summarized in Tables 3 and 4, respectively. Only seven (21%) guidelines reported all elements described in the NAM criteria for high-quality guidelines (Table 1). Almost all guidelines had systematically developed recommendations ($n = 32$, 97%), were developed or endorsed by one or more associations or professional organizations ($n = 32$, 97%), and reported an assessment of benefits and harms in developing individual recommendations ($n = 32$, 97%). Guidelines that did not meet NAM criteria most commonly did not report a synthesis of the evidence, which was reported in only nine (27%) guidelines. A synthesis of the evidence is a detailed description of individual studies that were reviewed, often displayed as evidence tables, which allow the reader to understand how specific evidence is translated into recommendations. Additionally, only 11 (33%) guidelines reported performing a systematic review of the literature and fewer contained all key elements relevant to performing the systematic review.

The mean overall domain score was 67% [±12%] (Table 4, Figure 2). There were 10 guidelines that scored above 75%. The highest domain scores (% of available points ± SD) were found for Domain 4 ("Clarity of Presentation") at 79% (±13%) and Domain 1 ("Scope and Purpose") at 78% (±14%). The lowest average domain score was for Domain 5 ("Applicability") at 53% (±13%). A summary of all AGREE II item scores and a separate overall assessment for each guideline (scored as 1–7 for the guideline as a whole) averaged across the 3 reviewers is provided in Supplementary Table 5.

Discussion

This updated systematic review of prehospital EBGs published between January 1, 2021, and June 6, 2023, identified 33 new prehospital guidelines not included in the prior reviews. This represents, on average, one new prehospital guideline published each month. Most guidelines focused on clinical aspects of prehospital care, while close to half also addressed non-clinical core content areas, most commonly special operations ($n = 8$, 24%) and medical oversight ($n = 7$, 21%). Details of the guidelines identified in this systematic review along with those of prior systematic reviews performed by the PGC are available at prehospitalguidelines.org ("Evidence-Based Guidelines").

Only seven (21%) guidelines met the NAM criteria for high quality guidelines, a lower but similar proportion compared to the 2020 (27/71, 28%) and 2022 (24/75, 24%) systematic reviews (5, 6). This demonstrates continued opportunities for improvement in the development of prehospital EBGs to ensure that the highest quality of evidence evaluation and recommendations are available to EMS clinicians. Most guidelines not meeting the NAM criteria failed to report performing a systematic review of the evidence to inform recommendations, did not report key elements of the systematic review if performed, or did not include a synthesis of the evidence, which is essential to understanding the evidentiary basis for specific recommendations. For example, the guideline by Reisberg et al. states that a systematic review of the literature was performed but does not report the key elements of such a review (39). These details are important to understand how specific articles were considered in the literature review, ensure findings are reproducible, and providing a mechanism for updating the guideline through a follow-up systematic review when new literature on the topic becomes available. If a systematic review is performed in the creation of a guideline, we recommend using a checklist like PRISMA to ensure reporting of essential elements of the evidence evaluation (48). This finding also highlights the continued need to identify the highest quality guidelines on an ongoing basis to facilitate and focus dissemination efforts that have the greatest potential to positively impact out-of-hospital clinical care and operations.

Unlike the binary NAM criteria, there are no specific AGREE II domain scores that can be used to identify a "high quality" versus "low quality" guideline (15). Instead, the AGREE II instrument provides important information about how well individual guidelines address specific items and domains that are important to guideline development and reporting. End-users such as EMS medical directors and administrators may prioritize specific domains over others or choose to implement guidelines meeting a certain threshold either overall or for each domain. These scores also provide insights into opportunities for improving EMS guidelines. For example, like the prior systematic reviews, our appraisal identified Domain 5 ("Applicability") as the lowest scoring domain. This domain represents how well guidelines address implementation of recommendations, including describing facilitators and barriers to application, providing advice and/or tools for how recommendations can be put in practice, resource implications of applying the recommendations, and monitoring or auditing criteria. This finding corroborates prior work identifying gaps in our knowledge of how best to implement guidelines in the

Table 3. Criteria for clinical practice guidelines assessment.

Guideline	Systematically developed recommendations	By an association or similar	Systematic review	Description of search strategy	Study selection	Synthesis of evidence	Summary of evidence synthesis	Assessment of benefits/harms and alternate care options	Meets all NAM criteria
Aziz 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bagou 2022	Yes	Yes	No	No	No	No	No	Yes	No
Cheng 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Choi 2021	Yes	Yes	No	No	No	No	No	Yes	No
Cowley 2022	Yes	Yes	No	No	No	No	No	Yes	No
Deaton 2021	No	Yes	No	No	No	No	No	Yes	No
Eyal 2022	Yes	Yes	No	No	Yes	No	Yes	Yes	No
Gaudio 2022	Yes	Yes	No	No	No	No	No	Yes	No
Gottlieb 2022	Yes	Yes	No	No	No	No	Yes	Yes	No
Heo 2021	Yes	Yes	No	No	No	No	No	Yes	No
Heran 2022	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No
Hwang 2021	Yes	Yes	No	No	No	No	No	Yes	No
Joannes-Boyau 2022	Yes	Yes	No	No	No	No	Yes	Yes	No
Kim 2021	Yes	Yes	No	No	No	No	No	Yes	No
Lee, M 2021	Yes	Yes	No	No	No	No	No	Yes	No
Lee, J 2021	Yes	Yes	No	No	No	No	No	Yes	No
Lindbeck 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lipman 2019	Yes	Yes	No	No	No	No	No	Yes	No
Lulla 2023	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No
Newgard 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Oh 2021	Yes	Yes	No	No	No	No	No	Yes	No
Panchal 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pasquier 2023	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Pottecher 2021	Yes	Yes	No	No	No	No	No	Yes	No
Riesberg 2021	Yes	Yes	Yes	No	No	No	No	Yes	No
Roy 2021	Yes	Yes	No	Yes	Yes	No	No	Yes	No
Russell 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Song, K 2021	Yes	Yes	No	No	No	No	No	Yes	No
Song, W 2021	Yes	No	No	Yes	Yes	No	No	Yes	No
Tiwari 2021	Yes	Yes	No	No	No	No	No	No	No
Topjian 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walter 2022	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No
Zafren 2023	Yes	Yes	No	No	No	No	No	Yes	No
Total Meeting Criteria, n (%)	32 (97%)	32 (97%)	11 (33%)	11 (33%)	11 (33%)	9 (27%)	14 (42%)	32 (97%)	7 (21%)

Table 4. Appraisal of guidelines for research and evaluation (AGREE) II assessment.

Guideline	Domain 1 scope & purpose	Domain 2 stakeholder involvement	Domain 3 rigor of development	Domain 4 clarity of presentation	Domain 5 applicability	Domain 6 editorial independence	Domain average
Aziz 2020	90%	79%	91%	94%	76%	88%	86%
Bagou 2022	87%	63%	64%	86%	31%	81%	66%
Cheng 2020	95%	75%	88%	94%	65%	88%	83%
Choi 2021	51%	63%	60%	65%	48%	74%	57%
Cowley 2022	87%	94%	57%	81%	73%	83%	78%
Deaton 2021	81%	54%	33%	78%	54%	71%	60%
Eyal 2022	68%	63%	46%	67%	45%	67%	58%
Gaudio 2022	78%	59%	42%	81%	52%	64%	62%
Gottlieb 2022	86%	83%	68%	94%	55%	74%	77%
Heo 2021	62%	68%	71%	71%	51%	67%	65%
Heran 2022	87%	89%	86%	95%	77%	88%	87%
Hwang 2021	54%	52%	39%	51%	38%	67%	47%
Joannes-Boyau 2022	92%	65%	57%	87%	39%	81%	68%
Kim 2021	65%	59%	65%	65%	49%	76%	61%
Lee, M 2021	59%	63%	64%	71%	65%	76%	65%
Lee, J 2021	52%	70%	62%	62%	46%	74%	58%
Lindbeck 2023	90%	73%	76%	94%	74%	79%	81%
Lipman 2019	70%	52%	49%	81%	52%	71%	61%
Lulla 2023	92%	73%	85%	92%	62%	76%	81%
Newgard 2022	86%	90%	76%	83%	70%	90%	81%
Oh 2021	52%	48%	41%	49%	40%	62%	46%
Panchal 2020	92%	79%	90%	94%	61%	86%	83%
Pasquier 2023	92%	56%	68%	84%	56%	83%	71%
Pottecher 2021	90%	52%	53%	83%	49%	57%	65%
Riesberg 2021	73%	48%	31%	78%	30%	38%	52%
Roy 2021	65%	52%	60%	83%	56%	55%	63%
Russell 2023	90%	57%	79%	86%	56%	69%	74%
Song, K 2021	62%	56%	42%	49%	39%	62%	50%
Song, W 2021	70%	54%	58%	71%	42%	62%	59%
Tiwari 2021	90%	67%	51%	76%	37%	69%	64%
Topjian 2020	92%	84%	92%	95%	68%	83%	86%
Walter 2022	89%	56%	74%	90%	55%	79%	73%
Zafren 2023	76%	46%	46%	71%	36%	69%	55%
AVERAGE	78%	65%	63%	79%	53%	73%	67%

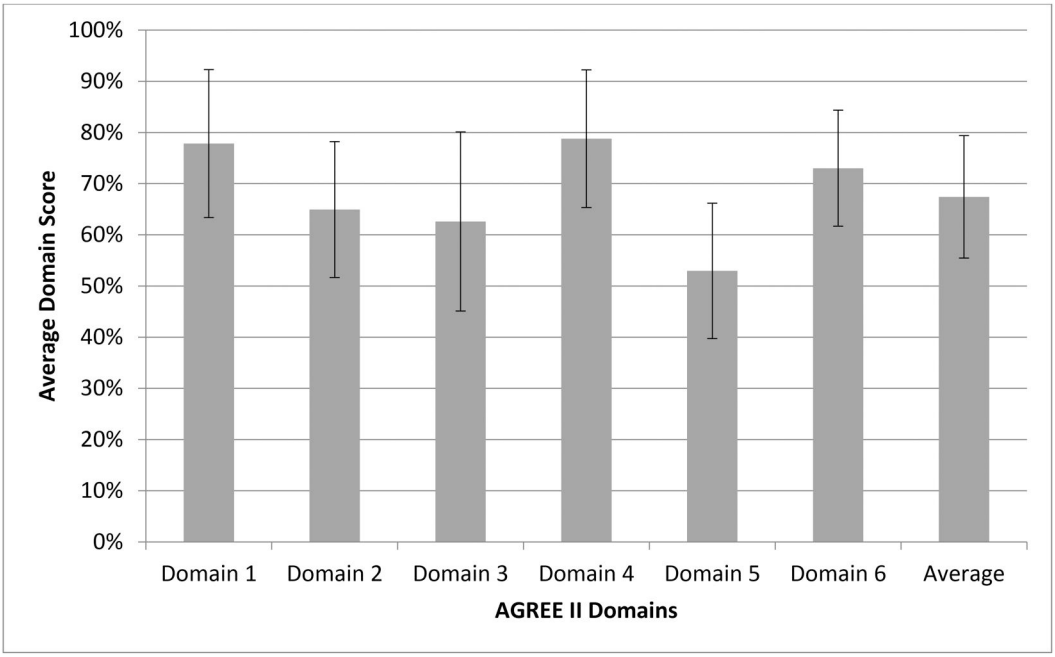

Figure 2. Average scores across AGREE II domains (average of three appraisers ± standard deviation).
Domain 1 – Scope and Purpose (i.e., description of objectives, questions, and population)
Domain 2 – Stakeholder Involvement (i.e., description of input gained from stakeholders including target population)
Domain 3 – Rigor of Development (i.e, description of methodology of evidence evaluation and development of recommendations)
Domain 4 – Clarity of Presentation (i.e., clarity of recommendations including options for management)
Domain 5 – Applicability (i.e., description of implementation and evaluation)
Domain 6 – Editorial Independence (i.e, description of potential conflicts from funding body or guideline development group members)

prehospital setting and a need for guidelines to provide greater focus and content addressing how EMS systems can best implement the recommendations they are providing (1, 49).

In 2021, the Prehospital Guidelines Consortium engaged EMS stakeholders in a gap analysis *via* a Delphi panel to identify clinical and operational topics that could serve as priorities for future guideline development (50). The top three content areas identified as clinical EBG gaps were airway management, care of the pediatric patient, and management of behavioral health emergencies. A recent guideline by Jarvis et al., published after the time period of this review and not yet included in our appraisals, serves to comprehensively address the first topic of airway management, adding to other guidelines identified in our prior systematic reviews addressing individual aspects of airway management (5, 6, 51). On the other hand, management of behavioral emergencies remains a topic of great importance to the prehospital environment for which none of the three systematic reviews have identified a single guideline. Behavioral health emergencies remain a key target for future guideline development efforts. This review identified 6 guidelines addressing pediatric topics, adding to multiple pediatric-focused prehospital guidelines. However, five of these six guidelines focused on cardiopulmonary resuscitation of pediatric and neonatal patients, with the sixth addressing pediatric traumatic hemorrhagic shock (13, 16, 19, 21, 41, 45). This is like the distribution of pediatric topics represented by prior guidelines, to which are added guidelines for pediatric seizure management, head injuries in children, pediatric respiratory distress, and childhood stroke (52–59). Given that most clinical and operational topics addressed in adults likely have unique aspects relevant to pediatric care, future guideline development should consider addressing pediatric patient care, whether as independent guidelines or by having a pediatric portion that addresses the clinical or operational topic.

Limitations

Our systematic review has several limitations. While we have continued to refine the search criteria used across now three systematic reviews of prehospital EBGs, we may have missed relevant guideline documents. However, our latest search strategy identified and screened almost twice as many titles as the 2022 systematic review, suggesting our updated search strategy was overall more inclusive than previously and less likely to miss relevant articles. Consistent with our intention to identify the latest guidelines in this systematic review, we did not retrospectively apply the updated search criteria to prior periods, except in the four-month overlap with the most recent review. Our appraisal of guidelines may be influenced by the subjective nature of certain items. For example, our reviewers provided credit for an assessment of benefits and harms or alternative care options in forming recommendations even when the description of these aspects was very limited in some individual guidelines (17, 19, 21, 24, 29, 30, 39, 47). While our assessments of the subjectivity of scoring all AGREE II items was mitigated by using the average of three independent reviewers as recommended by the AGREE Collaborative (15), other investigators may have provided different appraisals of individual guidelines.

Conclusions

This biennial systematic review of prehospital EBGs identified an additional 33 prehospital guidelines. Several important topic areas were addressed, with a continued emphasis on resuscitation science. Important gaps remain for future guidelines development, including behavioral emergencies. The latest high-quality guidelines identified in this review should form the basis for future dissemination and implementation efforts aimed to incorporate evidence-based recommendations in EMS systems, as well as for the education of EMS personnel in the latest evidence that should guide their clinical care and operations.

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Declaration of Generative AI in Scientific Writing

The authors did not use a generative artificial intelligence (AI) tool or service to assist with preparation or editing of this work. The author(s) take full responsibility for the content of this publication.

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