

ORIGINAL ARTICLE

Global emergency care clinical practice guidelines: A landscape analysis

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ABSTRACT

Introduction: An adaptive guideline development method, as opposed to a *de novo* guideline development, is dependent on access to existing high-quality up-to-date clinical practice guidelines (CPGs). We described the characteristics and quality of CPGs relevant to prehospital care worldwide, in order to strengthen guideline development in low-resource settings for emergency care.

Methods: We conducted a descriptive study of a database of international CPGs relevant to emergency care produced by the African Federation for Emergency Medicine (AFEM) CPG project in 2016. Guideline quality was assessed with the AGREE II tool, independently and in duplicate. End-user documents such as protocols, care pathways, and algorithms were excluded. Data were imported, managed, and analysed in STATA 14 and R.

Results: In total, 276 guidelines were included. Less than 2% of CPGs originated from low- and middle income-countries (LMICs); only 15% (n = 38) of guidelines were prehospital specific, and there were no CPGs directly applicable to prehospital care in LMICs. Most guidelines used *de novo* methods (58%, n = 150) and were produced by professional societies or associations (63%, n = 164), with the minority developed by international bodies (3%, n = 7). National bodies, such as the National Institute for Health and Care Excellence (NICE) and the Scottish Intercollegiate Guidelines Network (SIGN), produced higher quality guidelines when compared to international guidelines, professional societies, and clinician/academic-produced guidelines. Guideline quality varied across topics, subpopulations and producers. Resource-constrained guideline developers that cannot afford *de novo* guideline development have access to an expanding pool of high-quality prehospital guidelines to translate to their local setting.

Discussion: Although some high-quality CPGs exist relevant to emergency care, none directly address the needs of prehospital care in LMICs, especially in Africa. Strengthening guideline development capacity, including adaptive guideline development methods that use existing high-quality CPGs, is a priority.

African Relevance

- The new development of CPGs is expensive, time-consuming, and often out of reach for guideline groups in resource-poor settings.
- Alternative methods have been proposed that accelerate this process by adapting CPGs to a local setting.
- Alternative guideline development methods are dependent on existing high-quality up-to-date CPGs.
- Guideline developers need to be aware of the availability, content, gaps, and quality of emergency care CPGs.

Introduction

De novo development of clinical practice guidelines (CPGs) is well-developed and documented [1]. *De novo* CPG development involves setting research questions, searching and synthesising primary evidence using systematic methods, convening guideline panels, and developing locally appropriate recommendations. But because *de novo* development is often expensive and time consuming [2], these methods are often out of reach for guideline development groups in resource-poor settings. Alternative methods of guideline development have been proposed, some of which draw on existing high-quality CPGs to adapt,

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adopt, or contextualise these to a local setting [2,3]. Some methods accelerate or simply remove certain steps in the guideline development processes [4], while others combine aspects of *de novo* development with regrading of existing evidence [5]. Some of the modified methods are not dependent on synthesising evidence from individual studies, such as by producing new systematic reviews, but on synthesising existing high-quality CPG documents. This makes the process more efficient than the *de novo* approach by not re-inventing or re-synthesising documents each time guidance is developed for a particular context. All methods are dependent on the scope, quality, and availability of existing up-to-date high-quality CPGs within a particular topic or context. Guideline developers, whether using *de novo* or adaptive methods, need to be aware of the availability, quality, content, and gaps of relevant existing guidelines, in order to inform current and future guideline development and reduce waste.

Acute care, specifically prehospital emergency care in low-resource settings such as South Africa, faces the above problems when considering CPGs. Resources are limited and often preclude *de novo* development, leading to guideline groups searching for adaptive methods to develop robust CPGs using work already done by others [6]. However, the availability, scope, and quality of existing CPGs need to be described and assessed so that guideline developers are better informed regarding what evidence is available to them.

To date, limited attempts have been made to describe the current state of CPGs applicable to prehospital emergency care in resource poor settings. In 2016, Machingaidze et al. assessed the quality and reporting of South African primary care CPGs and concluded that the methodological quality of guidelines was generally poor to moderate [7]. Closer to acute care, Hoogmartens et al. appraised the completeness and level of evidence behind recommendations in prehospital guidelines of traumatic brain injury and noted large content variation in the recommendations [8]. They did not attempt to appraise the quality of the included guidelines, which might have helped to explain the heterogeneous results. Furthermore, a similar landscape study exploring South African protocols and end-user documents highlighted the lack of emergency care guidance available in South Africa [9].

As emergency care is expanding throughout low- and middle-income countries, guideline development teams are seeking to identify high-quality CPGs to adapt, adopt or contextualise for use in local settings [10], or use other methods to prepare CPGs to guide their practice. Given this, there is a need for the description, assessment, and appraisal of emergency care guidelines globally, so that these teams can be better informed of the existing body of evidence. This should help them to streamline their guideline development processes and to prepare their CPGs as efficiently and effectively as possible.

In 2015, the Health Professions Council of South Africa (HPCSA) Professional Board of Emergency Care (PBEC) sought to revise the national emergency care protocols at the time and partnered with the African Federation for Emergency Medicine (AFEM) for this project. AFEM collaborated with the Centre for Evidence-based Health Care (Stellenbosch University) and the Department of Emergency Medical Sciences (Cape Peninsula University of Technology) [6] and, in early 2016, the working group produced the first African evidence-based CPG for prehospital emergency care providers [11]. The AFEM CPG development project used an adaptive guideline development approach to *de novo* development, by adopting, adapting, or contextualising existing high-quality CPGs to produce contextually appropriate recommendations for emergency care in South Africa. An overview of the project, lessons learned, and experiences are reported elsewhere [12]. Its scope was extensive, including key identified emergency care topics such as acute coronary syndromes, airway, adult and paediatric and neonatal resuscitation, cerebrovascular accidents, environmental emergencies, fever, obstetrics and gynaecology, paediatric gastroenteritis, pain and procedural sedation, respiratory emergencies, seizures, sepsis, and trauma.

Methods

This paper describes and assesses current international and national CPGs relevant to prehospital care using an existing guideline database to strengthen resources for guideline development teams. We conducted a descriptive study of a database of global and local CPGs relevant to emergency care produced by the AFEM CPG project. We aimed to describe guideline characteristics such as scope, locale, methods, target audience, and guideline quality.

The database was produced during the AFEM CPG development project in 2016 as part of a rapid scoping review of local and international prehospital CPGs [11]. The database contains i) a Google Drive repository of the included guidelines and ii) a database of information on included guideline characteristics, country development location, developer type, methods, guideline topics and subtopics, and guideline quality scores using the AGREE II tool [13].

In order to identify CPGs, we did an initial guideline search conducted in October 2015 and identified 276 eligible CPGs (Appendix 1). Guideline topics and searching priority areas were defined through consensus and consultation with the AFEM clinical advisory and methods boards. Initially, there were eleven focus areas, but this was subsequently reduced to eight focus areas with sub-categories to decrease guideline scope. These focus areas were acute pain, airway management, altered mental status, dangerous fever, respiratory distress, resuscitation and ventilation, trauma, and shock/dehydration.

Quality appraisal of CPGs was performed in duplicate and independently by members of the AFEM CPG panel (Appendix 2). Domain scores were calculated as per the AGREE II methods.

The original database contained information such as guideline quality, guideline topics, country development location and year published.

All the CPGs in the AFEM database were included in this descriptive study. As well as guideline quality, year produced and guideline topic, we extracted data on i) overall guideline quality (measured using the AGREE II tool), ii) country classification (as correspondence or first author address, if not explicitly stated), iii) country income classification (as defined by the World Bank Classification [14]), iv) guideline producers, v) target audience, vi) sub-population (stratified by age), and other guideline characteristics such as year published, broad therapeutic disease area, guideline development method, and evidence grading classification. We extracted data directly from the guidelines to an Excel spreadsheet and imported it into STATA 14 (StataCorp) for analysis.

Spatial mapping was presented graphically to summarise the number of guidelines and guideline quality by country in R [15]. Continuous data (AGREE II scores) was assessed for normality, determined using quantitative (hypothesis testing) and qualitative (graphical) methods. Tabulation and graphical presentation were the primary methods of analysis. Appropriate parametric and non-parametric tests were used to test hypotheses at a $p = 0.05$ threshold for statistical significance. This study was approved by the Stellenbosch University Health Research Ethics Committee (S17/03/069).

Due to the AFEM guideline project's dependence on recommendations from high-quality CPGs as primary sources of evidence, the panel excluded guidance documents that did not strictly adhere to the Institute of Medicine definition of a clinical practice guideline [16]. Guidance documents such as protocols, care pathways and algorithms where there was no reference to a systematic processes of evidence synthesis and no clear link between evidence and recommendations were excluded, as the validity of recommendations could not be determined. Disagreements were resolved by panel discussion and consensus.

Results

In total, we included 276 guidelines in the analysis. Approximately

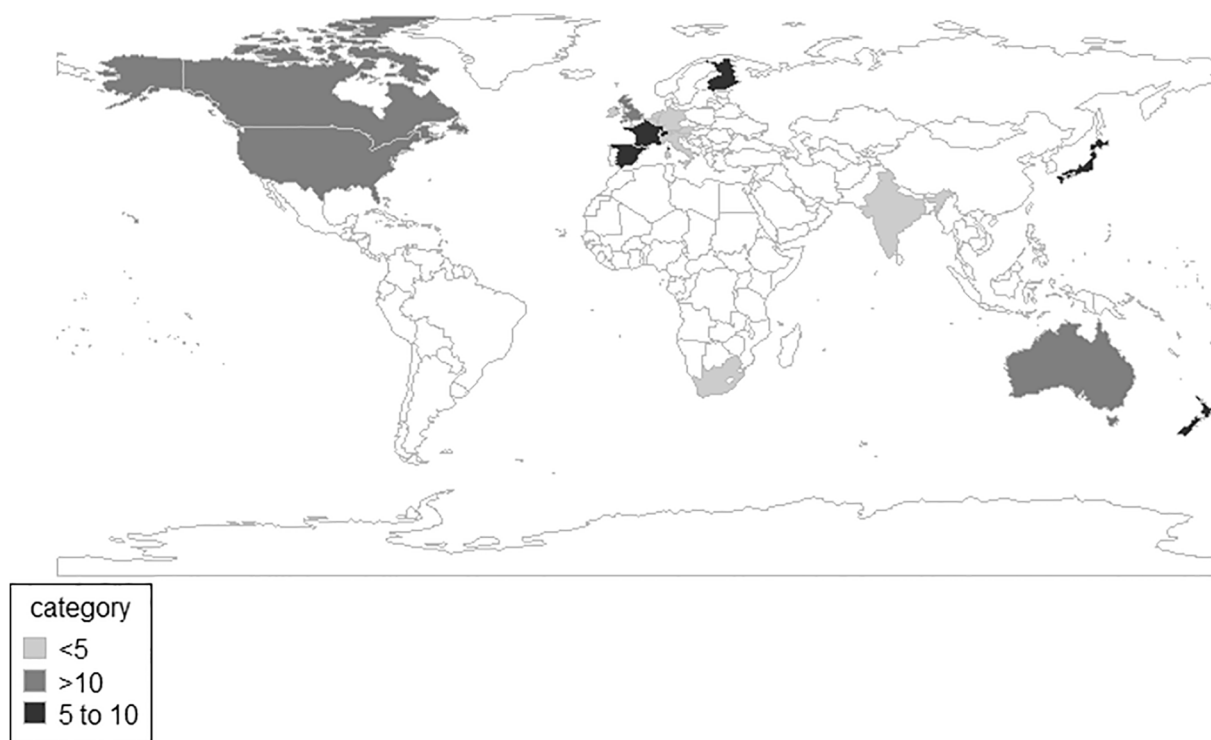


Fig. 1. Number of prehospital clinical practice guidelines by country.

half of the guidelines were published from 2010 onwards. *De novo* development methods were used in 58% (n = 150) of guidelines, a combination of *de novo* and/or adaptive methods were used in 8% (n = 19), use of expert reviews and literature reviews were reported in 4% (n = 8), with 32% (n = 82) of guidelines not specifying their development methods.

Nearly two-thirds of the guidelines were developed by professional societies or associations (63%, n = 164), with only a small proportion having been developed by international bodies or organisations (3%, n = 7). Only two guidelines originated from LMICs; the rest were from high-income countries (HICs) and none of these were specific to pre-hospital care (Fig. 1). The minority of guidelines (15%, n = 38) were prehospital-specific: 20% (n = 53) were in-hospital specific, and a large proportion (41%, n = 105) were mixed (both in-hospital and pre-hospital). Almost a quarter of guidelines (24%, n = 63) did not specify their target audience.

Considering age, the largest proportion of guidelines were applicable to adults (39%, n = 101), followed by infants (11%, n = 28) and pregnancy and childbirth (9%, n = 23). More than a quarter of guidelines focused on multiple population subgroups (28.5%). Table 1 provides a brief overview of the demographic population groups by guideline applicability. There were no prehospital-specific guidelines dedicated to neonates, infants or geriatric subpopulations. The majority of prehospital guidelines were produced by professional societies/

associations (63%, n = 164) for adults or mixed populations subgroups (cumulatively, ± 90%).

Across the 276 guidelines included, guidance was provided for 94 unique topics. The majority of topics focused on treatment (66.8%, n = 173), while 30% (n = 80) were mixed topics, including other clinical efforts such as disease prevention, screening and diagnosis. Dominant topics included resuscitation (15.5%, n = 40), stroke (6.2%, n = 16), poisoning and acute coronary syndromes (5% each, n = 13), general trauma and heart failure (2.7% each, n = 7), and asthma and ST-elevation myocardial infarction (2.3% each, n = 6). Various topics, such as psychiatric acute care, triage and communicable diseases (e.g. acute diarrhoea and acute bronchitis), contributed less than 1% of the total CPGs.

Table 2 provides an overview of development methods by guideline producers. Across guideline producers, the primary method of emergency care guideline development was *de novo*. National Departments of Health (NDoH) and professional societies predominantly used adaptive, or a combination of adaptive and *de novo*, methods. Professional societies/association guideline producers did not clearly specify their development methods in close to half of their guidelines. About one in nine (10.8%) guidelines used expert opinion or literature reviews as their primary development methods.

Overall guideline quality is presented in Table 3. Guideline quality was assessed with AGREE II, an international tool to assess the quality

Table 1
Subpopulation by applicability.

Applicability	Prehospital n (%)	In-hospital n (%)	Mixed n (%)	Unspecified n (%)	Total n (%)
Pregnancy and childbirth	2 (5.2)	14 (26.4)	7 (6.6)	0 (0)	23 (8.8)
Neonates	0 (0)	2 (3.7)	4 (3.8)	3 (4.7)	9 (3.4)
Infants	0 (0)	0 (0)	3 (2.8)	25 (39.6)	28 (10.8)
Children	1 (2.6)	6 (11.3)	5 (4.7)	4 (6.3)	16 (6.1)
Adults	18 (47.3)	18 (33.9)	42 (40)	23 (36.5)	101 (39)
Geriatrics	0 (0)	1 (1.8)	1 (0.9)	0 (0)	2 (0.7)
Mixed	16 (42.1)	10 (18.8)	42 (40)	6 (9.5)	74 (28.5)
All ages	1 (2.6)	2 (3.7)	1 (0.9)	2 (3.1)	6 (2.3)

Table 2
Methods by guideline producers.

Applicability	Professional Society/Association Guidelines n (%)	International Collaboration Guidelines n (%)	NDoH n (%)	Clinician/Academic Guidelines n (%)	Total n (%)
<i>De novo</i>	77 (46.9)	6 (85.7)	37 (78.7)	30 (73.1)	150 (58)
Adaptive	1 (0.6)	0 (0)	0 (0)	0 (0)	1 (0.34)
Expert opinion/literature review	3 (1.8)	0 (0)	0 (0)	5 (12.2)	8 (3)
<i>De novo</i> + adaptive	8 (4.8)	0 (0)	6 (12.7)	3 (7.3)	18 (7)
Unspecified	75 (45.7)	1 (14.2)	4 (8.5)	3 (7.3)	82 (31)

NDoH, National Departments of Health.

Table 3
AGREE II domains by guideline producers.

Domains	Professional Society/Associations Guidelines % (sd)	International Collaboration Guidelines % (sd)	National Guidelines % (sd)	Clinician/Academic Guidelines % (sd)	Overall Domain Scores	
					Median	Range
SP	67 (19)	80 (20)	84 (13)	68 (24)	72	24
SI	36 (22)	53 (7)	65 (21)	46 (19)	47	51
RD	61 (23)	69 (19)	72 (28)	58 (21)	61	29
CP	77 (21)	77 (16)	85 (15)	72 (19)	85	16
APL	36 (20)	54 (15)	60 (20)	37 (25)	38	38
EI	42 (17)	60 (19)	58 (23)	56 (31)	46	19
Overall, mean (sd)	4.32 (1.54)	4.57 (1.69)	5.10 (1.49)	3.81 (1.4)	4	3

AGREE, Appraisal of Guideline Research and Evaluation; SP, scope and purpose; SI, stakeholder involvement; CP, clarity of presentation; RD, rigour of development; APL, applicability; EI, editorial independence; overall judgement (score out of 7, 1 = lowest possible quality and 7 = highest possible quality); sd, standard deviation.

and reporting of practice guidelines. The maximum score for each AGREE domain is 100%, whereas the overall score is out of seven. Domains 1 and 4 (scope and purpose, clarity of presentation) both scored high, with 70% and 78%, respectively. Domains 2, 5 and 6 (stakeholder involvement, applicability, and editorial independence) each scored below 50%, while rigour of development scored 62%. Stratified by guideline producers, overall guideline quality and quality across domains varies widely. On average, guideline quality is significantly higher in those produced by national bodies (such as NICE or SIGN), compared to international guidelines (e.g. WHO), professional societies, and clinician or academic-produced guidelines ($p = 0.001$). Across CPG producers, median guideline quality was poorest in relation to applicability, editorial independence, and reporting stakeholder involvement, while clarity of presentation and scope of purpose showed high-quality reporting. Clarity of presentation had a median score of 85%, making it the highest scoring domain, followed by scope and purpose (72%). Overall, only 6.5% (95% confidence interval: 4–10%, $n = 18$) of included CPGs were recent (published from 2015 and onwards) and rated as moderate to high-quality (AGREE II score of > 4), all of which were developed *de novo* and originating from HICs for established prehospital settings.

Discussion

Less than 2% of the 276 emergency care guidelines that we identified originated from LMICs and no guidelines were specifically developed for prehospital care in low-resource settings. This highlights the need for investment in building local guideline development infrastructure and training, specifically in settings where guidelines from HICs cannot be readily adopted due to contextual differences. Furthermore, our results indicate that a very large proportion of emergency care guidelines were developed *de novo* (new), which might be expected considering that most guidelines originated from well-funded HICs where there may be sufficient resources to do this. However, these guideline developers still had a large sample of *de novo* guidelines from HICs that they could draw from to either adopt, adapt or contextualise to their local setting, instead of re-inventing the wheel

by doing *de novo* development. If one assumes that guideline developers would only want to use adaptive guideline techniques on up-to-date, high-quality guidelines, our results indicate that perhaps 10% of pre-hospital relevant guidelines could be translated to a local context using such methods. This 10% includes guidelines on resuscitation, acute coronary syndromes, heart failure, and trauma topics, originating mostly from European and American organisations, the Australian Queensland guidelines, and NICE. However, the relative lack of examples of adaptive guideline development methods, such as adoption [5] or adapting, adopting or contextualising existing high-quality guidelines [12,17] warrants attention. This is particularly important in resource-strapped settings where *de novo* development is not always affordable.

Guideline development training over the past decade has mostly focused on *de novo* guideline development, via universities (as component courses of professional degrees), professional groups (short courses), or as published information by groups dedicated to CPG development, such as the Guidelines International Network (G-I-N) [18]. Since *de novo* CPG development is time-consuming and expensive, there is an increased need for new emerging CPG-development approaches that do not rely on *de novo* development but use existing high-quality CPGs instead. This would be especially attractive for resource-constrained settings. In Africa, the South African Guidelines Excellence (SAGE) [19] project has started addressing these gaps by building capacity via CPG courses that focus on both *de novo* and adaptive guideline development methods [18] and providing open-access CPG-development toolkits [20].

Our findings highlight the need to strengthen prehospital guideline development quality worldwide, especially by professional societies and clinicians, because guideline quality was found to be significantly lower in these groups. Our findings reflect similar trends in studies assessing guideline quality, both in South Africa [7,21] and internationally, [22] where guideline quality varied by producers. Almost a third of guidelines did not specify a guideline development method, a key requirement when determining validity of evidence; this was reflected in their relatively poor ‘rigour of development’ domain scores in AGREE II results. Adherence to guideline development standards (such

as the G-I-N 11 standards [23] or the McMaster group's 18 standards [24]) will assist developers in addressing key issues of quality and improve guideline validity. Regrettably, these standards are biased towards *de novo* development and only a few pragmatic examples exist showcasing adaptive [3] or *de novo* [25] techniques in low-resource settings. Even fewer exist for prehospital care, as there are no standards.

Linked to guideline quality and reporting, we found more than 15 unique systems for rating evidence quality, similar to findings by Movsisyan (2018), who identified 17 unique ratings of evidence quality in guidelines for the effectiveness of health and social interventions [26]. Our analysis includes guidelines older than 2010, before dominant recommendations classifications were developed (such as GRADE) [26]. This, together with varied guideline development methods, might explain the heterogeneity we observed.

Although we did not perform an evidence gap assessment, there were important clinical topics for which we could not find appropriate prehospital guidance. These include intensive care transfers, crisis interventions and behavioural emergencies, psychiatric and aggressive patient emergencies, extremity trauma (including dislocations and amputation), abdominal and pelvic trauma, and gender-based violence and sexual assault. The geriatric subpopulation received the least attention in prehospital guidelines, which is surprising considering that most of the guidelines originated from HICs, where a growing elderly population is placing increasing pressure on healthcare systems.

In considering our findings on the status of emergency care clinical practice guidance available worldwide in early 2016, some limitations should be borne in mind as the quality of the data and selection of guidelines was dependent in large part on the methods, processes and demands of the immediate AFEM CPG project. The definition of a CPG was narrow and, therefore other documents which provide guidance in prehospital care globally (such as treatment protocols and care pathways) were excluded. It is also likely that some eligible guideline documents were missed in the searches, such as those reported in the grey literature or published in languages other than English. Future research should focus on bringing these guidelines into this landscape analysis and separately strengthening guideline development capacity in resource-poor settings.

Conclusion

Although some high-quality CPGs exist for emergency care, none are specific to prehospital care in LMICs, including in the African context. The majority of CPGs for emergency care are developed *de novo*, are from HICs, and vary in quality. Adaptive guideline development methods are seen in only a minority of prehospital guidelines, despite the potential time and cost-effectiveness of these methods. Our research shows that guideline developers in low-resource settings that cannot afford *de novo* guideline development have access to an expanding pool of high-quality prehospital guidelines to adapt to their local setting, but there are also some important topics for which robust evidence-based prehospital guidance is lacking. Future research should address these gaps by conducting relevant systematic reviews to inform *de novo* guideline development. We highlight the importance for strengthening adaptive guideline development methods that use existing high-quality CPGs. Further research, such as guideline case studies, is required to showcase the pragmatic application of adaptive guideline development methods to strengthen guideline development in resource-strapped settings for prehospital care.

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Conflicts of interest

The publication originates from work commissioned and funded by the HPCSA Professional Board of Emergency Care. The funder commissioned the work, and approved the design and scope of the guidelines developed by the AFEM, but did not participate in the development of the methods in relation to this publication. MM, SB and LW are editors of this journal. They were in no way involved with the peer review process or editorial decision of this paper.

Dissemination of results

Results of this study will be shared at local and international conferences. Results will also be distributed via local newsletters, blogs, and social media, including targeted dissemination strategies for appropriate audiences.

Authors' contributions

MM conceptualised the research idea, collected data, performed the analysis and wrote the first draft of the manuscript. TY, SB and MC provided oversight and supervision of the research. MM, BdW, PH and JP were involved with guideline searching and appraisal. All authors read and approved the final manuscript. All authors agree with the manuscript results and conclusions.

Appendix. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.afjem.2018.09.002>.

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