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Research

Australasian paramedic clinical practice guidelines for managing cardiac arrest: an appraisal

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Abstract

Introduction
There are 10 government-regulated ambulance services (paramedic provider services) in Australasia who are members of the Council of Ambulance Authorities (CAA). These CAA-member services each produce clinical practice guidelines (CPGs), which guide the practice of their paramedics. Common to each set of CAA-member CPGs is a guideline that addresses cardiac arrest due to ventricular fibrillation and pulseless ventricular tachycardia (pulseless VT/VF). This study sought to answer the question: 'Are current CAA-member CPGs developed with sufficient methodological rigour to consistently produce guidelines that, according to validated, evidence-based best practices, can be recommended for clinical use?'

Methods
This question was addressed by performing a comparison of existing CAA-member CPGs for pulseless VT/VF against the Appraisal of Guidelines for Research & Evaluation (AGREE II) instrument. All CPGs were anonymised and sent to each appraiser along with the AGREE II appraisal sheet. Appraisals were conducted independently for each CPG and returned to the lead author for collation. The anonymised results were then shared among all appraisers for consideration and discussion. Appraisers were free to change their appraisal after considering the comments from the other appraisers, and results were then converted into a final percent score for each CPG in accord with the recommended AGREE II instrument methodology. One appraisal question, in addition to the AGREE II criteria was added to each appraisal; the response to this was analysed separately.

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Australasian paramedic clinical practice guidelines for managing cardiac arrest: an appraisal

Abstract (continued)

Results
Nine CPGs were evaluated according to the AGREE II instrument. The appraisers gave passing marks to only two of the six domains in the AGREE II instrument: Domain 1 – Scope and Purpose (73%), and Domain 4 – Clarity of Presentation (74%). Less than passing marks were awarded for Domain 2 – Stakeholder Involvement (27%). Scores of less than 10% were awarded for Domain 5 – Applicability (8%) and Editorial Independence (1%).

Conclusion
Based on the findings of this paper, the authors conclude that it cannot be assumed that current CAA-member paramedic CPGs are developed with sufficient methodological rigour to consistently produce guidelines that, according to validated, evidence-based best practices can be recommended for clinical use. However, most of the authors agree that the CPGs reviewed could be recommended for clinical use with relatively minor modifications. It would be useful to determine whether end users of the CAA-member CPGs agree on the importance of characteristics of CPGs that the AGREE II instrument appraises.

Keywords:
paramedic; Australasia; clinical practice guideline; AGREE II

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Introduction

Cardiovascular disease is the single largest killer of Australians (1). There are approximately 23,000 to 33,000 deaths per year due to sudden cardiac arrest, with a roughly 6-10% survival rate (2,3). Approximately 70% of all victims who die do so before reaching hospital (according to a study with data from five Australian ambulance services in 2015) (4). These findings suggest that many (if not most) patients who suffer a cardiac arrest and are treated by health care professionals are treated by paramedics. In these patients, survival is highly dependent on the care that paramedics administer.

The lay public is encouraged to respond to the discovery of cardiac arrest by calling a predetermined emergency number (eg. 000 in Australia and 111 in New Zealand) to activate the emergency medical response system. Altogether, there are 10 government-regulated ambulance services (paramedic provider services) in Australia and New Zealand and all are members of the Council of Ambulance Authorities (CAA) (5). In each state and territory of Australia and New Zealand a call to 000 or 111 results in the dispatch of CAA-member paramedics to respond to the patient in order to provide emergency medical care.

Clinical practice guidelines (CPGs) are 'statements that include recommendations, intended to optimise patient care, that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options' (6). In Australia, CPGs are defined by the National Health and Medical Research Council (NHMRC) as '… evidence based statements that include recommendations intended to optimise patient care and assist health care practitioners to make decisions about appropriate health care for specific clinical circumstances' (7). The majority of CAA-member services refer to their clinical guidance documents as 'CPGs'.

Each CAA-member service produces CPGs that guide the practice of the paramedics they employ (Table 1). Common to each set of CAA-member CPGs is a guideline that addresses cardiac arrest due to ventricular fibrillation and pulseless ventricular tachycardia (pulseless VT/VF).

Do CPGs work?

Five systematic reviews (8-12) have been conducted investigating whether CPGs improve patient outcomes. However, the populations under study varied widely, methods were heterogeneous and in many cases the target studies reviewed were identified by the authors of the systematic reviews as having poor methodological rigour. Additionally, measurements in these studies focussed on a range of indicators, including health related system improvements, health related process improvements, and health related outcome improvements, as well as patient satisfaction measurements. All the systematic reviews stated that the amount and quality of evidence on which to develop their conclusion was poor and that more high-quality research was needed. Despite this, the consensus of the studies in aggregate was that there was a weak trend of evidence to support the assertion that CPGs contribute to improved patient outcomes.

Do paramedics follow CPGs?

Two studies have been conducted to determine the degree to which paramedics adhere to CPGs during the treatment of cardiac arrest (13,14). Unfortunately, both studies evaluated a heterogeneous mix of health care providers (including doctors, nurses and unspecified levels of 'paramedic') and both were conducted in northern Europe. Therefore, we cannot rely on published research to tell us the extent to which paramedics in the Australasian context do adhere to CPGs. However, all CAA

Table 1. Clinical practice guidelines for cardiac arrest per CAA service

Region	Agency	Paramedic PVT/VF CPG and version
Australian Capital Territory	ACT Ambulance Service	CMG 4 Adult Cardiac Arrest, 2014 (20)
New South Wales	New South Wales Ambulance Service	C3 Cardiac Arrest, 2015*
New Zealand	St John Ambulance	2.9 Cardiac Arrest, 2013-2015
New Zealand	Wellington Free Ambulance	Cardiac Arrest, 2014 (21)
Northern Territory	St John Ambulance NT	Resuscitation Adult, Version 2.3, 2013*
Queensland	Queensland Ambulance Service	Cardiac/Cardiac Arrest, 2016* Resuscitation Adult, 2016*
South Australia	South Australia Ambulance Service	CPG-002. Adult Cardiac Arrest Guideline – Paramedic, 2015*
Tasmania	Ambulance Tasmania	Uses Victorian CPGs**
Victoria	Ambulance Victoria	Cardiac Arrest CPG AO201, Version 5, 2011 (22)
Western Australia	St John Ambulance WA	SJA-WA CPG 4.6A Cardiac Arrest – Adult, 2016*

*Personal communication

**The CPG for Ambulance Tasmania was not evaluated, as it is identical to the one for Ambulance Victoria. This is due to a strategic partnership between the services and it was considered an unnecessary duplication to appraise what are essentially two identical CPGs

member services do mandate that their paramedics generally adhere to the CPGs as a condition of being granted their authority to practice, and paramedics are expected to be able to consistently apply the guidelines in a clinical context. Therefore, it is reasonable to assume that most paramedics in most situations will adhere to their service's CPGs although there is no primary literature to support this.

How good are the CAA-member CPGs?

The quality of resuscitative guidelines was brought into question by a review of the Australian Resuscitation Council (ARC) Guidelines for Managing Acute Dysrhythmias which concluded that use of the CPG was 'not recommended' and that 'emergency departments and out-of-hospital systems should consider looking elsewhere for a higher quality guideline' (15). The ARC guidelines are foundational documents commonly referred to in the creation and modification of CAA-member service CPGs. For this reason it was considered timely to review the CPGs on which paramedics in Australasia base their clinical care and ask the following question: 'Are current CAA-member CPGs developed with sufficient methodological rigour to consistently produce guidelines that, according to validated, evidence-based best practices, can be recommended for clinical use?'

This question was addressed by performing an appraisal of existing CAA-member CPGs using the Appraisal of Guidelines for Research & Evaluation (AGREE II) instrument. The AGREE II instrument is internationally recognised as the tool of choice for evaluating the quality of CPGs, with the AGREE I and AGREE II instruments having been cited at least 700 times to date in the research literature (16). In Australia, the AGREE II criteria are also the basis for the NHMRC endorsement of clinical practice guidelines (17). One CAA-member service, Ambulance Victoria, has formally committed to informing their CPG development with the AGREE II instrument (18).
The final outcome of CPG evaluation using the AGREE II instrument is a rating of the CPG into one of three possible outcomes:

- Recommended for clinical use
- Recommended for clinical use with modifications, or
- Not recommended for clinical use.

It is the authors' contention that Australasian paramedic CPGs should, upon formal evaluation, be found to be 'recommended for clinical use'.

Methods

The AGREE II instrument is a formalised, check-sheet that is utilised in the evaluation of CPGs (Table 2).

The AGREE II manual recommends that each guideline be assessed by at least two appraisers (and preferably four) to increase the reliability of the assessment. In our study we chose to utilise eight appraisers from a wide range of perspectives in order to ensure a diversity of perspectives. The appraisal of the nine CAA-member CPGs was conducted by a team consisting of the following:

- Three paramedic experts directly involved in the development of their CAA-service's CPGs
- Three medical directors of CAA-member ambulance services
- One paramedic who (at the initiation of this study) was also a senior lecturer and course co-ordinator of a Master of Paramedicine degree, and a physician's assistant with extensive experience in the emergency department setting
- One medical doctor (not affiliated with a state ambulance service) who specialises in emergency medicine, with previous experience working in the out-of-hospital environment, who also has a PhD.

The lead author of this paper organised and moderated the appraisals but did not participate as an appraiser.

Each appraiser evaluated the listed CAA-member CPGs for pulseless VT/VF according to the AGREE II criteria. Appraisers who were affiliated with a specific ambulance service did not rate the CPG for their own ambulance service to avoid the perception of a conflict of interest. The CPGs themselves were redacted to blind the reviewers as to which services had authored the CPGs. Appraisers were also blinded to the results of the other appraisers until all appraisals had been completed. Results were then compared, and appraisers were offered an opportunity to modify their score based on the comments of the other appraisers. This is in accord with the AGREE II methodology. Final scores were calculated using the system prescribed by the AGREE II instrument.

In the AGREE II instrument, a Likert scale of 1 to 7 is used to appraise each domain, where a 1 indicates that the domain is of the 'lowest possible quality' and a 7 indicates the domain is of the 'highest possible quality'. In the AGREE II scoring instructions it is recommended that the Likert scores initially scored by the appraisers must be converted to percentage scores for reporting results. Therefore, if all appraisers were to enter a 7 out of 7 for a domain (the highest Likert scale score), that would result in a score of 100%. Similarly, if all appraisers were to enter a 1 out of 7 for a domain, that would result in a score of 0%.

Question 23 of the AGREE II instrument asks specifically if the appraisers would recommend this guideline for use (based on the outcome of all evaluations). In the discussion that resulted from the appraisal of the initial 'calibration' CPG it was clarified that the AGREE II tool is not meant to evaluate the clinical validity of a guideline. Instead it is meant to evaluate the rigour with which the guideline was created. On page 7 of the AGREE II manual it explicitly states: 'As an assessment tool, AGREE II evaluates the methodological rigour used to develop a particular practice guideline. It does not assess the clinical validity of practice guideline recommendations' (19).

Consequently, for question 23 the appraisers were asked to refrain from looking at the outcome of the process (the guidelines themselves) and instead look at the process of development of the guidelines and determine whether they would trust the outcomes (whatever they may be) based on their evaluation of the developmental process. Possible answers were: 'Yes', 'Yes, with modifications' (YwM), or 'No'. With the approval of the AGREE II instrument developers, one additional statement was added to this study for the appraisers. The statement was: 'I would recommend this guideline for use' (based on my knowledge of the clinical validity of the guideline recommendations). Possible answers were: 'Yes', 'Yes, with modifications' (YwM), or 'No'. This assessment determined whether the appraisers felt that the guidelines could be recommended for clinical use based on their own knowledge and understanding of paramedic treatment (independent of the findings of the AGREE II instrument evaluation). The intention of this evaluation was to a) determine whether the appraisers agreed with the findings of the AGREE II instrument, and to b) rate their support of the CPG's recommendations based on their own professional opinion.

Table 2. AGREE II instrument items (19)

Domain 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.

Domain 2 – Stakeholder involvement

4. The guideline development group includes individuals from all the 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.

Domain 3 – Rigour 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.

Domain 4 – Clarity of presentation

15. The recommendations are specific and unambiguous.
16. The different options for management of the condition are clearly presented.
17. Key recommendations are easily identifiable.

Domain 5 – Applicability

18. The guideline describes facilitators of and barriers to its application.
19. The guideline provides advice 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 or auditing criteria.

Domain 6 – Editorial independence

22. The views of the funding body have not influenced the content of the guideline.
23. Competing interests of members of the guideline development group have been recorded and addressed.

Final evaluation:

'I would recommend this guideline for use' (based on the outcome of all evaluations)

- □ Yes
- □ Yes, with modifications
- □ No

Note: Items 1 to 23 are rated on a 7-point Likert scale with 1 representing the lowest possible quality and 7 representing the highest possible quality

Discussion of methodology

There are several ways to answer this study's question: 'Are current Australasian paramedic clinical practice guidelines developed with sufficient methodological rigour to consistently produce guidelines that, according to international best practices, can be recommended for clinical use?'

One method would be to conduct statistical process control sampling as a qualitative study. This was determined to be an onerous task that would involve several hundred hours of work that would not necessarily produce an answer that would be superior to a qualitative case study, purposive sample approach, which is how this study was conducted.

The argument supporting this approach in attempting to answer the study question is as follows:

a) CAA-member paramedic CPGs guide the care of paramedics' patients
b) Paramedic care, as directed by CAA-member paramedic CPGs, contributes to positive patient outcomes
c) CAA-member paramedic care is not uncommonly delivered in situations of high clinical acuity and consequence
d) The CPGs that guide care during pulseless VT/VF arrests are those which govern situations of very high clinical acuity and consequence
e) CAA-member paramedic CPGs, therefore, have the potential to positively influence patient morbidity and mortality
f) As such, the process which leads to the creation of CAA-member paramedic CPG should entail sufficiently high methodological rigour to ensure that no CPGs are produced which would be objectively judged as inadequate for clinical use
g) Discovery of a CAA-member paramedic CPG that failed to be objectively judged as adequate for clinical use would cast into question the methodology and process that created it and would, therefore, cast into question the possible quality of any other CPG produced by the same process.

There is an iconic precedent for this method of quality assurance sampling, which has been referred to as the 'brown M&M method' (23). M&Ms are small, candy-coated chocolates, which come in different colours. In the previous century, the rock band Van Halen toured extensively with an entourage that was several times larger and more complex than most rock bands of the era (24). Because of the complexity and therefore potential danger of their stage and concert production, there was a large manual of specifications that all promoters had to agree to strictly adhere to in order to avoid potential disaster. Buried in the hundreds of pages of the manual was a small proviso that stipulated that the band members must be supplied with a large bowl of M&Ms in their dressing room and that no brown M&Ms could ever be in the bowl. Failure to adhere to this clause permitted Van Halen to immediately cancel the concert with no financial penalty or legal repercussions. Far from being an irrational demand to satisfy the overblown ego of a few rock stars (as it was occasionally reported being in the popular press), this proviso was a sophisticated method of quality assurance (23).

On entering a new venue, one of the first things the Van Halen production managerial leaders would check for were brown M&Ms in the dressing room bowl. If they were present, it suggested that the manual had not been read and the safety of the entire preparations for the concert were suspect and immediately reviewed by the band's safety team.

This argument, applied to CAA-member CPGs, would translate to the following: 'If a CPG as foundational as the one for viable cardiac arrest was not developed with sufficient rigour to objectively be recommended for clinical use, then it calls into question whether any of the CPGs can be recommended for clinical use'. In effect, either a 'recommended with modifications' or 'not clinically recommended' judgement of a service's cardiac arrest CPG is the 'brown M&M' that calls the clinical utility of all of the other CPGs into question.

Results

Across all of the appraised CPGs the appraisers gave passing marks in only two of the six domains in the AGREE II instrument. They were: Domain 1 – Scope and purpose (73%), and Domain 4 – Clarity of presentation (74%). Less than passing marks were awarded for Domain 2 – Stakeholder involvement (27%). Scores of less than 10% were awarded for Domain 5 – Applicability (8%) and Editorial independence (1%). For all CPGs, the appraisers agreed with the statement: 'I would recommend this guideline for use (based on the outcome of all evaluations)' only 16% of the time while 54% of the appraisers stated they would recommend these guidelines for use if they were modified in some manner, and 43% stated they would not recommend these guidelines for use at all (based on the outcome of all AGREE II evaluations).

For all CPGs, the appraisers agreed with the statement: 'I would recommend this guideline for use (based on my knowledge of the clinical validity of the guideline recommendations)' 38% of the time. This was a higher recommendation rate than the 16% rate produced by the AGREE II instrument, but it still fell short of a majority; 56% of the appraisers stated they would recommend these guidelines for use if they were modified in some manner (compared to 54% using the AGREE II criteria), and 19% stated they would not recommend these guidelines for use at all (compared to 43% using the AGREE II criteria).

The AGREE II instrument produced lower levels of support for the use of these CPGs compared to the appraisers' independent evaluation. In summary, none of the guidelines

were recommended for use based on the AGREE II criteria. Based on the appraisers' professional opinion only three of the nine CPGs evaluated were recommended for use without amendment, with five being recommended for use following amendments and one not being recommended for use at all.

Table 3 presents the evaluations of each of the nine anonymised CAA-member CPGs as well as the averaged results of the evaluation of all the assessed CAA-member paramedic CPGs.

Limitations

Several of the appraisers expressed concern that sections of the AGREE II instrument were not appropriately applicable to paramedic CPGs. Some appraisers pointed out that many of the CPGs' scores were particularly low in Domain 3 (Rigour of development), Domain 5 (Applicability) and Domain 6 (Editorial independence). A brief exploration of the issues regarding each of these domains is offered below.

Domain 3 asked eight questions regarding the systematic methods for searching, evaluating and translating research into the CPGs. CAA-member CPGs that address pulseless VT/VF generally follow the international guidelines for cardiac arrest produced by the International Liaison Committee for Resuscitation as contextualised by the Australian and New Zealand Committee on Resuscitation. It was felt that although there was no explicit statement that the CPGs themselves were robustly evidence-based it was understood by the appraisers that they actually were. However, without an explicit statement confirming this, the appraisers were forced to assign scores which did not represent the extent of how evidence-based the CPGs were perceived to be by the appraisers. A simple reference to the evidence on which the CPGs are based, an explanation that the CPGs were reviewed by external experts before publication and a stated procedure for updating the guideline would have greatly increased the scores for Domain 3.

Domain 5 asked four questions regarding the applicability of the CPGs. As in Domain 3, a few simple modifications would have greatly increased the scores for CPGs in this area. If the authors were to describe facilitators of and barriers to the application, list the potential resource implications of the CPG and include monitoring or auditing criteria in each CPG the scores would have significantly increased for this Domain.

Table 3. AGREE II appraisal results of each CAA-member clinical practice guideline

	CPG A	CPG B	CPG C	CPG D	CPG E	CPG F	CPG G	CPG H	CPG I	Average
Domain 1 – Scope and purpose	34%	90%	48%	67%	67%	73%	57%	71%	73%	73%
Domain 2 – Stakeholder involvement	20%	38%	50%	8.3%	27%	25%	8%	18%	21%	27%
Domain 3 – Rigour of development	5%	34%	67%	4.1%	10%	2%	2%	4%	16%	18%
Domain 4 – Clarity of presentation	60%	77%	69%	57.6%	65%	56%	55%	73%	83%	74%
Domain 5 – Applicability	38%	3%	6%	0.5%	3%	2%	1%	12%	1%	8%
Domain 6 – Editorial independence	7%	2%	0%	0%	0%	0%	0%	0%	0%	1%
'I would recommend this guideline for use' (based on the outcome of all AGREE II evaluations, Domains 1-6)	Yes 14% YwM 14% No 71%	Yes 29% YwM 71% No 0%	Yes 0% YwM 57% No 43%	Yes 12.5% YwM 2.5% No 75%	Yes 12.5% YwM 62.5% No 25%	Yes 0% YwM 43% No 57%	Yes 0% YwM 43% No 57%	Yes 43% YwM 43% No 14%	Yes 14% YwM 86% No 0%	Yes 16% YwM 54% No 43%
'I would recommend this guideline for use' (based on my knowledge of the clinical validity of the guideline recommendations)	Yes 0% YwM 33% No 66%	Yes 71% YwM 29% No 0%	Yes 14% YwM 86% No 0%	Yes 25% YwM 50% No 25%	Yes 62.5% YwM 37.5% No 0%	Yes 14% YwM 57% No 29%	Yes 0% YwM 71.5% No 28.5%	Yes 43% YwM 57% No 0%	Yes 71% YwM 29% No 0%	Yes 38% YwM 56% No 19%

YwM = yes, with modifications

Domain 6 asks only two questions regarding editorial independence: did the views of the funding body influence the content of the guideline and, were competing interests declared and addressed. It is reasonable to assume, in the context of the public provision of paramedic services, that the answer to these questions is probably 'no', however, none of the guidelines addressed these questions. As with the other two domains, it would be quite simple for the authors of the CPGs to address these questions and greatly improve the scores for this domain.

The section questioning whether members of the public were consulted in the creation of the CPG (Domain 2) was also highlighted, as some appraisers felt it would be difficult to find consumer advocacy groups for victims of cardiac arrest treated by paramedics. Other authors pointed out that the area of consumer involvement in guideline development is broadly accepted in national guidelines with a singular area of focus. It could be argued that this will be more difficult to achieve in paramedic services producing multiple guidelines. However, the fact that few of the CAA-member services are currently utilising consumer consultants within their systems may represent an area for improvement in both the rigour of guideline development and the shift toward a patient-centred model of care.

CPGs frequently exist as only one element in a package of documents produced by ambulance services that often also include policies, work instructions, pharmacology monographs and procedural instructions. For readers familiar with these other documents the CPGs may be easier to interpret due to common elements such as colour coding, abbreviations or other pieces of unwritten organisational knowledge. Readers from outside of the service, viewing the CPGs for the first time, as the appraisers in this paper were, may be hampered by their lack of familiarity with those common elements. The differences in presentation are likely a hangover from when each CAA-member service recruited and trained their own paramedics. There is currently no requirement to have a nationally consistent presentation of information. In the era of university-trained paramedics and with greater portability of staff, this lack of standardisation presents an area of opportunity for enhanced safety by having some consistency in the way each service presents guideline information.

The results of this appraisal may also reflect the different purposes of paramedic CPGs. Most CAA-member CPGs assessed for this study were only one to two pages in length. It appears that many CAA-member services write guidelines as a summary, prompt or aide-memoir for their clinically operational staff. Many of the VF/VT guidelines assessed for this study were built around a flow chart with some additional clarifying information. If the purpose of the existing paramedic documents identified as CPGs is to serve as a prompt for staff, rather than a fully developed guideline, then they will be rated correspondingly poorly against the AGREE II instrument. Because there are only 10 CAA-member paramedic services (and most of the appraisers are familiar with them) it was impossible to completely blind all the appraisers as to which CPG they were reviewing. CPG-C was identified by two appraisers who recognised the jurisdiction in which the CPG was produced, despite redactions. Both appraisers recused themselves from evaluating that CPG. However, to the best of our ability, the names and any other information that could identify which state the CPG was from were redacted before distribution to the appraisal team.

Discussion

There is a nuance to the conclusion of this paper that is important to highlight. The authors are not concluding that all of the CAA-member CPGs are inadequate for clinical use, in fact the authors highlight that with some relatively simple modifications (such as including authors names, conflicts of interest and references) the CPGs assessed could easily meet evidence-based, best-practice standards. However, the conclusion does stand that there are indicators in the CPGs which were appraised that suggest that the rest of the CAA-member CPGs cannot necessarily be assumed to be good. Just as an upside-down light switch, or doors that close poorly, in a new building don't unequivocally indicate that the building is structurally unsound, even such relatively cosmetic errors do call into question the underlying quality of the work. This is especially true to an outsider who is unfamiliar with, or even antagonistic towards the organisation that performed the construction.

Developing a desire in all parties involved in the development of these CPGs to work collaboratively to create robust and defensible CPGs is the next important step in research and development. In conjunction with the ongoing and future expansion of paramedicine beyond the conventional role of ambulance based, out-of-hospital medical professionals the authors believe it would be valuable to explore the co-ordinated development of Australasian 'exemplar' CPGs that are developed in accord with predetermined criteria which could then be adapted for local use by organisations which employ paramedics. Such a system already exists in the United Kingdom (25) and national model emergency medical services guidelines have been developed for the United States (26).

In Australia the NHMRC has the authority to nationally endorse CPGs developed by external bodies (27). Independent expert groups, such as the Cochrane Collaboration or the Joanna Briggs Institute focus on the translation of research evidence into clinical practice. CAA-member partnerships with independent organisations such as these could be explored as a method to help improve the perceived credibility of any 'exemplar' Australasian paramedic CPGs in the future.

The AGREE II instrument represents a statement of best-practice in CPG development by expert CPG researchers

and scientists. However, as outlined in the discussion above, this is only one of many possible perspectives. The authors believe it would be useful to conduct a study of end-users of all Australasian paramedic CPGs to determine what they consider to be the minimum required set of characteristics that would meet their needs. It could be that the AGREE II instrument is appraising characteristics that paramedics and other end-users of paramedic CPGs consider unimportant, and not appraising other characteristics that end-users do consider to be important. Such a study is currently in development by the lead author.

Conclusion

Based on the findings of this paper, the authors conclude that it cannot be assumed that current CAA-member paramedic CPGs are developed with sufficient methodological rigour to consistently produce guidelines that, according to validated, evidence-based, best practices can be recommended for clinical use. However, most of the authors agree that the CPGs reviewed could be recommended for clinical use with relatively minor modifications. It would be useful to determine whether end users of the CAA-member CPGs agree on the importance of the characteristics of CPGs that the AGREE II instrument appraises.

Conflict of interest

The authors report no conflicts of interest. Each author of this paper has completed the ICMJE conflict of interest statement.

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