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Research paper

Paramedic clinical practice guideline development in Australia and New Zealand: A qualitative descriptive analysis

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ABSTRACT

Background: This collaborative study by The Australasian College of Paramedicine's Clinical Practice Guidelines (CPG) Working Group aimed to examine CPG development practices in Australian and New Zealand ambulance services.

Methods: Employing a qualitative descriptive design, the research utilised thematic analysis to extract insights from interviews with eleven experts actively involved in CPG development. The study embraced a nominalist and constructivist approach, recognising the intricate connection between individual experiences and the realities of CPG development in the paramedic field.

Results: Key findings revealed significant heterogeneity in CPG development practices, emphasising a lack of formal training and a substantial reliance on existing guidelines. The study highlighted challenges in project management flexibility, limited research capacity, and inconsistencies in external consultations and resource utilisation.

Conclusion: The study recommends adopting project management frameworks, investing in training, and utilising evidence evaluation methodologies like GRADE. It emphasises the need for multidisciplinary teams and formal expertise in evidence synthesis, advocating for targeted training programs. Funding challenges highlight the importance of dedicated budgets and collaborative efforts for resource allocation. Knowledge translation and implementation issues underscore the significance of training programs for evidence evaluation and knowledge translation in overcoming these challenges.

1. Introduction

The National Health and Medical Research Council (NHMRC) of Australia advocates for the development of high-quality, evidence-based clinical practice guidelines (CPGs) with the aim of "promoting health, preventing harm, encouraging best practice, and reducing waste." To achieve these goals, the NHMRC emphasises that CPGs should be "based on systematic reviews of evidence, transparent development processes and decision-making, and the judgment of evidence by experts, consumers, and other end-users" [1].

This recommendation aligns with the definition provided by the US Institute of Medicine (IOM), which describes a clinical practice guideline as a "statement that includes recommendations intended to optimise patient care, informed by a systematic review of evidence and an assessment of the health benefits and harms of alternative care options" [2]. Trustworthy CPGs play a pivotal role in enhancing patient outcomes and overall healthcare quality [3,4]. They also facilitate shared decision-making, addressing concerns related to the costs of care delivery and disparities in an era marked by escalating healthcare expenses [2,5].

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Clinical practice guidelines (CPGs) hold a ubiquitous and influential role within the profession of paramedicine [6]. CPG content covers the assessment and management of clinical problems and are the standard reference for paramedic clinical practice [7–16]. Clinical guidance documents have evolved as the paramedic profession has developed [6]. Early ambulance clinical protocols were relatively simple and prescriptive documents that served as straightforward resources to support the teaching, delivery, and supervision of basic medical care [6,17]. However, paramedicine has matured rapidly as a profession: paramedics are now registered health professionals in Australia and New Zealand [18,19] and practice is now underpinned by a university-based education model [20]. Correspondingly, protocols have progressed to become comprehensive and detailed CPGs [6,17]. However, the development processes of paramedicine clinical guidance are not well understood.

Most Australian and New Zealand paramedics practice within government-funded emergency ambulance services that are members of the Council of Ambulance Authorities (CAA), hereafter referred to as "jurisdictional ambulance services". Approximately one-third of Australian and New Zealand paramedics practice in private, non-CAA services in settings such as industrial workplaces or temporary gatherings [21]. This study will focus on the development of clinical guidance for paramedics practising in jurisdictional ambulance services in Australia and New Zealand.

The Australasian College of Paramedicine (ACP) is the leading representative body for paramedics in Australia and New Zealand [22]. The ACP established a CPG working group in 2020 to explore the role of CPGs and advocate for CPG improvement. As at the time of this study, the working group comprises nine members: six who are the creators of guidelines within a service, and three who are academics with a research interest in guideline development. Membership has remained consistent since group establishment. All members are part of the research team and co-authors of this study.

The primary aim of this study is to establish a comprehensive understanding of the current practices and processes involved in the development of CPGs within Australian and New Zealand jurisdictional ambulance services. Secondary study aims include identification of the variations, challenges, and areas for improvement in CPG development. Ultimately, this research intends to lay the groundwork for efforts to promote best practice CPG development processes. Optimal CPG development is expected to deliver evidence-based guidance, limit guideline variation, enhance paramedic clinical care delivery, and support improved patient outcomes [3].

2. Research design

A qualitative descriptive design was used to gain insights from the individuals leading the CPG development process (referred to as participants) within Australian and New Zealand jurisdictional ambulance services. The research team adopted the axiological view that healthcare research should result in positive real-world impact [23]. Essentially, this perspective applied to this research posits that understanding the current process of CPG development will lead to identification of methods to improve CPG development. The study design incorporated a nominalist ontological and constructivist epistemological perspective, acknowledging that individual understanding is derived from personal experiences and beliefs [24,25].

2.1. Eligibility and recruitment

This study conducted a census of all jurisdictional ambulance services in Australia and New Zealand, contacting representatives who are specialists and managers of CPGs within their respective organisations. All agreed to participate, resulting in no exclusions. By capturing the perspectives of individuals leading CPG development, the study ensured comprehensive coverage [26]. Potential participants were approached in December 2021, and eleven participants representing all Australian and New Zealand jurisdictional ambulance services were interviewed. Notably, four out of the eleven participants were also authors of this study. This approach was chosen to leverage their unique expertise and firsthand knowledge of CPG development.

In qualitative research, it is not uncommon for researchers to participate as subjects, especially when they possess unique expertise relevant to the study [27,28]. This insider perspective can provide valuable insights; however, it also raises concerns about potential bias and 'groupthink' [29]. Reflexivity was employed to mitigate these risks, with researchers actively reflecting on their own influence on the research process and outcomes. By maintaining a critical awareness of our positions as both researchers and participants, we aimed to minimise the impact of preconceived notions or group dynamics on the findings.

2.2. Interview procedures

Interviews were conducted online via Zoom (Zoom Video Communications, 2022) from February 2022 to April 2022. Transcription of interview audio recordings was completed by a professional transcription provider. Interview duration ranged from 53 to 72 min. Participants were given the opportunity to review a copy of their transcript prior to analysis. Participant characteristics including country of employment and membership of the research team are supplied in Table 1.

To augment trustworthiness, the research team consistently practised reflexivity throughout the process. Reflexivity involves recognising and considering one's own background and potential influence on data interpretation [31]. This was particularly critical in this research because four of the eight research team members also participated in the study. This dual role placed them in the contentious position of being interviewed by a colleague and subsequently agreeing (or disagreeing) with the interpretation of their transcribed statements.

The research team made a conscious decision to include team members as participants to leverage their unique expertise and ensure a comprehensive sample, given the limited number of potential participants. Excluding these participants would have limited access to key insights from those most directly involved in CPG development. While many individuals are involved in CPG development, the authors, as members of the ACP CPG working group, were uniquely positioned to provide in-depth perspectives on the processes and challenges faced.

To enhance trustworthiness, no members coded their own transcripts. Lively and candid discussions among the group were frequent and ensured a high level of reflexivity. Each team member

Table 1
Characteristics of the study sample.

Participant	Member of the research team	Country	Coders
1	✓	Australia	JO, MC, AM, SM
2		Australia	MT, FW, LP, SM
3	✓	Australia	JO, JB, FW, SM
4		Australia	FW, LP, MWS, SM
5		New Zealand	JO, JB, SM
6		Australia	LP, MWS, SM
7		New Zealand	JB, SM
8	✓	Australia	MC, MWS, SM
9		Australia	SM, MT
10	✓	New Zealand	MC, AM, SM
11		Australia	MT, AM, SM

had the opportunity to bring their own perspective to data analysis and findings and no single researcher dominated group discussions. Consequently, the research team achieved consensus that the analysis and study conclusions are balanced and representative.

2.3. Data analysis

This study employed a thematic analysis methodology to investigate and analyse participant views expressed in interviews [30–32]. Thematic analysis allowed participants to express themselves using the nuance of natural language [33–35]. The research team then sought to identify themes in this source material. Themes may be found semantically, where participant statements are taken on their plain meaning, or latently, where implications, inferences and omissions are identified [33,34]. To determine the dominant themes, individual themes identified by the research team were grouped based on the frequency with which concepts were discussed or by the degree of emphasis placed on them by participants. Participant characteristics were also used to further classify themes. For example, concepts expressed predominantly by participants engaged in CPG production in jurisdictional ambulance services of a certain size were aggregated [33,35].

The subjective data analysis methodology involved interpretation of participant statements by multiple researchers. The research team employed a set of qualitative criteria, collectively referred to as “trustworthiness”, to mitigate inconsistency and enhance confidence in the interpretations of the source material and study conclusions. Trustworthiness, in the context of thematic analysis here, refers to credibility, transferability, dependability, and confirmability, as described below [30–32, 36].

A rigorous methodological approach was developed to support coding of participant interviews over a series of online meetings from June to December 2022. A semi-structured theme guide was developed to guide interviews (see supplementary file 1). All interviews were conducted by a single researcher with experience in qualitative interviews (SM), ensuring uniformity across participants. Prior to analysis, all participants were given the opportunity to review their interview transcripts. Each transcript was then independently coded by at least two researchers with no researcher coding their own transcript (the concept of reflexivity is discussed later). Thematic analysis was conducted following the guidance of Braun and Clarke [30, 34, 37]. Researchers became familiar with the data via coding of the transcripts, memoing in a shared Google Drive and group discussions. In total, analysis required more than one year to complete.

A data analysis plan was formulated as part of the ethics protocol in June 2021, and revised in March 2022; this is summarised in Fig. 1. Analysis commenced in April 2022 and continued, commensurate with research team capacity, until August 2023.

2.4. Ethical approval

Ethical approval (#H21417) was approved by the ethical review board of Charles Sturt University.

3. Results

The results section presents the main findings derived from the analysis of the eleven interviews conducted. These findings are organised into three themes, each comprising various subthemes that provide diverse perspectives and experiences shared by the participants. A summary of themes is provided in Supplementary File 1. The characteristics of the participants and the coders are as follows in Table 1. All participants except one were paramedics working in the discipline. The exception was an emergency nurse who had previously worked as a guideline developer associated with the NHMRC before transitioning to the ambulance service to work in guideline development.

3.1. Theme 1: developing CPGs is a complex, multifaceted process influenced by various organisational, professional, and individual factors

The dynamic nature of project management in the development of CPGs within the field of paramedicine is distinguished by a collection of related sub-themes including: 1) Minimal formal training in CPG development and limited application of project management principles, 2) resource limits and reliance on existing guidance, 3) consultation and alignment challenges, 4) limited research capacity, and 5) variable access to external resources.

3.1.1. Subtheme: lack of formal training in guideline development and lack of a project management approach

Processes lacking formal training in guideline development and a project management approach were exemplified by Participant 10’s statement: "It was just me, and really, I didn’t have any experience or knowledge about the process, about developing guidelines. I sort of made up my own process." Another participant echoed these sentiments, adding, "Our application of the principles of AGREE (Appraisal of Guidelines, Research and Evaluation), for example, sometimes we do them well and other times, not too well, all depending on a long list of things, like capacity, timeframes, political agendas, what the… Committee want to approve or not approve" (Participant 2).

The variability in training, scope, and location highlighted in these statements may be expected, given the diverse contexts in which paramedic guidelines are developed. Factors such as the level of formal training, the specific goals and scope of the guidelines, and the geographical location of the services can significantly influence the guideline development process. For instance, smaller or rural

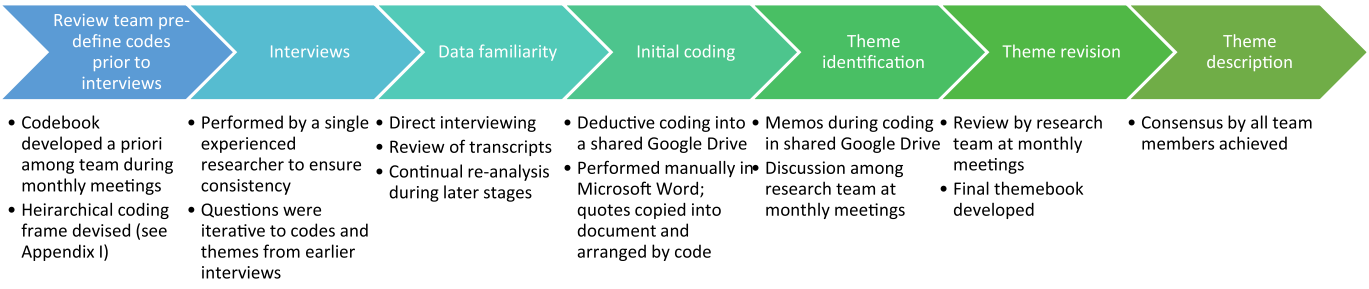

Fig. 1. Research methods. Theme identification drew on: a) recurrent concepts among coded quotes, b) memos taken by participants in the shared Google Drive, and c) discussion during research team meetings. In alignment with the guidance of Braun and Clarke [30,37], themes did not seek to replicate the coding framework or interview protocol, rather they identified broader commonalities across all codes and questions.

services may face different challenges compared to larger urban services, including limited access to resources and expertise. Moreover, the scope of guidelines may vary based on regional health priorities and available infrastructure, which can lead to differences in how guidelines are developed and implemented. Therefore, while the lack of formal training and project management approach is a notable finding, it is essential to consider these contextual factors to fully understand the challenges faced in the guideline development process.

3.1.2. Subtheme: resource limits and over-reliance on existing guidance

Participants emphasised the challenges they faced due to resource constraints and time limitations. One participant described the barriers to conducting complete systematic reviews of the literature, stating: "While I'd love to be able to do a complete systematic review of the literature for a guideline, we don't have enough staff. It's a part of the complexity with having a very lean team and trying to get through a lot of our CPGs" (Participant 11).

The participant continued, outlining their approach: "We generally tend to reference a lot of the national guidelines and conform to them wherever we can. Where there are gaps in the knowledge base, then we try and revert to any meta-analysis or systematic reviews of literature or things like that. Then failing that, we generally see what the other services are doing, and a bit of consensus. Which is a bit unfortunate" (Participant 11).

This suggests resource limitations drive reliance on leveraging existing guidelines. However, existing guidelines may not always be perfectly applicable to all local contexts. This lack of perfect generalisability means that guidelines developed for one setting may not fully address the specific needs, conditions, and constraints of another setting. For example, national guidelines might not account for local variations in patient populations, available treatments, and healthcare infrastructure, which can lead to challenges in effectively applying these guidelines across different regions and services.

3.1.3. Subtheme: consultation and alignment challenges

Participants consistently noted the complexity of aligning the opinions of multiple stakeholders and expert bodies during the consultation phase. One participant expressed the challenge of reconciling different viewpoints from advisory groups, stating, "You get ten different opinions back. That's where it gets really tricky for us, to then try to work out where we align ourselves with" (Participant 8). This encapsulates the difficulties encountered when consulting widely without applying a formal consultation methodology.

3.1.4. Subtheme: limited research capacity

The lack of research capacity within small-scale organisations and the need to rely on resources from other services was noted by Participant 6: "It's hard to generate large-scale research in small-scale organisations, so you often find you have to leverage off of other services… They were from another service and heavily plagiarised.".

The constraints faced by small organisations and the reliance on external sources underscore the challenges of conducting independent research. National guidelines were discussed by several participants, largely viewed positively from a resourcing perspective due to economies of scale, particularly by smaller services with inadequate resources to produce evidence-based guidelines. However, reservations were expressed regarding the necessity of local variations and integration with each jurisdiction's health department.

As stated by Participant 1: "As a group of people who are involved in the development of guidelines, we recognise that a national body would actually be really, really helpful… people saying, well, why don't you just do what the UK do and go to a national body? There is an appetite for it. I guess the challenge I think is going to be higher up board level how that will be received.".

Participant 10 also supported the idea, stating, "The idea of pooling resources just makes a lot of sense." Participant 6 further emphasised the need to share intellectual property between services: "[We need] to open up our intellectual property between services and share on a greater level.".

3.1.5. Subtheme: variable access to external resources

Participants recounted differing levels of access to external resources such as database subscriptions and university systems: "Fortunately, I just completed some more graduate study, so I had access to the university systems" (Participant 6). This fortuitous situation indicates how CPG development may be vulnerable to ad-hoc availability of external resources and suggests there is variability in resource availability between CPG development teams.

3.2. Theme 2: the challenges in developing CPGs are often exacerbated by limited resources, lack of formal training, and varying levels of support from health services

This theme delves into the hidden challenges met in the development of CPGs and covers concepts including low prioritisation and inadequate funding of CPG development, limited research time allocation, and under-recognition of the value of paramedicine CPG development compared to other health disciplines. These concealed barriers appear to inhibit the accuracy of cost estimation and consequently impede the planning and resource allocation required to meet the economic burden of CPG development.

3.2.1. Subtheme: low prioritisation and inadequate funding of CPG development

Participants described the way costs associated with CPG development are relatively invisible, with no explicit funding dedicated to development. Lack of resources assigned to development and difficulty quantifying and estimating the required time investment and development timeframes was also identified. This contributed to a perception that CPG development is considered a low priority function within jurisdictional ambulance services. Participant 4 emphasised this point: "There's only so many hours in the day, and the CPG system is just one small part of the overall provision of prehospital care".

The importance of appropriately valuing CPG development and the relationship between recognition and funding were noted by participant 1: "Recognition from Health that these elements are important to running our service because even in our organisation, if we identify those things, we've still got to sell it higher up the chain to get the funding". Moreover, Participant 2 highlighted the cost considerations: "That gold standard happens to be very expensive, then that's where those conversations start to happen. We look at, maybe, cost-effective alternatives which are almost as good but cost a fraction.".

Insufficient funding is likely to inhibit CPG development and implementation efficiency. This subtheme underscores the need for increased prioritisation and funding support to ensure the effectiveness of CPG development within jurisdictional ambulance services.

3.2.2. Subtheme: research is time consuming

Developers of CPGs encounter significant challenges in managing the burden of conducting research, particularly in finding the necessary time to complete reviews. Participant 6 describes the challenges: "It was just communicating with all these different departments and just spending a lot of time on the phone and understanding stuff.

Despite the desire among CPG developers to utilise evidence decision frameworks, the time-intensive nature of the process is acknowledged by Participant 8: "I want to use an evidence decision framework and do a proper [investigation] with PICO (Patient, population or problem, Intervention or exposure, Comparison or control, Outcome) questions and whatnot. It just takes time.".

The need to balance multiple responsibilities and its consequential impact on finding dedicated time for CPG development is also highlighted by Participant 8: "Even today, I've blocked out writing time to do stuff, and then we've already been given appointments. You know what it's like, it's just busy. We do very well, but unfortunately, we get asked to do a lot of stuff that's not our core business. Today, I'm doing a whole lot of media this afternoon. For the last two weeks, I've been doing a whole lot of education. I appreciate that's part of the job."

These statements underscore the time-consuming nature of research-related activities in CPG development. Moreover, the requirement for individual CPG developers to manage competing responsibilities dilutes their ability to allocate sufficient hours to CPG development.

3.2.3. Subtheme: Under-recognition of the importance of CPG development in paramedicine

There is a notable disparity in the recognition of the importance of Clinical Practice Guideline (CPG) development in paramedicine compared to other health professions. Participant 2 highlights the ongoing struggle: "We're constantly asking for extra support, we have limited success with that over the last few years.".

Resourcing is consistently identified as a challenge: "Resourcing is always an issue… It's very hard to put a financial figure on the benefits of a proper guideline. We are very poorly resourced." (Participant 8).

While evidence-based practice is a foundational element across all healthcare professions, the use of CPGs as specific tools to implement evidence-based practice can vary in prominence. In paramedicine, CPGs play a crucial role in standardising care and ensuring that paramedics can deliver evidence-based treatments in diverse and often rapidly changing environments.

In contrast, other registered professions such as medicine, nursing, and allied health also employ CPGs, but their integration into everyday practice may not be as singularly pivotal due to differences in the scope of practice and the advantage of a more structured environment with additional support and resources.

Therefore, while CPGs are a key component of evidence-based practice in paramedicine, the relative emphasis on CPGs versus other forms of evidence application might be less pronounced in other health professions. This distinction underscores the need for greater recognition and support for CPG development in paramedicine, given its critical role in guiding prehospital care.

3.3. Theme 3: enhancing the effectiveness of CPGs requires addressing both the development process and the implementation strategies to ensure practical and sustainable improvements in paramedic practice

Theme 3 identifies an inconsistent approach to human resourcing for CPG development. Key findings within this theme include: 1) variable skill sets and fluctuating membership of those involved in CPG development project teams, 2) the value and challenges of utilising voluntary capacity, and 3) the necessity for training and expertise in evidence evaluation.

3.3.1. Subtheme: variable skill sets and fluctuating project team membership

Project team members possessed a variety of skill sets and differing levels of expertise in CPG development, and recruitment processes did not necessarily insist on formal expertise or qualifications in CPG development. One participant shared their approach to recruiting paramedics for CPG development, indicating that the recruitment was based on an expression of interest process. This means that any currently practising paramedic could apply: "We do an expression of interest for these groups. Anybody that is on the road, they don't need to be off the road. They are told that this is a development opportunity to do within their own time" (Participant 1).

This approach relies on the voluntary participation of paramedics who are interested and available, but it does not necessarily ensure that team members have specific expertise in guideline development. Consequently, project teams often changed from one guideline review to another, leading to concerns about consistency:

> "Believe me, I'm it. Officially the only team member of clinical practice is me". – *Participant 3*

> ["Is there a CPG team"?] … "Not specifically, no".– *Participant 1*

> "No one has a full-time role with CPGs". – *Participant 7*

The number of full-time staff dedicated to CPG development varies widely among services. In some services, there are no staff with a dedicated guideline role, while in others, there are as many as three to four full-time positions. This inconsistency in staffing levels impacts the capacity to develop and maintain high-quality guidelines. Services with more dedicated staff can manage the research burden and maintain consistency in guideline development more effectively, whereas those with fewer resources struggle to sustain the same level of rigour.

By relying on volunteers through an EOI process, the consistency and continuity of CPG development teams can be affected, as team composition may vary significantly with each review cycle. The fluctuation in team composition raises challenges related to maintaining consistency and institutional knowledge within the project teams. The lack of a dedicated, full-time role for CPGs and the reliance on volunteer contributions add further layers of complexity to the dynamics of project team membership.

3.3.2. Subtheme: value and challenges of voluntary capacity

The use of voluntary capacity in CPG development was recognised as both valuable and tenuous. Paramedics and other professionals volunteered their time, often while continuing to work in their usual roles. Participant 3 emphasised the reliance on volunteers, stating "We have to rely on volunteers in our workforce to give up their time."

While unpaid working groups made valuable contributions to the CPG development process, it was noted that this did not necessarily alleviate the workload of the core CPG development team members. Participant 1 highlighted the importance of maintaining realistic expectations of voluntary contributors: "You can't expect stakeholders within a group who are not being paid to do your work for you within an organisation" Sustaining relationships with voluntary contributors while ensuring an equitable distribution of workload appears to be an ongoing challenge. The delicate balance between valuing the contributions of volunteers and acknowledging the limitations of their involvement in the broader development process was a recurring theme.

3.3.3. Subtheme: lack of expertise in evidence evaluation

Participants highlighted both the need for training in evidence evaluation and the challenges associated with developing expertise in this area. One participant, reflecting on their background, remarked, "My background actually before [service] was working for the NHMRC. I lived and breathed a lot of these tools for quite a few years. Interestingly, coming into [service], my mind has been broadened – to put it mildly – to the real world" (Participant 2).

Paramedic CPG developers did not express confidence in systematically synthesising research and using formal appraisal tools. Participant 8 expressed scepticism, stating, "I just don't think we're very good at doing AGREE II. I think that to do AGREE II properly and put the dedicated work into it. It does take time, and to do it well is difficult.".

Efforts were made to address this gap through formal training sessions and providing additional resources. Participant 1 discussed their training experience, stating, "We're going to give you a day of additional training, and we're going to have a play with some appraisal tools. We're going to look at how to do proper searches and we're going to show you how to use Endnote.".

However, the scale of formal training required to successfully employ instruments such as the Appraisal of Guidelines for Research and Evaluation II (AGREE II) was noted by Participant 11: "There was no formal methodology, like AGREE II or GRADE used at any point in the process." Another participant (Participant 12) expressed awareness of various tools but acknowledged, "I've heard of a number of them before. Do we use it? Sadly not.".

4. Discussion

Analysis of interview transcripts suggested three predominant themes for CPG development in paramedicine in Australia and New Zealand. Firstly, development occurs in a relatively unstructured manner unsupported by a formal project management approach. Secondly, the skills of individual development team members are variable and do not necessarily include expertise in guideline development. Thirdly, it appears that CPG development is a relatively low priority function in ambulance services, and this is associated with difficulty estimating costs and allocating adequate funding. By examining these features, we can identify areas for improvement and propose recommendations for enhancing CPG development using evidence-based practices. The discussion tackles the three major themes in order and will also explore the way optimised CPG development can a) support future CPG standardisation efforts and b) improve the delivery of paramedic care and patient outcomes.

4.1. Applying project management to CPG development

This study identified a lack of project management approaches in CPG development, revealing variations in the composition of project teams responsible for creating guidelines, with team members' skill sets varying from review to review. These inconsistencies in team composition and expectations introduce potential sources of inconsistency and compromise the overall quality and reliability of CPGs.

Effective project management plays a crucial role in ensuring efficiency, transparency, consistency, and high-quality guidelines [1,2]. Without proper training and standardised approaches, development teams may encounter difficulties in conducting systematic searches, synthesising evidence, and adhering to rigorous methodological standards, resulting in variations in CPG quality and reliability, potentially impacting patient care and outcomes [1,2].

Viewing CPG as complex health interventions and adopting relevant health promotion models as conceptual frameworks can provide valuable insight. Adopting established project management frameworks has the potential to simplify and streamline the development process, facilitating resource allocation, and encourage collaborative efforts among team members [1,2]. To tackle the issues highlighted in this study, investing in training programs for guideline development teams in project management becomes crucial. This investment aims to refine their planning, execution, and monitoring skills, with the potential to yield improved outcomes in CPGs.

The value of effective project management extends beyond the CPG development phase. Regular review and timely revision supports integration of new evidence and evolving clinical practice throughout the lifecycle of a CPG [1]. This continual improvement is expected to enhanced patient care and outcomes by providing up-to-date, evidence-based guidance for paramedic clinical practice. The application of suitable project management methodology is considered to enhance the overall reliability of CPGs and contribute to standardisation in the field of paramedicine [1,2].

4.2. Optimising CPG development team capacity

The CPG development project teams were comprised of individuals with differing levels of expertise in guideline review, and membership fluctuated. This study indicates that recruitment may include team members with expertise in subject knowledge, however, without formal skills in evidence synthesis and CPG development methodologies.

Enhancing the capability of team members involved in CPG development is a natural response to these challenges. The need to ensure that CPG development teams comprise of individuals with a broad range of relevant aptitudes and capacities, including expertise in clinical subject matter, research, project management, and evidence evaluation methodologies [1,2]. High-quality guidelines are based on systematic reviews of evidence, transparent development processes, and decision-making, guided by the judgment of experts, consumers, and other end-users [1]. A multidisciplinary approach is expected to promote a comprehensive and high-quality CPG development and implementation process. However, it is time to acknowledge that increased clinical capacity does not automatically translate into expertise in evaluating and translating evidence, guideline development, or project management.

Expertise in formal evidence evaluation methods is crucial for CPG development. Quantifying the level of evidence through literature appraisal is essential when recommendations have implications for practice [38]. The NHMRC sets recommended standards for CPG development in Australia, endorsing GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) framework[1]. GRADE is a transparent framework and considered the international gold standard for developing and presenting evidence summaries, and offers a systematic approach to formulating CPG recommendations. It is the most widely adopted tool for grading evidence quality and making recommendations [39]. When used appropriately, GRADE methods ensure compliance with the AGREE II (Appraisal of Guidelines Research and Evaluation II) tool, a validated and widely used appraisal tool to assess the quality of CPGs.

4.3. Prioritising CPG development to unlock funding

Previous research in various healthcare domains has highlighted the difficulty of accurately assessing the costs associated with guideline development due to the multifaceted nature of the process [40–43]. This study similarly found that funding issues were a recurring theme, impacting both the production of guidelines and the feasibility of implementing interventions.

Jurisdictional ambulance services typically lack dedicated funding for CPG development. Participants indicated that development costs are often absorbed into other existing cost structures, making these costs less visible and harder to quantify. This lack of designated funding creates uncertainties around resource allocation, quality expectations, consultation processes, and feedback systems, which impedes the creation of evidence-based CPGs.

To address these challenges, it is crucial to prioritise CPG development as a key area for investment. Using economic evaluation frameworks can help in accurately estimating the costs and benefits associated with guideline development [43]. Collaborating with other healthcare organisations to share resources and expertise can also lead to more efficient use of available funds. Establishing

dedicated budgets specifically for CPG development will ensure that sufficient resources are allocated, leading to higher-quality and more consistent guidelines.

By making CPG development a priority, ambulance services can unlock funding opportunities that are currently untapped. Clear and visible allocation of resources for CPG development will not only improve the quality of the guidelines but also enhance their implementation, ultimately leading to better patient outcomes.

4.4. Knowledge translation and implementation challenges

The challenges faced by paramedicine in translating evidence into practice are not unique. Similar difficulties are observed across various healthcare professions, where the implementation of evidence-based practices often encounters barriers such as limited resources, varying levels of staff training, and organisational constraints [44,45]. A key discovery in this study is the potential to enhance the capability of paramedicine CPG developers in evidence evaluation methodology.

Addressing these challenges may involve applying relevant healthcare sector knowledge translation strategies and frameworks. Furthermore, knowledge translation science emphasises the importance of employing a systematic approach to bridge the gap between research evidence and practice [46]. Collectively, these frameworks and tools aim for a collaborative and iterative process involving stakeholder engagement, adaptation of evidence to the local context, and ongoing support and evaluation. This approach is designed to facilitate the production of high-quality clinical guidance.

4.5. Future directions and recommendations

To enhance the development of evidence-informed CPGs in paramedicine, it is essential to increase paramedicine capacity in formal project management, evidence evaluation, knowledge translation, and guideline development. Investing in training programs focused on these areas will equip guideline developers with the requisite skills and knowledge to develop high-quality CPGs. Building this capacity will also create pathways for ongoing professional development and knowledge sharing among guideline developers, fostering a culture of continuous learning and improvement.

There is a clear need for policies that recognise the value and importance of CPGs in paramedicine. Establishing dedicated funding and resources for CPG development is crucial to address the current challenges associated with limited budgets and time constraints. Policies should include creating dedicated funding streams, transparent resource allocation processes, and clear expectations for guideline development roles and responsibilities. This approach is anticipated to promote consistent and sustainable CPG development.

Identifying opportunities for jurisdictional ambulance service cooperation to standardise CPG content and effectively use pooled resources is vital. Endeavours by individual ambulance services to use high-quality but time-intensive evidence evaluation frameworks, such as GRADE, are not necessarily supported by the requisite funding. Promoting inter-service cooperation in CPG development will not only foster standardised guidance and more comprehensive coverage but also minimise unnecessary duplication of resource expenditure. This collaboration will enable a best-practice approach to guideline development, leveraging shared expertise and resources to enhance the quality and applicability of CPGs across different contexts.

Opportunities for further research in paramedicine include investigating the association between CPG development processes and patient outcomes, understanding the degree of paramedic autonomy in applying CPGs to specific clinical situations, and evaluating evidence translation and guideline implementation training programs. These research endeavours will provide valuable insights into optimising CPG development and implementation, ultimately improving patient care and outcomes.

4.6. Limitations

This study has several limitations. The data collection focused on participants involved in paramedicine CPG development within jurisdictional ambulance services in Australia and New Zealand, which may affect the generalisability of the findings to other paramedic services, particularly those in different countries or under different healthcare systems. Additionally, the exclusion of private providers and paramedics working primarily in the primary healthcare space may limit the applicability of the findings to the broader paramedic workforce. Future research should aim to include these sectors to provide a more comprehensive understanding of CPG development in paramedicine.

Moreover, the inclusion of authors as participants could introduce potential biases and 'groupthink,' as four of the eleven participants were also authors. While their specialised knowledge and firsthand experience were crucial for the study, reflexivity and methodological rigour were employed to mitigate these risks. Despite these efforts, some degree of bias may still be present, and this limitation should be considered when interpreting the results. Furthermore, the reliance on self-reported data may introduce bias, although multiple data sources and triangulation were used to enhance credibility. Lastly, the findings represent a snapshot in time, and changes in policies, funding, and organisational structures may impact CPG development processes and outcomes in the future. Continued research is necessary to monitor these changes and assess their effects.

5. Conclusion

This study employed a qualitative descriptive methodology to investigate Australian and New Zealand jurisdictional ambulance service CPG development processes. Key findings indicate a relatively fragmented approach to CPG development, marked by uneven formal evidence evaluation expertise, and processes lacking clearly support from project management principles. Low prioritisation of CPG development coupled with a lack of dedicated funding, seemed to impede the application of best practice principles. Despite these challenges, guideline writers expressed a high level of optimism about the future of guidelines in interviews. They were strongly committed to increasing transparency of guidelines and their development processes. Additionally, they continued to advocate for improved processes within their services, and for the development of more accessible and user-friendly guidelines, particularly with the transition to the digital medium.

Finally, CPG developers within jurisdictional ambulance services frequently expressed appreciation for the significance of guidelines and their foundational role within the profession that guides the treatment of millions of consumers annually. The identified priorities to support high quality CPG development in Australia and New Zealand include building formal project management and evidence evaluation capacity in paramedicine, establishment of policy and funding directed toward CPG development and promoting inter-service cooperation.

Author contributions

All authors contributed to the conceptualisation and design of the study. [Author 1] conducted the interviews, and [Authors 2 – 9) assisted in the thematic analysis. All authors participated in the interpretation of results, drafting, and critical revision of the manuscript.

Provenance

This research was conducted by The Australasian College of Paramedicine's Clinical Practice Guidelines (CPG) working group, aiming to comprehensively explore CPG development practices in Australian and New Zealand ambulance services. The study utilised a qualitative descriptive design, employing thematic analysis to derive insights from interviews with eleven experts actively engaged in CPG development.

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We declare that the absence of external funding did not influence the study design, data collection, analysis, interpretation of results, or the decision to submit the manuscript for publication. The research was conducted with the sole purpose of contributing to the scientific knowledge in the field of clinical practice guideline development in paramedicine.

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Declaration of Competing Interest

We wish to declare that there were no conflicts of interest associated with this research. None of the authors have any financial or personal relationships that could have influenced the study design, data collection, analysis, or interpretation of the results. Furthermore, there were no competing interests that could have affected the objectivity and integrity of the research.

We assure you that this Provenance and Conflicts of Interest Statement accurately reflects the origins and circumstances surrounding our manuscript. Should there be any additional information or clarification required, please contact the corresponding author.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.auec.2024.06.003.

References

[1] National Health and Medical Research Council. Guidelines for Guidelines [Available from: ⟨https://www.nhmrc.gov.au/guidelinesforguidelines⟩.
[2] Clinical Practice Guidelines We Can Trust. National Academy of Sciences., editor. Washington (DC): National Academies Press (US); 2011.
[3] Ward JEGV. Why we need guidelines for guidelines: a study of the quality of clinical practice guidelines in Australia. Med J Aust 1996;165(10):574–6.
[4] Grimshaw JM, Russell IT. Effect of clinical guidelines on medical practice: a systematic review of rigorous evaluations. Lancet 1993;342(8883):1317–22.
[5] Woolf SH, Grol R, Hutchinson A, Eccles M, Grimshaw J. Clinical guidelines: potential benefits, limitations, and harms of clinical guidelines. BMJ 1999;318(7182):527–30.
[6] Maria S. Paramedics' clinical reasoning and decision makaing in using clinical protocols and guidelines. Adelaide, Australia: Flinders University; 2021.
[7] New South Wales Ambulance. Clinical Practice Guidelines 2016 [updated 2023; cited 2023 20 Nov 2023]. Available from: ⟨https://cpg.ambulance.nsw.gov.au/tabs/guidelines⟩.
[8] St John Ambulance Western Australain Ltd. Clinical Practice Guidelines [cited 2023 24 Nov 2023]. Available from: ⟨https://clinical.stjohnwa.com.au/clinical-practice-guidelines⟩.
[9] Wellington Free Ambulance. Clinical Prodecures and Guidelines New Zealand2023 [cited 2023 24 Nov 2023]. Available from: ⟨https://www.wfa.org.nz/assets/What-we-do/b8a3986cc7/WFA-CPG-Comprehensive-2019–2022.pdf⟩.
[10] Australian Capital Territory Ambulance Service. Clinical Management Guidelines 2019 [cited 2023 27 Nov]. Available from: ⟨https://esa.act.gov.au/about-esa-emergency-services/ambulance/clinical-management-guidelines⟩.
[11] Queensland Ambulance Service. Clinical Practice Manual 2020 [cited 2023 24 Nov 2024]. Available from: ⟨https://www.ambulance.qld.gov.au/clinical.html⟩.
[12] South Australia Ambulance Service. Clinical Practice Guidelines 2023 [updated 2023; cited 2023 204 Nov 2023]. Available from: ⟨https://clinical.saambulance.sa.gov.au/tabs/home⟩.
[13] St John Northern Territory. Clinical Practice Guidelines 2023 [cited 2023 24 Nov 2023]. Available from: ⟨https://www.stjohnnt.org.au/img/documents/clinical-manuals/CPG-HV23June2013.pdf⟩.
[14] Ambulance Victoria. Clinical Practice Guidelines 2023 [cited 2023 24 Nov 2023]. Available from: ⟨https://www.ambulance.vic.gov.au/paramedics/clinical-practice-guidelines/⟩.
[15] St John New Zealand. Clinical Procedures and gudelines 2019 [cited 2023 24 Nov 2023]. 2019–2022 edition:[Available from: ⟨https://www.stjohn.org.nz/globalassets/documents/health-practitioners/clinical-procedures-and-guidelines—comprehensive-edition.pdf⟩.
[16] Ambulance Tasmania. Clinical Practice Guidelines 2023 [updated 2023; cited 2023 24 Nov 2024]. Available from: ⟨https://cpg.ambulance.tas.gov.au/tabs/guidelines⟩.
[17] Makrides T, Ross L, Gosling C, Acker J, O'Meara P. From stretcher bearer to practitioner: a brief narrative review of the history of the Anglo-American paramedic system. Austral Emerg Care 2022;25(4):347–53.
[18] Australian Health Practitioner Regulation Agency. Regulating Australia's paramedics 2023 [Available from: https://regroup-production.s3.amazonaws.com/documents/ReviewReference/773006523/2021%20Appraiser_Information_Handbook.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAYSFKCAWYQ4D5IUHG%2F20240116%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20240116T225608Z&X-Amz-Expires=604800&X-Amz-SignedHeaders=host&X-Amz-Signature=742bf1a5fbad543e6a572c05f2ab406ba3c9ea14cb713b04e6a4fd3268e20869.
[19] Kaunihera Manapou Paramedic Council. Registration information 2023 [Available from: https://paramediccouncil.org.nz/PCNZ/PCNZ/2.Paramedics/Registration-information-.aspx.
[20] Brightwell RL, B. Sim M, Holmes L. Standards and quality indicators for best pracice in paramedic and inter-professional experiential practica. Edith Cowan University; 2015.
[21] Bange R. The health workforce and paramedicine. Supplementary submission to Northern Australia Workforce Development Joint Select Committee on Northern Australia 2023.
[22] Australasian College of Paramedicine. Who we are [cited 2024 19 Jan]. Available from: https://paramedics.org/about.
[23] Brown MEL, Duenas AN. A medical science educator's guide to selecting a research paradigm: building a basis for better research. Med Sci Educ 2020;30(1):545–53.
[24] C M, editor. The foundations of social research. London, UK: SAGE; 1998.
[25] Grey D. Doing Research in the Real World. 3rd edition. London, UK: SAGE; 2014.
[26] Israel G.D. Determining sample size. 1992.
[27] Poth CN, Lincoln YS, Coghlan D, Clarke V, Clarke V, Clarke V. Qualitative Inquiry and Research Design: Choosing Among Five Approaches. The SAGE Handbook of Qualitative Research. Defense of Being "Native": The Case for Insider Academic Research. Using thematic analysis in psychology. Successful Qualitative Research: A Practical Guide for Beginners. Thematic Analysis: A Practical Guide. SAGE Publications; 2018. p. 59–74.
[28] Lincoln YS. The SAGE Handbook of Qualitative Research. SAGE Publications; 2011.
[29] Coghlan D. In defense of being "native": the case for insider academic research. Organ Res Methods 2007;10(1):59–74.
[30] Braun V, Clarke V, Hayfield N. 'A starting point for your journey, not a map': Nikki Hayfield in conversation with Virginia Braun and Victoria Clarke about thematic analysis. Qual Res Psychol 2019;19:424–45.
[31] Maher C, Hadfield M, Hutchings M, de Eyto A. Ensuring rigor in qualitative data analysis: a design research approach to coding combining nvivo with traditional material methods. Int J Qual Meth 2018;17(1).
[32] Cypress BS. Rigor or reliability and validity in qualitative research: perspectives, strategies, reconceptualization, and recommendations. Dimens Crit Care Nurs 2017;36(4):253–63.
[33] Nowell LS, Norris JM, White DE, Moules NJ. Thematic analysis: striving to meet the trustworthiness criteria. Int J Qual Meth 2017;16(1). 1609406917733847.
[34] Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol 2006;3(2):77–101.
[35] Maguire M, Delahunt B. Doing a thematic analysis: a practical, step-by-step guide for learning and teaching scholars. All Irel J High Educ 2017;9(3):3351.

[36] Guba E, Lincoln Y. SAGEeditor. Fourth generation evaluation. Texas, USA: SAGE; 1989.
[37] Braun V, Clarke V. What can "thematic analysis" offer health and wellbeing researchers? Int J Qual Stud Health Well-being 2014;9:26152.
[38] Hiller SG-SMT, Middleton P, Salisbury J, Tooher R, Weston A. FORM: an Australian method for formulating and grading recommendations in evidence-based clinical guidelines. BMC Med Res Methodol 2011;11(23).
[39] Siemieniuk R.G.G. What is GRADE? [Available from: https://bestpractice.bmj.com/info/toolkit/learn-ebm/what-is-grade/.
[40] Matchar DB, Mark DB. Strategies for incorporating resource allocation and economic considerations: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th Edition). Chest 2008;133(6 Suppl):132S–40S.
[41] Edejer TT. Improving the use of research evidence in guideline development: 11. Incorporating considerations of cost-effectiveness, affordability and resource implications. Health Res Policy Syst 2006;4(1):23.
[42] Hill SR, Olson LG, Falck-Ytter Y, Cruz AA, Atkins D, Baumann M, et al. Incorporating considerations of cost-effectiveness, affordability, and resource implications in guideline development: article 6 in Integrating and coordinating efforts in COPD guideline development. An official ATS/ERS workshop report. Proc Am Thorac Soc 2012;9(5):251–5.
[43] Guyatt G, Baumann M, Pauker S, Halperin J, Maurer J, Owens DK, et al. Addressing resource allocation issues in recommendations from clinical practice guideline panels: suggestions from an American College of Chest Physicians task force. Chest 2006;129(1):182–7.
[44] Reed JE, Howe C, Doyle C, Bell D. Simple rules for evidence translation in complex systems: a qualitative study. BMC Med 2018;16(1):92.
[45] Smith S, Johnson G. A systematic review of the barriers, enablers and strategies to embedding translational research within the public hospital system focusing on nursing and allied health professions. PLOS ONE 2023;18(2):e0281819.
[46] White J, Grant K, Sarkies M, Haines T, Morris ME, Carey L, et al. Translating evidence into practice: a longitudinal qualitative exploration of allied health decision-making. Health Res Policy Syst 2021;19(1):38.