Paramedics as researchers: A systematic review of paramedic perspectives of engaging in research activity from training to practice

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Abstract

Background: The need for a stronger evidence-base in paramedicine has precipitated a rapid development of pre-hospital research agendas. Paramedics are increasingly involved in research, leading to changes in their role. Yet the integration of research responsibilities has proven to be challenging, resulting in varying attitudes and levels of engagement. ***Objective:*** This systematic review aimed to explore paramedics' views and experiences of research as researchers during training and within practice.

Methods: A systematic search was undertaken across 6 databases. Qualitative empirical peer-reviewed articles which discussed paramedic perspectives on engaging with research activity were included. Of 10,594 articles initially identified, 11 were included in the final synthesis following quality appraisal. Data were extracted and subjected to narrative synthesis. ***Results:*** Four themes were identified: motivation to engage, moral dilemmas,

structural issues within the profession, and reflections on trial involvement. Attitudes towards research, understanding of related concepts, and the drive for patient benefit were interwoven core issues.

Conclusion: Research was highly valued when links to patient benefit were obvious, however, this review highlighted some cultural resistance to research, particularly regarding informed consent and changes to standard practice. Paramedic research methods training should provide structured opportunities to explore concerns and emphasize the role of research in developing a high-quality evidence base to underpin safe practice. Currently there is inadequate organisational support for paramedics to engage effectively in research activity, with minimal allocations of time, training, and remuneration. Without properly integrating research activity into the paramedic role, their capacity to engage with research activity is limited.

Key words: Paramedics, pre-hospital, research, trials, evidence-based practice.

Introduction

In the UK, paramedicine has been a regulated allied health profession since 2001 (1), with practice historically founded on best-practice and reasonable assumptions governing care (2). Whilst still in its infancy (3, 4), there has been a recent exponential growth in the volume of pre-hospital research (5). Simultaneously, the paramedic role has evolved from being vocationally trained and protocol driven, to requiring tertiary-level qualification with heightened expectations for clinical autonomy and the delivery of evidence-based practice (EBP) (6, 7). EBP is now widely regarded to be an essential tenet of providing safe and effective health care, including paramedicine (8). It is defined as the combination of quality research evidence, patient preferences, and clinical experience to enhance the treatment provided (9).

It is the outcomes of research that drive EBP, and health care providers are expected to evaluate and incorporate findings into their practice (10). Increasingly there is an expectation that paramedics play a role in the design and conduct of research (6). The rapid development of pre-hospital research agendas to address the need for more research in this area has led to changes to the paramedic role (4, 11); with paramedics now being involved in research as researchers, such as being tasked with enrolling patients onto research projects and delivering research interventions (8, 11). Outside of paramedicine, previous reviews with clinicians and Allied Health Professionals have concluded that engagement in research is likely to lead to healthcare performance improvements in terms of processes of care and healthcare outcomes (12, 13). However, the introduction of research tasks to the role has proven to be challenging with varying levels of engagement from paramedics and the identification of multiple barriers (14). For example, challenges with gaining informed consent (15) and a lack of contractual time for research (16). Furthermore, dedicating time to research activities, for instance, the consent process, may not align with paramedics' traditional priorities of treating and getting a patient to hospital as soon as possible (4).

With increasing demands on paramedics (17), additional tasks such as research may be seen as burdensome on their already limited capacity (18). Engagement with research activity does not automatically occur, it requires organisational commitment to foster the acceptance and adoption of research practice, accompanied by a culture shift within paramedicine towards this way of working (6, 19). It also requires researchers and clinical trial managers to develop effective means of facilitating paramedic engagement (4, 20).

Views of research as part of the paramedic role are likely formed early in a paramedic's career or during training. Paramedics in the United Kingdom must complete a pre-registration qualification to register with the Health & Care Professions Council (HCPC); this is increasingly undertaken in higher education institutions. Paramedicine does not have a strong tradition of research, and the relationship between higher education and professionalism is perhaps not as straightforward as other disciplines (21, 22). Furthermore, students often choose allied health training due to their interest in patient care (23). Following the emergence of research as a component of the paramedic role, the focus on research in paramedic education is increasing (24), however engrained beliefs about the prioritisation of hands-on care can form a significant barrier to successfully teaching research (7, 24). A better understanding of student attitudes that may form barriers to acceptance of research is required.

To better understand how research activity can be promoted most effectively within paramedicine, it is necessary to first explore current views within the profession. This will contribute to the development of strategies to support research engagement (25), foster positive attitudes towards the role of research in paramedicine, and increase paramedic understanding of research. The purpose of this systematic literature review was to synthesize the available empirical qualitative literature to address the review question which was defined under the SPICE (setting, perspective, intervention/phenomenon of Interest, comparison, and evaluation) framework (26): What are paramedics' views and experiences of research as researchers during training and within practice?

Methods

This review followed the six stages outlined in the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) guidelines, and the reporting was guided by the standards of the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) Statement. Details of the protocol were registered on PROSPERO (ID: CRD42022310711).

Search strategy

A research librarian supported the refinement of search terms and identification of databases most likely to produce appropriate results. During this initial scoping research Google Scholar was also explored. Formal searches were undertaken in 2022 in 5 electronic databases: PubMed, APA PsycINFO, CINAHL (The Cumulative Index to Nursing and Allied Health Literature), Web of Science, and Cochrane Library. To maximize the amount of relevant literature, truncation (*) and Boolean operators 'AND/OR' were applied. The following search strategy was applied to title and / or abstract:

Paramedi OR Prehospital OR "pre hospital" OR ambulance OR EMT OR "Emergency Medical Technician*" OR "paramedical clinician*" OR "prehospital research" AND research OR "research method*" OR "data collect*" AND engage* OR access* OR participat* OR support OR perspective* OR involve* OR perception* OR view* OR "paramedic-driven" OR "driven" OR "paramedic-led" OR led OR experience**

Study Selection

Inclusion and exclusion criteria were set before any search commencement. To be eligible, articles needed to: (a) utilize a qualitative research design and (b) discuss paramedic or

student paramedic perspectives on research or experiences of involvement in conducting research. Studies using mixed methods were eligible, but only the qualitative data were included in the synthesis. The review focused on qualitative research because the aim was to understand perceptions and experiences which cannot be gleaned from quantitative data. No date restrictions were applied. Articles were excluded if they were (a) not peer reviewed; or (b) not published in the English language or if no published English language translation was available.

All authors independently screened items yielded by the search against the eligibility criteria, initially by titles and abstracts and then by full text (Figure 1). Uncertainties were resolved through group consensus. To support reliability, JR screened 10% of the excluded articles with 100% agreement. Lastly, the reference lists of all included articles were searched, and a hand search of Google Scholar was conducted; no additional relevant articles were identified at this stage.

Quality Assessment

Each included article was independently assessed for quality by two authors using the JBI Critical Appraisal Checklist for Qualitative Research (27). Adherence to each item is answered with “yes”, “no”, “unclear” or “not applicable”. A numerical value of one was attached to each ‘Yes’ answer; a minimum score of zero and a maximum score of 10 could be awarded by each reviewer and overall quality was determined by averaging scores. Table 1 presents the allocated JBI scores.

The evaluation of the studies found variable quality across the articles. There is no consensus on specific thresholds for excluding studies from qualitative synthesis and it is typical for reviewers to make informed decisions based on their topic and the literature identified (28). Articles of all quality can generate insights for an understanding of paramedics’ views, and in the current review few relevant studies were identified. Therefore,

only one article (29) was excluded at this stage. This was a self-reflective case study which raised concerns during quality appraisal in relation to poor methodological and reporting rigor, it was therefore deemed that inclusion of the study may jeopardize the integrity of any conclusions drawn from this review, and it was removed. In total, 11 articles were included in the final synthesis.

Reference	**JBI quality scores**		
	Reviewer 1 score	**Reviewer 2 score**	**Average score**
(Ankolekar et al., 2014)	7	9	8
(Armstrong et al., 2019)	7	7	7
(Burges Watson et al., 2012)	8	7	7.5
(Charlton et al., 2019)	10	10	10
(Green et al., 2020)	8	5	6.5
(Lazarus et al., 2019)	4	5	4.5
(Leonard et al., 2012)	5	7	6
(Lim et al., 2014)	2	1	1.5
(Pocock et al., 2016)	5	5	5
(Pocock et al., 2019)	9	9	9
(Ripley et al., 2012)	8	7	7.5
(Wilson et al., 2021)	9	8	8.5

Table 1: JBI quality appraisal scores

Data Extraction and Synthesis

The following information was extracted from the included articles into an Excel spreadsheet: authors, title, year of publication, country, aim/research question, population/participant demographics, methodology and methods, findings, and conclusions. As is typical of

qualitative research, variation in reporting styles across articles presented challenges in identifying the most appropriate findings (30), therefore all text labelled as 'findings' were extracted (31). Key information is summarized in appendix 1.

A narrative synthesis was performed in accordance with the synthesis method set out by Thomas and Harden (2008). This inductive method (32) is well-suited to synthesize empirical research conducted across different research paradigms (e.g., medicine and psychology). It comprises three stages: coding text, developing descriptive themes, and generating analytical themes that address the research question.

In the first stage, all authors independently undertook line-by-line coding in which they coded the text in consideration of meaning and content. This stage was iterative as the text within each code was repeatedly examined to check the consistency of interpretation and to see whether additional levels of coding were needed. The initial codes from all authors were then combined and grouped into descriptive codes through group discussion. After which, using an iterative process and discussion amongst authors, descriptive codes were grouped into analytical themes that provided a narrative to answer the review question.

Results:

Presentation of Studies

The initial search returned a total of 10,594 articles, as shown in Figure 1, from which 3782 duplicates were removed. Screening at the level of title and abstract resulted in the exclusion of 6,783 articles. Full texts from the remaining 29 studies were assessed against the eligibility criteria and quality appraised, and 18 studies were subsequently excluded. No additional relevant articles were identified through further hand searching. In total, 11 articles were included in the final synthesis.

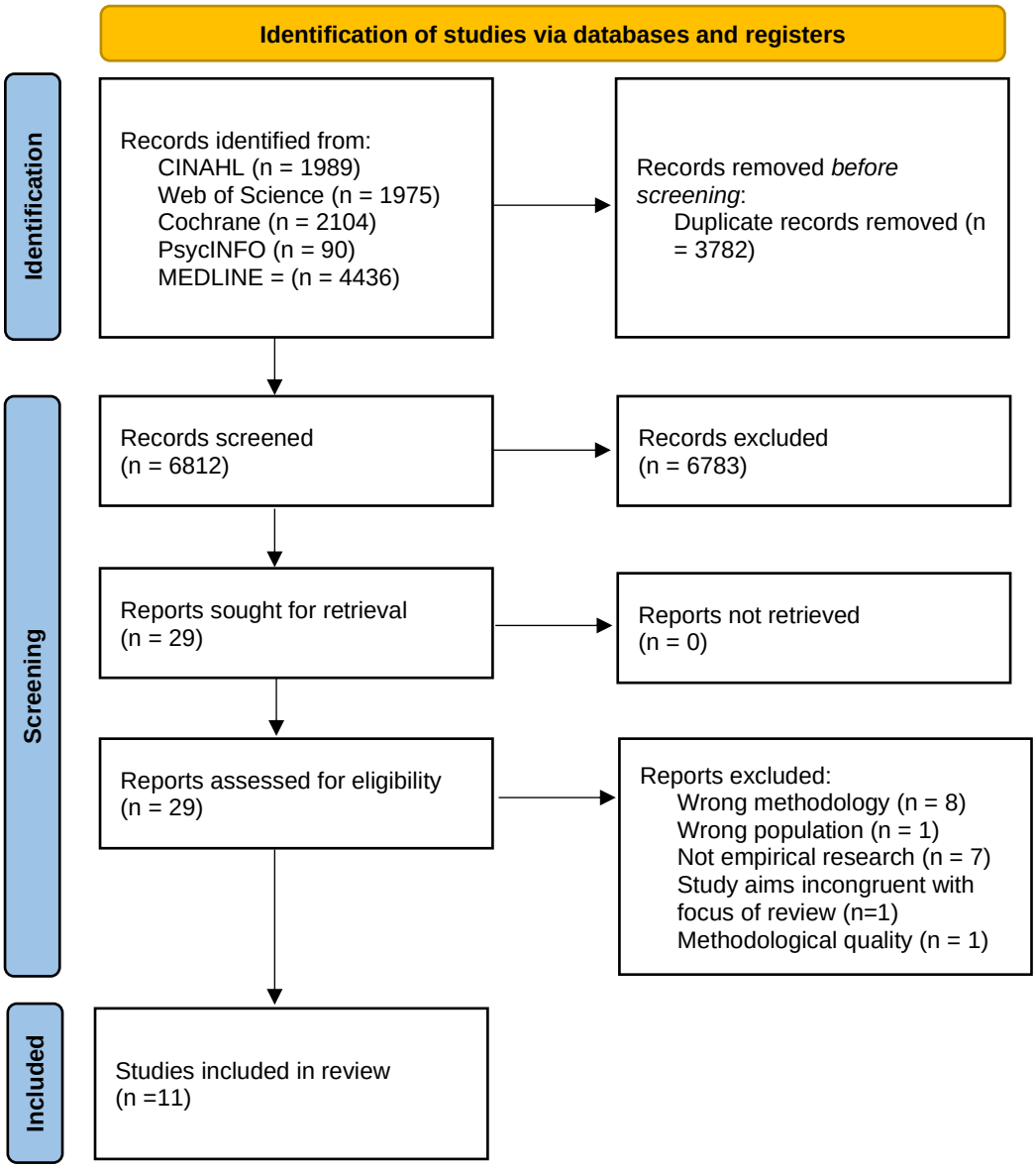

Figure 1: PRISMA flow diagram for article selection

Full details of included studies are listed in Appendix 1. Studies had a publication date range of 2012-2021; most were conducted in the UK (4, 14, 16, 33-36), one in Australia (24), one in the US (37), and one reported on experiences of paramedics from both the UK and US (20). All studies reported paramedic views and experiences of research participation; most reported on specific trials (14, 16, 33-36), whilst others investigated general perceptions of research (20, 24, 37-39). All studies were conducted with paramedics, one study exclusively recruited student paramedics (24), and sample sizes had a range of 5-152.

Approaches to qualitative study designs included textual content analysis, focus groups and interviews, with thematic analyses applied in all studies.

Thematic Findings

The thematic analysis of the findings across the 11 studies generated four themes, as detailed in Table 2:

Theme	**Theme description**	**Data extraction sources**
Motivation and reservations	Factors that were reported to have been influential in paramedics' decisions whether to engage with research.	Ankolekar et al. (16), Burges Watson et al. (20), Charlton et al. (33), Leonard et al. (39), Pocock et al. (36), Ripley et al. (37)
Moral dilemmas	Issues that concerned paramedics in relation to the morality of research in paramedicine.	Ankolekar et al. (16), Armstrong et al. (38), Burges Watson et al. (20), Charlton et al. (33), Green et al. (14), Lazarus et al. (34), Leonard et al. (39), Pocock et al. (35), Pocock et al. (36), Ripley et al. (37)
Structural issues in the profession	Factors ingrained within the paramedic profession led to barriers to research engagement.	Ankolekar et al. (16), Leonard et al. (39), Pocock et al. (35), Pocock et al. (36), Green et al. (14), Lazarus et al. (34), Wilson et al. (24).
Reflections on trial involvement	Experiences of past research involvement had an impact on paramedics' views on research.	Ankolekar et al. (16), Lazarus et al. (34), Pocock et al. (35), Leonard et al. (39), Armstrong et al. (38), Green et al. (14)

Table 2: Themes extracted from data

Theme 1: Motivations and Reservations

Most articles reported that overall, research was held in a positive regard by paramedics. Participants interviewed by Ripley et al. (37) expressed excitement at the prospect of delivering “ground-breaking” protocols, with the recognition that research holds potential to improve national standards. Paramedics were patient-focused in discussing motivations for their involvement, often driven by the possibility of providing better and faster care (16, 20, 37) for improved patient outcomes (16, 20, 33, 36, 37, 39). Equally, paramedics were resistant if a direct or obvious benefit to patients was lacking (39), if administrative processes were considered lengthy and out of alignment with the traditional paramedic role, or threatened autonomous practice (20). Ankolekar et al. (16) identified that some paramedics were intrinsically motivated to be involved when they had personal experience of the condition under investigation.

Paramedics recognized the potential for professional benefits associated with research. Pride for the profession drove paramedics to contribute to a stronger evidence base (20, 36, 37). There was also recognition of possible individual career progression (37, 39) and advancement of practice-based skills (16). However, the resistance of colleagues was found to be a barrier (34), which is pertinent given that most paramedics work as part of small teams. Burges Watson et al. (20) suggested that the incorporation of research within paramedicine precipitated a newly emerging professional identity, in which the adaptation to increasing medical roles within the service was welcomed.

Theme 2: Moral Dilemmas

By following stringent procedures to establish consent, paramedics were confronted with competing priorities by providing time-sensitive patient care (20) and managing the emotional status of those on scene (16). In addition to practical challenges, paramedics held conflicting views regarding the enrolment of patients where consent was not possible due to

a reduced level of consciousness (33, 34). Charlton et al. (33) reported that several paramedics expressed concern that this impedes patient autonomy, thus rendering recruitment to research as immoral and unacceptable. Ankolekar et al. (16) suggested that the development of an abridged consent procedure for conscious patients may provide a viable means to address such concerns. However, it was generally reported that paramedics accepted a lack of consent if the overall goal was to improve practice (33, 34, 37).

A further ethical dilemma was the unknown efficacy of interventions being trialed, particularly if protocols required withholding standard care for trial purposes (33, 39). This led to reluctance from some paramedics to be involved (14, 33, 36), with some *"equating trial medicines with placebo*" (36). Additionally, some paramedics were uncomfortable about the blinded nature of trials when they could not disclose to patients or families whether the standard or trial treatment was being administered (20, 36). This was significant as "*honest relationships with their patients were seen as fundamental to their identity as paramedics*" (20). Pocock et al. (35) noted that education around the background and need for research was important to address concerns, also studies called for robust and specific ethics training and continued guidance for paramedics during data capture periods (14, 16, 38).

Theme 3: Structural Issues within the Paramedic Profession

A lack of organisational priority for research was deemed to be a barrier to engagement with research (35). Articles reported that paramedics do not have time allocated for research activity within contracted hours (16, 20, 39). Consequently, research was viewed as an additional task rather than integral to the paramedic role, and involvement thus relies on the motivation of individuals. The capacity of paramedics to undertake tasks in addition to their current workload is further limited by the nature of working practices, such as long hours, shift patterns, and winter pressures (35). The lack of contractual time for research activity contributed to the perception that research was not part of a paramedic's role (16, 20). This

view may also be reflective of a lack of research teaching pre-registration, particularly about how knowledge is produced and integrated into practice (24). Without developing knowledge of, and confidence in research at this initial stage, paramedics may not feel confident to engage with research once qualified (24).

Training to understand the research process is required before paramedics can decide whether to be involved, however, Ankolekar et al. (16) and Green et al. (14) reported that training was unpaid and scheduled outside of working hours, which discouraged participation. Attendance at research training increased when organisations rewarded engagement (35), although instances were rare (39). Consequently, voluntary recruitment of paramedics to research projects was cited to be a challenge (14, 35), although this was overcome by mandating involvement (36). Pocock et al. (35) identified that a large-scale research project, involving multiple paramedic teams fostered feelings of inclusion, and being valued, and therefore increased willingness to participate.

Theme 4: Reflections on *Trial Involvement*

Reflections from paramedics about their involvement in clinical trials were reported across several studies. Experiences of training were positive across some studies (16, 34, 39), with ongoing support and regular trial updates found to be particularly supportive (16). Simplicity in trial protocols was highly valued by paramedics involved (35) and Ankolekar et al. (16) reported that paramedics found trial processes to be straightforward and became easier with experience. However, communication with investigators was sometimes perceived to be poor, compounded by a lack of researcher awareness of the prehospital environment (35, 38). Practically, the mobile nature of the profession also posed challenges for communication, given that it was not possible to guarantee that crews would be at their ambulance station (35). Ineffective communication channels were thought to prevent trial paramedics from reporting protocol deviations to investigators (14). These deviations were

more common when there were large discrepancies between trial protocols and standard practice (35) or when there was limited training on when trial deviations would be acceptable (14). These challenges became less apparent as paramedics became more familiar with the trial protocol (16).

Practical obstacles to trial involvement experienced by paramedics included the volume of paperwork, particularly when data collection was paper based (35, 39), the need to store and transport sometimes heavy equipment (35), and the maintenance of research logs (16, 35). Storage of trial devices posed an additional difficulty (35) and items were often lost when vehicles were moved for servicing or transferred to another ambulance station (16).

Discussion

The appetite for research amongst paramedics was apparent across studies, yet issues were highlighted which compromised engagement with research activity. A focus on patient welfare shaped many of the views held by paramedics in relation to research. Whilst better patient care was a motivator for paramedics to be involved in developing a better evidence base (16, 20, 37), it also induced concerns regarding safety and consent (33, 34). Paramedics held reservations about the ethics of recruiting patients to clinical trials in circumstances where they have a reduced level of consciousness, and thus capacity. Pocock et al. (36) advocate for more explicit teaching on the necessity of research during pre-registration training. Increasing research awareness at this stage may also provide an opportunity to address ethical concerns and reservations, such as the internal struggle of weighing the individual risk to patients against public good (36-38).

There is strong indication that the introduction of research tasks to the role has been poorly supported at an organisational level. Paramedics play an important role in the recruitment of participants and the delivery of interventions for research (16, 34, 39). Yet, whilst research protocols may only deviate minimally from routine care, reporting and administrative

processes were highly time-consuming (16), and led paramedics to question whether research activity can be in alignment with their role. Considering the incongruencies between research and paramedic processes, the incorporation of research within paramedicine requires a culture shift towards this way of working. Whilst both share the goal of improving patient care and outcomes, this needs to be made explicit through organisational commitment to foster its acceptance and adoption (6, 19). It also requires researchers and clinical trial managers to develop effective means of facilitating paramedic engagement if research is to be carried out in practice (4, 20). A sustainable and desirable strategy would enable research to become embedded, such as bespoke training opportunities, integration within typical shift patterns (35), and remuneration (39). Such practices not only affirm the value of research but build capacity into the paramedic role. Considering the strong collegiate bonds in paramedicine (40), significant efforts may be required to address a culture of resistance. Consequently, paramedics need to be involved in research design, whether directly or through consultation. This is important given the complexity of pre-hospital setting, and could reduce perceived barriers and negative perceptions, particularly with the use of a placebo or managing unconscious patients (33, 39).

This review demonstrated that the training opportunities for research engagement were limited (35, 36). Wilson et al. (24) revealed cynical attitudes towards research and frustration related to the complexity of research principles. Many hold a binary view towards knowledge and practice and research is not valued with equivalence to clinical skills (7). Challenges in understanding and applying the principles of research have been found to contribute to negative perceptions of its role in the profession (23). This emphasizes the need for high quality pre-registration teaching, in order to draw awareness to the necessity for research in paramedic practice. Lim et al. (29) highlight the positive experiences that students can yield if offered supportive research mentoring. To address current deficits in paramedical research, resources need to be directed to support the identity development of paramedic academics (41).

Implications for Research

Further research is required in the following areas to develop some of the findings of this review:

1) Student perspectives: Most studies reported the high value placed upon training opportunities for building research skills, yet there was little evidence from student paramedics. Obtaining student views holds the potential to understand how research might be taught more effectively.
2) Understanding resistance: The perspectives captured in studies were largely of paramedics who had volunteered involvement in the delivery of clinical trials. Future research needs to include the perspectives of paramedics who choose not to engage in research trials. Specifically, further work should seek to understand the nature of individual concerns and widespread negative attitudes.
3) Systems perspective: To facilitate the translation of such research, a systems perspective should be employed to identify the wider factors (e.g., logistical or financial) that impact the inclusion of research in a paramedic's role.

The review also identified areas for improvement in the design of research:

1) Paramedic involvement: Many studies reported barriers to paramedics' engagement with research. Future research which relies on paramedic 'buy-in' should consult paramedics, or involve them in the research team, on factors such as the research design, consent processes, training needs, and support required throughout the study process.
2) Research quality: The quality of included studies was varying, which yields the recommendation that processes are installed to support the quality of future research.

Strengths and Limitations

This is the first systematic review to explore allied healthcare professionals' perspectives of research. The overall quality of the research articles identified by this review was varying (27), largely owing to methodological rigor; this reflects the overall paucity of research in paramedicine. All studies adopted a self-selecting sample; therefore, it is likely that the research captures the perspectives of those with relatively strong views. Some only recruited paramedics who had been involved in a preceding trial (14, 16, 33-36, 38) which suggests participants would hold more favorable views compared to those who had not elected to participate in a trial. Further, whilst some perceptions may be transferrable to research more broadly, it is likely that some factors will be relevant to that trial only. As a result of the limitation to papers available in English, all studies were conducted in the UK, US, and Australia. Consequently, findings and recommendations may be less transferable internationally.

The potential for bias of the authors has been acknowledged throughout the review process. Two authors (SO and AH) are paramedics, and two teach research methods to paramedic students in higher education (JR and SO). Owing to the potential influence of preconceptions, a subject non-specialist methodologist was recruited to the team (HH). As part of the analysis process, the group engaged in critical discussion and group reflexivity to support the confirmability of findings (42). To maximize trustworthiness and rigor, a stringent qualitative systematic review methodology and analysis process was followed.

Conclusion

Paramedicine presents unique challenges and opportunities for research, spotlighting moral debates such as obtaining informed consent from unconscious patients and distressed relatives during emergency situations when treating and transporting the patient is the priority. With the safety and autonomy of patients at the forefront of practice, and the

commitment to “do no harm”, this places significant pressures on paramedics. Evidence from this review highlights a strong drive to develop the evidence base to improve patient outcomes from many paramedics. However, there were also widespread reservations, particularly regarding the ethics of enrolling patients in clinical trials that may involve withholding interventions or changing standard practice. This appears to have cultivated resistance to research engagement across the profession, and a culture shift within paramedicine towards this way of working is potentially required (6, 19). Currently, there is inadequate organisational support for paramedics to engage in research activity. Researchers must develop effective means of facilitating paramedic engagement if research is to be carried out in practice. Research methods training in paramedicine should provide a platform to explore concerns and emphasize the role of research in developing a high-quality evidence base to underpin safe practice. Without integrating research activity into the role of the paramedic and increasing capacity, the future of evidence-based paramedicine is at risk.

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