Research

Preparedness of graduate paramedics for practice: a comparison of Australian and United Kingdom education pathways

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Abstract

Introduction

Internationally, emergency ambulance paramedic education has evolved from 'on the job' training by ambulance services to tertiary-level qualifications. However, across many countries and jurisdictions clinical practicum requirements still differ substantially. For example, Australian paramedic students spend fewer hours on clinical practicum than their United Kingdom (UK) counterparts.

Methods

Fifteen semi-structured face-to-face interviews were conducted with Australian and UK paramedics and managers to identify their perceptions regarding the preparedness of graduate paramedics for practice.

Results

Interviewees in Australia and the UK identified that newly graduated paramedics require an internship period before independent practice. Interviewees in both jurisdictions recognised the robust theoretical knowledge and practical skills of graduates. Organisational operations, clinical judgement and decision-making, and care-pathway selection were areas where interviewees identified that an internship period consolidated the graduate's learning.

Conclusion

This research found that increased time spent by paramedic students on ambulances did not increase a new graduate's ability to practice independently before an internship period. The time spent on ambulance practicums, objectives and supervisory model should be reviewed.

Keywords:

paramedic education; practicum; skills acquisition; knowledge; human factors; practice preparedness

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Introduction

Universities in the United Kingdom (UK) and Australia have undergraduate pathways into paramedicine which prepares graduates for employment in an emergency ambulance service. The Australian pathway for paramedic education places a greater emphasis on theoretical education (1,2) compared to the UK pathway, which has more clinical practicum-based training (3). This research compares the viewpoints of professional paramedics and their managers on whether newly graduated paramedic students are prepared for practice under each system of education.

Systems overview

Australian paramedic education

The majority of state and territory government-run or contracted emergency ambulance service providers in Australia require new paramedics to hold a Bachelor degree for entry to practice. However two services, St John Ambulance Western Australia and the Ambulance Service of New South Wales, offer alternative entry pathways in addition to nationally-accredited Bachelor degree entries (4,5).

Until recently, paramedical science qualifications were accredited by the Council of Ambulance Authorities (CAA), the peak body representing emergency ambulance services throughout Australia (6). There are 22 Australian programs that have received full, partial or provisional accreditation from the CAA (7). The CAA works with provider ambulance services to develop public policies and standards, and to increase paramedic and service knowledge through research, information exchange and monitoring (6).

Paramedic education in the UK

Paramedic education in the UK has similarly evolved over the past two decades. Since the introduction of statutory registration for paramedics in 2000, paramedic education has transitioned from a vocational training model to a Higher Education Institution (HEI) model (8). The first cohort of UK paramedics graduated with Honours degrees in 2001 and the increasing professionalisation of paramedics saw the creation of a professional body, the British Paramedic Association, latterly the College of Paramedics (CoP) (8). In 2004, CoP developed and published the first paramedic standards of proficiency, followed in 2006 by the publication of its first curriculum guidance and competency framework (8). In 2006 there were six approved educational pathways delivered by three HEIs in the UK. By 2017 this number had increased to 68 educational pathways delivered by 36 approved education providers (9).

Governance of paramedic education programs in the UK is administered by a statutory agency. The UK Health and Care Professions Council (HCPC) approve education providers

against their standards, which all education providers must meet if offering paramedic programs. The programs are defined under the Standards of Education and Training (SETs) (9). After the initial program approval, all education providers are subject to an annual monitoring process to ensure continued adherence to the SETs (9). A fundamental aspect to the HCPC's work is collaboration with professional bodies that may develop curriculum guidance on behalf of their professions, with a specific standard identifying that paramedic programs must reflect the philosophy, core values, skills and knowledge base as articulated in curriculum guidance (10). In addition to this, the SETs also identify that practice placements must be integral to an undergraduate student's education (11). At present, there is no similar statutory approval for Australian universities who offer undergraduate paramedic training programs, however, it is noted that the Australian Health Practitioner Regulation Agency (AHPRA) has taken on the role of undergraduate course accreditation since paramedics became registered in December 2018 (12).

Graduate preparedness to practise and paramedic competencies

There is no system-wide agreed definition of what it means to be a graduate paramedic who is prepared to practise. In the context of this research, we used the definition provided by interviewees that, from their perspective, preparedness to practise referred to the ability of a graduate to independently practise as a paramedic.

Each jurisdiction defines their individual professional paramedic competencies or professional capabilities that must be met by graduate paramedics. In Australia, competencies/standards of proficiency are set by the CAA (13) and are now set by AHPRA (12,14), and in the UK they are set by the HCPC (15) (Table 1).

Paramedic competencies can be achieved in a number of ways, and in the UK the College of Paramedics provides detailed curriculum guidance for universities (16). Although the CAA has guidance for accreditation of undergraduate paramedic courses, in Australia there is no corresponding detailed curriculum guidance for Australian universities (13,17). At present, AHPRA are seeking to appoint an accreditation committee and have not published guidance on the accreditation on undergraduate courses (18). To date, it is unclear whether the UK or Australian model results in paramedics who are better prepared for independent practice upon graduation.

Practice-based education

Throughout the Australian (average 3-year) paramedical science Bachelor degree, students are taught clinical skills in practice-based units using simulation. Students then consolidate these skills while on clinical placement with healthcare providers and ambulance services. Simulation scenarios are conducted in university laboratories utilising

Table 1. Paramedic competencies in Australia and the UK

Australian Paramedic Professional Competencies (13)	UK Paramedic Professional Standards of Proficiency (15)
1. Acts in accordance with accepted standards of conduct and performance	1. Be able to practise safely and effectively within their scope of practice
2. Makes informed and reasonable decisions	2. Be able to practise within the legal and ethical boundaries of their profession
3. Demonstrates professional autonomy and accountability	3. Be able to maintain fitness to practise
4. Develops and maintains professional relationships	4. Be able to practise as an autonomous professional, exercising their own professional judgement
5. Demonstrates the knowledge and understanding required for practice as a paramedic	5. Be aware of the impact of culture, equality and diversity on practice
6. Operates within a safe practice environment	6. Be able to practise in a non-discriminatory manner
7. Identifies and assesses health and social care needs in the context of the environment	7. Understand the importance of and be able to maintain confidentiality
8. Formulates and delivers clinical practice to meet health and social care needs within the context of the environment	8. Be able to communicate effectively
9. Critically evaluates the impact of, or response to, the paramedic's actions	9. Be able to work appropriately with others
	10. Be able to maintain records appropriately
	11. Be able to reflect on and review practice
	12. Be able to assure the quality of their practice
	13. Understand the key concepts of the knowledge base relevant to their profession
	14. Be able to draw on appropriate knowledge and skills to inform practice
	15. Understand the need to establish and maintain a safe practice environment

mannequins and mock patients. Using simulation allows students to practise invasive skills such as intravenous cannulation and advanced airway management without the risk of adverse events. Mock patients allow students to practise skills on persons who are not injured or ill, but can act as someone who is. Students are able to converse with the patient and practise communication techniques such as patient rapport and history-taking (19). Simulations are conducted under the supervision of paramedic lecturers in a safe and controlled environment which allows a wide leniency for errors to occur with no risk to patients or students. Simulation allows skills to be practised enough to enable a degree of preparedness for 'real-world' application. However, due to the safety net simulation provides, the potential arises for students to become lax in their approach because they are not dealing with real patients (19).

The learning pathway is designed to allow skills taught in simulation to then be consolidated while on clinical practicum. However, the evidence supporting clinical practicums is mixed. Across professions, professional socialisation has been identified as a means by which students can acquire the necessary behaviours, values and skills of the profession in which they are entering (20-22). However, professional socialisation in the clinical practicum context is not undertaken consistently. In a study (23) by Monash University in Australia, paramedic students reported a lack of opportunity to practise clinical skills while on clinical practicum. Students identified that less than half the cases they attended on practicum allowed for skills practice. The authors (23) concluded that for some students, clinical practicum did not provide opportunities for theory consolidation or skills practise at a level appropriate to their level of education. The study identified that up to 30% of third year students did not participate in patient management. Another Australian study (24) found that a 3-day simulation workshop allowed more than double the amount of clinical skills practise compared to an equivalent 3-day clinical practicum. The lack of clinical skills practise by students on practicums raises questions about student preparation for practice. At the literature review stage of this research project there is emerging evidence that clinical practicums need to be well structured in order to be beneficial to students.

Undergraduate paramedic educational content

In order to guide students to meet the competencies set for paramedics, Australian and UK universities offering an undergraduate paramedical science degree teach and assess theoretical and practical components of paramedical science. Theory elements common to both jurisdictions include human anatomy and physiology; advanced life support; mental health; medical emergencies; trauma; paediatrics; obstetrics; and law and ethics (which include components of paramedic professionalism) (25).

An extensive range of practical skills is also taught to undergraduate paramedics across both jurisdictions. Practical skills include patient assessment, airway management,

ventilation, circulatory support and diagnostic skills. Treatment modalities are taught in line with each country's published clinical practice guidelines. In Australia such guidelines are ambulance-service dependent. In the UK, the common standard is set by the Joint Royal Colleges Ambulance Liaison Committee Clinical Practice Guidelines (26). Clinical practicums are completed with partner healthcare providers including ambulance services, primary care, patient transport, aged care, mental health and, in Australia, Indigenous or multi-modal services such as rural and remote nursing posts.

Practicum hours

In Australia, before 2018 there was no minimum mandated number of clinical practicum hours for paramedic students. Each Australian university with an accredited program had their placement program reviewed by the CAA as part of their accreditation process (10). Of the 11 universities in Australia who publish information, practicum requirements for undergraduate students range from 304 to 740 hours, averaging 496 hours of external clinical practice hours over a 3-year degree (27-37). The CAA released Clinical Placement Guidelines for Higher Education Paramedic Programmes in 2018. These guidelines recommend a minimum of 300 hours clinical practicum time with Australian or New Zealand emergency ambulance services, and an additional 300 hours across a range of relevant alternative clinical settings (38).

The College of Paramedics in the UK produced guidance for undergraduate paramedic practicum hours in 2006 (8), with the recommendation that 'at least 50 percent of learning takes place in the clinical practice environment' (39). A previous iteration of the CoP Curriculum Guidance suggested that a minimum number of practice practicum hours (ie. 2250 over a 3-year program) was required to achieve competency (39). The 4th edition of the CoP Curriculum Guidance now suggests a less prescribed approach to the required number of practice practicum hours (40). Of the four universities in the UK that publish information, external clinical practice hours averaged 1625 hours (range 1575 to 2400 hours) over a 3-year degree (41-44). The difference in practicum hours between the UK and Australia posed an interesting question as to whether UK students were better prepared for practice upon graduation.

In summary, Australia and the UK have largely moved to a model of higher education for paramedics. In common, education of paramedics includes theoretical and skills aspects, with clinical practicum being an important component. However, there is a lack of curriculum guidance in Australia and the requirements for clinical practicum differ markedly between the jurisdictions. This research sought to ascertain the views of paramedics and managers on newly graduated paramedic students' preparedness for practice under each system of education.

Methods

The method of data collection in this study was guided by its

qualitative nature and aligned to the consolidated criteria for reporting qualitative research (45).

Fifteen semi-structured interviews were conducted by the two primary authors of this paper. Both interviewers are qualified paramedics with over 20 years' experience, and both have taught for over 5 years within accredited undergraduate paramedic programs in their respective jurisdictions. Both researchers are qualified to Master degree level and have previously published in the paramedic education domain (one is currently completing his doctorate). It was disclosed to interviewees before data collection that the interviewers were paramedics. Some interviewees were professional colleagues of the interviewers. The two interviewers were known to each other through undergraduate student placements in each country, although had not worked together on a research project previously. Having worked as practitioners, the researchers experience was grounded in patient care, alongside mentoring graduate paramedics. Both the primary researchers are part of the paramedical practice context which was being examined, and have first-hand experience of graduate paramedics. The risk of bias or researcher assumptions was reduced by performing a comprehensive literature review, bracketing interview results and aligning them to the literature, and including non-paramedic researchers in the submission process.

Face-to-face interviews were held with paramedic educators, mentors and managers in Australia and the UK. Sixteen interviewees were approached through ambulance management using a consecutive technique, with one interviewee not able to attend due to operational requirements.

Senior managers were provided with an overview of the research. Selection criteria for interviewees included having had experience of graduate paramedics and be currently practising in the relevant jurisdiction. Interviewees were then recruited by ambulance managers based on their experience with graduate paramedics, willingness to be involved in the research and availability. The researchers interviewed eight participants from St John Ambulance Northern Territory in Darwin (Australia) and seven participants from South-Central National Health Service (NHS) Ambulance Trust in Portsmouth (UK). All interviews were held at ambulance stations in private meeting rooms. At the start of each interview the interviewers confirmed the interviewees' experience with graduates to ensure they could provide sufficient information about their experiences. Ten interviewees were male, and five were female. One interviewee was at director level, three were senior managers and the remainder either shift supervisors or part of a paramedic crew at the time of interview. All interviewees had been in the pre-hospital sector for at least 5 years, with the majority having over 10 years' service. Half the interviewees had worked for more than one ambulance service, and five held casual appointments with universities who taught undergraduate paramedic degrees.

The research used an interpretivist paradigm. This paradigm assumes that reality cannot be separated from knowledge, and that the views of all involved in the research was equally truthful and based on the individuals' personal experiences of paramedic graduates (46).

Standardised interview questions were developed from the literature review. The interview opened seeking the background of the interviewee, then asked a series of questions on graduate paramedic skills, the interviewees' experience of graduates and the types of placements undertaken by undergraduate students in the interviewee's jurisdiction. The questions sought to gauge individuals' perceptions of graduate university paramedics; their theoretical knowledge; technical skill capability; practicum requirements of their course; and ability to meet paramedic competencies. The questions were developed in consultation with each interviewee's respective paramedic teaching team, and were piloted with each of the interviewer's academic team before data collection. The standard question guide was used by the researchers in each interview and the interview participants was provided with a consent letter, which outlined the key questions to be discussed in the interview.

The face-to-face semi-structured interviews were held with the two interviewers and interviewee present. This enabled the researchers to confidentially explore issues raised by participants in line with the broad themes of skills, practicums and the interviewee's experience of graduate paramedics. While no interviews were recorded, each had contemporaneous written notes taken by one researcher while the other researcher led the discussion. Interview notes were then transcribed and entered into NVivo® for analysis. Interviews were then coded into small groupings, based on words used by the interviewee. From the small groups, explanatory themes (47) were identified. Although a small sample was used for this research, the themes identified were common across the interviewees, indicating that saturation was reached.

Ethics

The study was approved by the Human Research Ethics Committee at Edith Cowan University (approval number 17671), and each ambulance service through the relevant ambulance director in the Northern Territory and the Ethics Committee in the UK.

Results

The interviews identified a number of themes in relation to paramedic education and practice after graduation. This correlated with the literature review. The themes, which were common across Australian and UK interviewees, are discussed in the following sections.

Theoretical knowledge

The literature and competency requirements for paramedics indicates that practising as a paramedic requires sound theoretical knowledge of emergency conditions, anatomy, physiology, pharmacology and a myriad of other topics in order to complement the paramedic's practical skills. A shift toward university education indicates that paramedicine is no longer a protocol-driven occupation (ie. driven by technical skills). The accrediting bodies requirements indicate that critical thinking, a sound understanding of emergency through to long-term care implications, combined with a thorough knowledge of appropriate care pathways, are now required by the contemporary paramedic. Interview participants suggested that they felt university paramedic students had a comprehensive understanding of the theoretical knowledge of paramedicine at the point of graduation. Particular areas identified by participants as being well taught included anatomy and physiology, treatment modalities and rationale for treatment:

'(graduates)... have the academic skills nailed. Skills are technically OK, but what graduates don't have is the application of the skills learned.' (Australian paramedic interviewee)

Practical skills

The competencies for paramedics, set by the accrediting bodies, indicate that there is a suite of practical skills required by graduates. Interviewees indicated that the practical skills of paramedic graduates were perceived as being of sufficient standard. There was, among interviewees, a perceived gap in the implementation of those skills as part of the clinical reasoning and decision-making process:

'It's the move from supernumerary to having responsibility to practise. The issue the UK has is to get students to contextualise their training into actual practice.' (UK paramedic interviewee)

Unlike the UK, disparity was noted across university paramedic degrees with respect to the suite of skills taught to students by Australian interviewees. For example, some universities still teach intubation, while others do not. This, participants felt, meant that ambulance services, and more importantly individual mentors, were unclear on what skills graduate paramedics in Australia possessed at the time of their initial employment:

'Each university teaches differently and there is no consistent minimum skill set – so have to teach additional content based on the university the graduate goes to.' (Australian paramedic interviewee)

'Universities need to have minimum content which is consistent across all courses'. (Australian paramedic interviewee)

Ambulance practicums

The literature review identified differences between Australian universities and between Australia and the UK in terms of the total hours paramedic students spend on practicum, in

particular in emergency ambulances, during their university course. This inconsistency was notable among paramedic interviewees. One UK paramedic participant suggested that annual practicum hours for a UK paramedic student was more than the entire practicum hours for an Australian paramedic student.

'We aim to achieve 750 hours per year on an emergency ambulance.' (UK paramedic interviewee)

In both jurisdictions interviewees suggested that specifying hours on an ambulance as part of the curriculum was not considered to be ideal. Both Australian and UK interviewees suggested that the length of time spent on ambulance placement with a paramedic crew did not necessarily result in optimal case-mix exposure for learning purposes. This was due to the uncontrolled nature of emergency ambulance work, dependent upon the geographic area in which students were placed, and the inability to ensure a defined case-mix seen by a student:

'Undergrads need to see a range of actual ambulance jobs and that may be unrelated to the time they spend on road.' (Australian paramedic interviewee)

'What you do as a student on-road is minimal – basic obs is pretty much the extent; although this can be highly crew dependent.' (Australian paramedic interviewee)

Australian paramedic interviewees identified that across Australian universities there was noticeable variation in the practicum experiences of students. While all universities had access to emergency ambulance, the level of access to mentors, hours spent and locations in which students were placed varied widely.

'There are organisational challenges – inflexible rostering for instance can mean grads aren't placed with mentors.' (Australian paramedic interviewee)

Non-ambulance practicums

Interviewees identified that the location of paramedic student practicums varied across UK universities. Interviewees indicated the practicums were heavily weighted towards emergency ambulance practicums, although there were non-ambulance placements available. Interviewees made clear that with paramedics able to be employed across a range of roles that are not only emergency ambulance based, there is a need for both ambulance and non-ambulance placements:

'Not all students go into an ambulance service – so moving to a 50%-50% split with other placements.' (UK paramedic interviewee)

In both countries interviewees suggested that some graduates undertook practicums in primary care, alcohol and other drugs, mental health, aged care, emergency departments or overseas practicums. Interviewees felt that these placements were valuable as learning experiences because of their controlled nature (in comparison to ambulance practicums), allowing an environment in which core ambulance skills could be learned

without the 'pressure' to treat and transport to hospital or other healthcare facilities. The need to consider alternative practicums was exemplified by the following Australian paramedic quote.

'What you do as a student on-road is minimal – basic obs is pretty much the extent; although this can be highly crew dependent. Need to consider alternatives to emergency, as that's a small proportion of what a paramedic does now.' (Australian paramedic interviewee)

'Used to be a job for life – now diversify into GP, hospitals, acute practices. Need to go into primary care, minor injury centres, nurse-led units and consider a range of specific clinics such as respiratory and home-based teams.' (UK paramedic interviewee)

Mentorship and responsibility on practicum

Interviewees in both jurisdictions identified that mentorship on ambulance practicums was inconsistent. UK interviewees suggested that in the UK typically every paramedic had an assumed responsibility to act as a mentor to practicum students. However, many interviewees considered an 'everyone is a mentor' approach resulted in a lack of depth in student education and placed an onus on individual paramedics, who may not want to be mentors:

'If every paramedic is a mentor, then the assurance of quality becomes almost impossible. The current approach lacks depth – we get the same product, but it looks very different depending on who they (the student) are working with.' (UK paramedic interviewees)

'The mentors themselves need to have done a proper, recognised course - College of Paramedics is coming out with recommendations - but not compulsory.' (UK paramedic interviewee)

Interviewees identified that the level of responsibility given to students on placement varied widely, from observation only to active participation in patient care and this was dependent on what the crew would allow the student to do. The variability between ambulance crews means that the student may not have achieved the outcomes for the practicum, or reached the required level of competency:

'Level of responsibility given to students will depend on the crew they are out with – can mean extra time spent on individual jobs, and the level of responsibility given to a student is highly dependent upon the mentor.' (UK paramedic interviewee)

Orientation

After students graduate, interviewees suggested there remained a need for newly employed graduate paramedics to be oriented into the ambulance service organisation, even if they had undertaken an on-road practicum as a student. Interviewees suggested that orientation was needed because it was a different role being a crew member and employee, as opposed to a student. Interviewees from both the UK and Australia suggested that graduate orientation made them an

effective crew member within the operational environment of an individual ambulance service:

'Orientation needs to make them an effective partner – useful second crew member.' (Australian paramedic interviewee)

Independent practice

All interviewees identified that a newly-graduated paramedic would be very unlikely to operate effectively as an independent practitioner:

'We get the finished product, which isn't finished. We then finish them to be independent practitioners.' (UK paramedic interviewee)

No matter how long students spent on clinical practicum, interviewees in both jurisdictions were of the opinion that paramedic graduates required a period of supervised practice before being allowed to practise independently. Supervised practice was described as rounding off the graduate's clinical decision-making capabilities, thus making them safe, independent practitioners:

'Even if placements (practicums) were to be increased we'd probably still want them to do the 12 months supervised practice – meet organisational needs and ensure organisational competency – so wouldn't decrease the time to do their supervised practice.' (Australian paramedic interviewee)

'Even after the amount of on-road as a student they aren't ready as a full paramedic – they need a consolidation time period; having to make decisions – it's the transition from learning to work.' (UK paramedic interviewee)

Interviewees' views on the length of the supervised practice period after graduation varied, with suggestions ranging from a minimum of 6 months to a maximum of 2 years. This variability was considered by interviewees, in both jurisdictions, to be related to the graduate's life experience (such as previous work history), maturity, capacity to learn on-the-job and ability to integrate their university learning to the workplace. Interviewees identified that it would not be possible to have a completely open-ended supervised practice system, and that timeframes for graduates to demonstrate competencies would be required to meet the needs of the organisation:

'Age of graduates doesn't really matter – older people may have more life experience, but younger may be more mouldable to the needs of the service.' (Australian paramedic interviewee)

'Product is a graduate with a degree suitable for registration but to be safe and competent will require a period of supervised practice 6-12 months.' (Australian ambulance service medical director interviewee)

Graduate knowledge gaps

Human factors including leadership, clinical decision-making and 'putting it all together' were identified by interviewees in

the UK as areas where the most work needed to be done by ambulance services as part of the supervised practice period. As already identified, interviewees were of the opinion that graduates had a sound theoretical basis of clinical practice with well-developed practical skills. The main knowledge gap identified by interviewees was clinical decision-making; bringing both theory and practice together. Interviewees suggested the principal reason students failed to develop their decision-making skills was because during practicum placements there was always a fully qualified paramedic taking responsibility for the patient. By contrast, Australian interviewees did not comment on this aspect of education post-university completion.

'Three years as a student and as supernumerary leaves student in that mentality – becoming the person in charge and making the decisions takes time.' (UK paramedic interviewee)

'The big transition is having to take responsibility – for everything that they are doing in relation to work, patient care and their workmate who may be at a lower clinical level.' (UK paramedic interviewee)

Financial costs of each system

The final area identified by interviewees related to the costs of educating students, and the need for ambulance services to ensure they invested in their future workforce. The costs for an ambulance service of taking on undergraduate students as well as new graduates can be both explicit and hidden. Interviewees from both jurisdictions indicated that there were two major and clear costs associated with university-led education: (1) undergraduate mentorship while students were on practicum, and (2) costs associated with supervised practice that occurred after graduation. Interviewees were of the opinion that the costs of educating students as part of a degree were not overly burdensome or inappropriate for an ambulance service to bear. Interviewees from both jurisdictions identified that it was part of a paramedic's role to assist, educate and train the future workforce:

'There will always be a responsibility on the employer to provide some education.' (Australian paramedic interviewee)

A number of interviewees in both jurisdictions identified that there could, however, be variable costs experienced depending on how 'fast' the student or graduate integrated into the ambulance service, particularly with respect to lost productivity from ambulance crews. The speed of graduate integration was suggested by interviewees to be multi-factorial and related to the individual's maturity, past work, and their ability to work in a high-pressure ambulance environment:

'The issue the UK has is to get students to contextualise their training into actual practice. The costs come in terms of the time it takes them (graduate paramedics) to make a clinical decision. It can take them up to 20 minutes to decide what to do with a patient.' (UK paramedic interviewee)

One suggestion from interviewees was to place third-year students as a 'second' ambulance crew member as part of their undergraduate course on the basis this would increase their exposure to clinical decision-making while still under supervision, and thus reduce the length of supervised practice required once employed. It was however, acknowledged by interviewees that this would require robust student mentorship models being in place:

'It could be useful that some students could work as a second, rather than as a third. For example as an emergency care assistant, although the employer would need to assess them first.' (UK paramedic interviewee)

Discussion

This research set out to explore the similarities and differences in paramedic education between the UK and Australia. There was consistency across interviewees' views on paramedic education and preparation for practice. Among all but two ambulance services, Australia has moved to a Bachelor degree requirement for paramedics before employment (4,5). The literature and some interviewees suggest Australia may not experience common undergraduate paramedic curriculum guidance to the level enjoyed in the UK, although both jurisdictions do have minimum competencies for paramedics (8,13,15). Our Australian study participants fervently suggested that curriculum standards, not unlike those provided in the UK, would be beneficial in Australia. Participants agreed that such standards would promote a greater level of consistency across Australian universities in terms of the breadth and depth of educational content provided.

Participants also suggested that regardless of how many hours of practicum students undertook during their university practicum, graduates were perceived as not ready for independent practice at the end of the formal university education process, needing up to 24 months of supervised practice. It was suggested that supervised practice was essential due to the limitations to learning associated with clinical practicum (ie. the disparity across availability and enthusiasm of mentors, an uncontrollable case-mix presentation, and students rarely assuming overall responsibility for patients). Some barriers to participation on clinical practicum have been identified in previous research (23), and more research is required on how specific barriers to clinical practicums can be overcome as a means to graduating more prepared paramedics and thus reducing the time period for supervised practice. There are a suite of professional competencies defined in both jurisdictions (13,15) and accredited universities are graduating students who meet those competencies. However, our data clearly suggests that graduates still need a period of supervised practice.

Across healthcare, a theory/practice education gap is well identified in the literature including nursing (48), allied health

(49) and paramedicine (23). Our participants suggested that although graduates are typically technically competent, they still lacked organisational and health systems knowledge, critical judgement and clinical decision-making skills. With no noticeable differences described between UK and Australian participants, this raises the question of the value of thousands of hours of placement if a period of supervised practice is required with or without these practicum hours. A need for further research into practicum hours is clear, potentially investigating the differences in competency upon graduation among students experiencing differing practicum hours throughout their degree.

Clearly identifying the requirements of a graduate paramedic is critical to education. Among UK participants, it was noted that while there is an expectation among ambulance services that once students graduate and are registered they can operate as independent practitioners, in practice this was rarely true. In Australia, with mandatory registration of paramedics from December 2018, it is important to clearly define the minimum standards required so that ambulance services can be assured they are receiving graduates with the minimum competency set. The requirements of graduate paramedics and the role of supervised practice requires further research, and exploration of competency-based medical education (50) may be a useful starting point.

Participants identified that the supervised practice period was not about theory or individual skills, but rather developing clinical decision-making and organisational understanding. Bridging the clinical decision-making gap would require further consideration of the role of university students on clinical practicum. Some suggestions from participants included allowing a student to act as the 'second person' on a paramedic crew in their final semester. It was felt this may authentically expose students to the responsibility of being a paramedic, under supervision, but without clinical responsibility for patients. No participant was supportive of the concept that a graduate would be able to work on day one without supervision. Participants identified that with a move to increased clinical decision-making exposure, the supervised practice period may be shortened.

Previous research suggests that, at least in some instances, there was an inability for paramedic students to practise their skills while on clinical practicum (23). Participants suggested this could be one reason that graduates are less prepared for independent practice when they graduate. There is an opportunity for Australian and UK universities to ensure a broad range of practicums and the extent to which this is already undertaken requires more research. On the basis of the expanding role of paramedics, participants suggested practicums in non-ambulance areas such as primary care, urgent care centres and emergency departments as potentially valuable additions to the clinical experience during an undergraduate degree.

Limitations

The findings of this research, while valuable, must be considered in light of several limitations. First, the results are based on a small cohort of semi-structured interviews with only two ambulance services, one of which is a small service. Second, the semi-structured interviews focussed on perceptions and personal experiences of interviewees with respect to students who had studied a university degree. Students who follow a work-integrated pathway may have a different outcome. An investigation evaluating the differences between these two pathways would be of benefit. The primary researchers, both of whom are operational paramedics, have experience of students and graduates and may have unintentionally influenced the interview analysis. However, both researchers were aware of the opportunity for pre-existing bias to impact on study results and employed bracketing techniques, as per the method suggested by Gearing (51), as part of the correlation between the literature and interviews to limit this impact. This approach involved abstract formation, the research praxis and reintegration following the interviews.

Finally, while the paradigm for this study valued every interviewees own experience as being valid, the small cohort means that others' experiences of graduate paramedics may be different.

Conclusion

This research suggests that graduate paramedics have robust theoretical knowledge and skills, but a period of supervised practice before becoming independent practitioners continues to be imperative in contextualising theory into practice. Placement quality, mentoring, appropriate case-mix presentation and the level of responsibility provided to undergraduate students were identified as barriers to 'quality' clinical placements for students. Interviewees identified that, regardless of how many hours of supervised clinical practicum students complete, graduate paramedics require a period of supervised practice at the end of the formal university process, before being authorised as independent practitioners.

More research is required on the optimal length of paramedic practicums, types of practicums, mentoring and supervision provided to undergraduate paramedic students.

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Conflict of interest

Kenneth Street and David Reid each hold a casual paramedic position with ambulance services in the UK and Australia respectively. Each author of this paper has completed the ICMJE conflict of interest statement.

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