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Title	Exploring alternative paramedic roles: a multinational mixed-methods survey
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Publication date	2025
Original Citation	Feerick, F., Coughlan, E., Knox, S., Murphy, A., Grady, I. and Deasy, C., 2025. Exploring alternative paramedic roles: a multinational mixed-methods survey. BMC Medical Education, 25(1), 600(15pp). https://doi.org/10.1186/s12909-025-07113-x
Type of publication	Article (peer reviewed)
Link to publisher's version	10.1186/s12909-025-07113-x
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Exploring alternative paramedic roles: a multinational mixed-methods survey

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Abstract

Background While paramedicine is an evolving profession globally, there remain many disparities around titles and roles within the various jurisdictions that may not be fully captured in the literature.

Aim The aim of this study is to gain a multi-national perspective on the current and future roles within paramedicine, highlighting the challenges and opportunities that shape the profession's ongoing evolution.

Methods A mixed-methods approach was adopted for this survey, incorporating both quantitative and qualitative data. A survey link was distributed internationally to paramedicine professionals via email, journals, and social media. Quantitative data were analysed using Microsoft Excel's statistical functions, with results presented as frequencies, percentages, and numerical summaries. Qualitative data were analysed using narrative synthesis and integrated with quantitative findings to provide a comprehensive overview.

Results The study gathered responses from 158 participants representing 59 organisations across 16 countries. Ireland had the highest number of respondents ($n=56$) followed by Australia ($n=41$) and England ($n=21$). Participants outlined current paramedic roles ($n=54$) and future roles planned within their respective organisations ($n=39$). Participants described aspirational, non-traditional roles that they felt paramedics may adopt into the future ($n=86$). Respondents practitioner titles varied across a range of clinical, managerial, and academic specialties, with examples provided ($n=33$). Respondents provided various descriptions of the clinical levels of practitioners available within their organisations ($n=41$).Various ambulance care models were identified with various combinations ($n=24$). Paramedic medical oversight was predominantly provided by a physician ($n=56$) although ($n=22$) other examples were described. Regulation of paramedic practice provided descriptions of various regulatory bodies ($n=8$) with examples of paramedic models of regulation described ($n=9$). Respondents described various patient safety framework models implemented within their respective organisations ($n=10$).

Conclusion The findings from this study highlight that paramedicine is rapidly evolving in response to varying local healthcare needs and sector-specific challenges. Rather than striving for a uniform standard of practice, the results suggest that paramedicine should be viewed as a flexible and adaptive domain, capable of specialising across diverse clinical, managerial, and academic settings. The diverse titles, roles, and models described by participants reflect the growing complexity of the profession. Furthermore, the study indicates that paramedic practice is often shaped by local contexts, such as organisational needs and healthcare gaps, which create innovative opportunities for expanding the scope of the profession. By embracing this variability and focusing on the development of versatile healthcare practitioners who can adapt to societal needs, paramedicine can continue to evolve effectively within well-governed healthcare systems.

Keywords Paramedicine, Paramedic, Mixed methods, Survey, Multi-national

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Introduction

Significant strides have been made in the professionalisation of paramedicine across countries such as the Republic of Ireland (ROI), the United Kingdom (UK), North America, Canada, Australia, New Zealand, and South Africa. These advancements encompass improvements in professional recognition, education, and regulatory frameworks [1]. Despite this progress, global inconsistencies persist in professional titles, educational standards, and scope of practice, roles, and registration, highlighting the ongoing challenges in achieving a unified professional identity. Although some jurisdictions have secured formal recognition for paramedics, the pace of professionalisation has not kept up with the evolving demands of healthcare systems worldwide. The development of paramedicine continues to be influenced by healthcare priorities, societal needs, technological advancements, and the ongoing balance between heterogeneity and homogeneity in practice models [2].

Defining the paramedic profession

The lack of a universally accepted definition of paramedicine has been a longstanding challenge. Eaton [3] identified nine different dictionary definitions of a paramedic, each sharing similarities yet lacking a unified consensus. Williams et al. [4], following a Delphi study, proposed a standardised definition of paramedicine, though acknowledged that global adoption would be difficult due to existing disparities. The 2016 National Emergency Medical Service Advisory Council (USA) report [5] documented 37 distinct terms describing pre-hospital practitioners, ranging from emergency medical technicians to paramedics. Long [6] highlights the need for an internationally agreed-upon definition, emphasizing its significance in strengthening the profession's path toward global professionalisation. Despite decades of debate, consensus remains elusive [7–9].

Disparities in educational standards

Variations in paramedic education continue to present challenges. In the UK, professionalisation evolved significantly from the Pantridge Report (1966) [10], which laid the foundation for advanced life support (ALS) paramedic training. This led to professional recognition in 1999, the establishment of national standards in 2003, and the introduction of higher-degree education in 2004 [11–13]. Brooks et al. [14] attribute the evolution of paramedicine in the UK to higher education, specialist training, clinical advancements, and political reforms spanning five decades. Similarly, Australia's paramedicine sector emerged in the 1960 s, with ALS developments and the introduction of degree-based qualifications in 1987. These advancements facilitated the National Health Workforce Innovation and Reform Strategic Framework for Action (2011–2015), which expanded paramedic roles and culminated in national registration in 2018 [15–17].

The USA and Canada followed different trajectories. The 1960 s"White Paper"report by the Department of Transportation [18] called for substantial improvements in emergency medical services, laying the groundwork for paramedicine in the USA. However, despite early recognition, standardisation of paramedic education and licensure remains fragmented due to complex state, provincial, and municipal regulations [19]. In contrast, Australia, the UK, and ROI have achieved national paramedic regulation, yet differences in educational requirements and scope of practice persist [20, 21].

Challenges in registration, licensing, and regulation

Disparities in paramedic registration, licensing, and regulation continue to hinder the profession's global mobility and recognition, particularly when compared to nursing and medicine [22]. Even in countries with national regulation, challenges remain. In Australia, Reed [23] reports ongoing discord within the profession, suggesting that many practitioners struggle with their professional identity despite regulatory advancements. In Ireland, Knox [24] highlighted the need to integrate continuing professional competence (CPC) with paramedic registration over a decade ago, yet the Pre-Hospital Emergency Care Council (PHECC) has yet to implement such changes. Hill [25] argues that for paramedicine to advance, policymakers and allied healthcare professions must acknowledge and address the barriers limiting its development. This study aims to gain an international perspective on the current and future roles within paramedicine, highlighting the challenges and opportunities that shape the profession's ongoing evolution.

Methods

Study design

This study employed a mixed-methods approach underpinned by a pragmatic paradigm, leveraging both quantitative and qualitative data collection methods [26]. As no pre-validated survey was available, the primary author developed a questionnaire, which was refined and validated through an expert peer-review process until consensus was reached. The peer review group comprised co-authors with extensive experience in paramedicine research and publication. Prior to dissemination, the survey was piloted with a convenience sample of senior academics at University College Cork (UCC) and revised accordingly (Supplementary File 1). A mixed-methods approach was used to capture a broad range of insights. The survey was distributed internationally to paramedicine professionals via email, academic journals, and

Table 1 Demographic of respondents

Country	Organisations	Respondents	%
Ireland	6	56	35.4%
Australia	9	41	26.0%
England	13	21	13.3%
Other	9	16	10.10%
South Africa	6	7	4.4%
USA	7	7	4.4%
Canada	4	5	3.2%
Germany	5	5	3.2%
Total	59	158	100%

social media platforms. Quantitative data were analysed using Microsoft Excel's statistical functions, with results reported as frequencies, percentages, and numerical summaries. Qualitative data were analysed through narrative synthesis and integrated with quantitative findings to enhance overall interpretation.

Sampling

A digital survey link was distributed internationally using a convenience sampling approach to recruit participants working in the field of Paramedicine. Invitations were shared through email, social media platforms (e.g., Twitter, Facebook, LinkedIn), and the Australasian College of Paramedicine Journal, following approval by the Research Advisory Committee of the Australasian College of Paramedicine. To maximise engagement and response rates, these distribution channels were strategically re-engaged on three separate occasions over a three-month period (March–May 2023). This iterative approach ensured broader outreach and sufficient data collection. While the sample was self-selecting, efforts were made to enhance diversity in participation across geographical and professional demographics [27].

Data analysis

The survey employed a combination of open-ended and closed ended questions to capture both quantitative data for statistical analysis and qualitative insights to provide richer context to participants' experiences. Narrative synthesis was utilised for conducting analysis, guided by the works of Popay et al. (2006), allowing us to systematically summarise and integrate findings from diverse data sources [28]. Quantitative data were analysed using Microsoft Excel's statistical functions, with results presented in tables and graphs using frequencies, percentages, and numerical summaries to provide a clear overview of the findings. Qualitative data, consisting of respondents' free-text responses, were analysed using narrative synthesis to integrate key insights within the quantitative findings. Instead, qualitative insights were directly integrated to support and contextualise the quantitative results. The combination of quantitative and qualitative data enhanced the depth and validity of the findings, offering a more comprehensive understanding than either approach alone [29].

Results

This study captured the responses of 158 participants, in 59 organisations, across 16 countries. The largest number of respondents originated from Ireland, ($n=$ 56), Australia, ($n=$ 41), and England, ($n=$ 21), accounting for 75% of the overall results combined. The remaining 25% of respondents originated from South Africa, USA, Canada, Germany, Scotland, Northern Ireland, Papua New Guinea, Saudi Arabia, Wales, New Zealand, Norway, Switzerland, and Tasmania, combined (Table 1). Qualitative results are integrated with the quantitative results to provide a more comprehensive analysis.

Current paramedic roles

A variety of current paramedic roles were described within the respondent's organisations, with ($n=$ 54), examples provided. All 158 respondents completed the question providing multiple examples of all applicable roles available within their organisation with 665 responses recorded. Non-urgent patient transport was described as the most common role 16%, ($n=$ 105), followed by community engagement, 19%, ($n=$ 127), and flight paramedic 12%, ($n=$ 79). Emergency response paramedic was 15 th, accounting for 2%, ($n=$ 13), of the overall responses. A diverse range of specialist roles were described including mental health paramedic, 3%, ($n=$ 21), prison service paramedic, retrieval paramedic, general practice paramedic, among others.

"Minimal available opportunities for diversification in paramedicine currently in the Northern Territory of Australia".P13

Future paramedic roles

Respondents were asked to describe future roles planned for paramedics within their organisation, with ($n=$ 39), roles identified. Community paramedic was the most common role described with 16%, ($n=$ 33), followed by mental health paramedic and critical care paramedic at 9%, ($n=$ 19) each. A range of alternative roles were identified equating for less than 2% each of overall responses that included pathfinder, search and rescue, advanced care, independent prescribing, cardiac arrest specialist, clinical hub, clinical leadership roles, consultant paramedic, registrar paramedic, diagnostic imaging, emergency care practitioner, minor injuries, emerging threat, enhanced low acuity care, expansion of existing roles, falls assessment, local referral, mental health expansion, military, offshore, social work, among others. A diverse range of roles were described by individual respondents with 24%, ($n=$ 51), reporting to be either not applicable or not know of any future planned roles within their organisation.

"The future is exciting and very bright".P112

Aspiring future paramedic roles

This question asked respondents in their opinion, to describe potential non-traditional roles that they might envisage the paramedic profession may aspire into the future. A broad range of roles were described across diverse specialities, ($n=$ 86), in total. A number of respondents described the question to be not applicable or did not know, 16%, ($n=$ 43). Roles within primary care were described 7%, ($n=$ 18), emergency department, and community care programmes with 6%, ($n=$ 17), each. While there were similarities with future roles described, a broad range of examples were described beyond the traditional norms such as palliative care paramedic, school-based paramedic, nurse paramedic model, physicians associate paramedic, PACER (Police, Ambulance, Clinician Emergency Response), dog peer support, among others.

"Hopefully more opportunities will become available within Ireland for paramedics, other than working on emergency ambulances"P108.

Practitioner title

When asked to describe their practitioner title, respondents provided ($n=$ 33) descriptions. The largest number of respondents described themselves as paramedic ($n=$ 67), 42%, with ($n=$ 33), 20% described as advanced paramedic and ($n=$ 6), 4%, described as critical care paramedic. A range of alternative titles were provided including critical care flight paramedic, ($n=$ 5), 3%, emergency care paramedic, ($n=$ 4), 2%, among others.

"Around one-third of paramedics in Australia do not work for an emergency service.... expansion of paramedic roles seems to be heavily political..... roles are also complicated by confusion about terminology"P144.

Clinical level within organisations

Table 2 details the distribution of clinical roles across organisations ($n=$ 496). The most common positions are Advanced Paramedic (28.2%), Basic Life Support Provider (24.0%), and Critical Care Paramedic (18.5%), with a long tail of 38 additional roles each representing 0.2–3.6% of the responses. This wide variety of roles highlights the diversity in clinical staffing within the organisations (Table 2).

Ambulance care model

Respondents provided ($n=$ 24), examples of ambulance care models provided by their organisations. A paramedic-led care model with clinical practice guidelines (CPGs) was described by ($n=$ 73), 46%, however the largest number of responses originated from jurisdictions Ireland, Australia, and England (75%), where this care model is long established. A range of discreet care models were provided including autonomous paramedic practice to physician led with examples of local and regional protocols and standing operating procedures (SOPs).

"Australia varies state by state, but paramedicine is jointly lead by doctors and paramedics. Doctors serve in a consultant/advisory role whereby they provide clinical governance functions but paramedics practice autonomously. Each state law allows certain degrees of private practice"P67.

Professional regulatory body/institution

Table 3 presents the distribution of professional regulatory bodies or institutions among respondents ($n=$ 158). The largest group is affiliated with the Pre-Hospital Emergency Care Council (PHECC) in Ireland (32.9%), followed by the Australian Health Practitioner Regulation Agency (AHPRA) at 18.4%, and the Health and Care Professions Council (HCPC) in the UK at 14.6%. The table also includes smaller percentages from various other bodies, with some respondents reporting"Not Applicable/Not known"(15.2%), (Table 3).

Table 2 Clinical level within organisations

No		*n* =	%	No		*n* =	%
1	Advanced Paramedic (AP)	140	28.2	22	Clinical Tutor (CT)	1	0.2
2	Basic Life Support Provider (BLS)	119	24.0	23	Community Resuscitation Paramedics (CRP)	1	0.2
3	Critical Care Paramedic (CCP)	92	18.5	24	Consultant (C)	1	0.2
4	Community Paramedic (CP)	76	15.3	25	Consultant Paramedic (CP)	1	0.2
5	Mental Health Paramedic (MHP)	18	3.6	26	Critical Care Flight Paramedic (CCFP)	1	0.2
6	Extended Care Paramedic (ECP)	3	0.6	27	Doctor Car (DC)	1	0.2
7	Flight Paramedic (FP)	3	0.6	28	Frequent Callers Team (FCT)	1	0.2
8	Paramedic (P)	3	0.6	29	Hospital Ambulance Liaison Officer (HALO)	1	0.2
9	Emergency Care Practitioner (ECP)	2	0.4	30	High Acuity Response Unit (HARU)	1	0.2
10	Pathfinder Paramedic (PP)	3	0.6	31	Intensive Care Paramedic (ICP) Search & Rescue (SAR)	1	0.2
11	Research Paramedic (RP)	2	0.4	32	Intensive Care/Extended Care Paramedic	1	0.2
12	Emergency Medical Technician (EMT)	2	0.4	33	Local Area Assessment and Referral Unit (LARU)	1	0.2
13	Hazardous Area Response Paramedic (HART)	2	0.4	34	Mobile Intensive Care—Road and Air, (MICA)	1	0.2
14	Intermediate Health Provider (IHP)	2	0.4	35	Paramedic EMT (EMT-P)	1	0.2
15	Special Operations and Rescue Paramedic (SORP)	2	0.4	36	Paramedic Team Leader (PTL)	1	0.2
16	Specialist Palliative Care Paramedic (SPCP)	2	0.4	37	Patient Transport Officer (PTO)	1	0.2
17	Medical Escort Retrieval (Road and Air) (MRV)	1	0.2	38	Remote Area Paramedic (RAP)	1	0.2
18	Associate Ambulance Practitioners (AAP)	1	0.2	39	Specialist Practitioner (SP)	1	0.2
19	Clinical Advisor (CA)	1	0.2	40	Tactical Paramedic (TP)	1	0.2
20	Clinical Team Educator (CTE)	1	0.2	41	Urgent Care Paramedic (UCP)	1	0.2
21	Clinical Team Leader (CTL)	1	0.2				
					Total	496	100

Table 3 Professional Regulatory Body/Institution

	n =	%
Pre-Hospital Emergency Care Council, (PHECC), Ireland	52	32.9
Australian Health Practitioner Regulation Agency, (AHPRA)	29	18.4
Not Applicable/Not known	24	15.2
Health and Care Professions Council, (HCPC), UK	23	14.6
Health Professions Council of South Africa, (HPCSA)	5	3.2
Emergency Medical Assistants Licensing Board, (EMALB) Canada	3	1.9
St John Ambulance, Papua New Guinean	2	1.3
National Registry of Emergency Medical Technicians, (NREMT), USA	2	1.3
Australian Pharmacy Council, (APC), Australia	1	0.6
Total	158	100

Medical oversight

A range of examples were described by respondents when asked to describe the clinical level of medical oversight available within their organisation, with ($n = 23$), examples provided. Though medical oversite was routinely provided by a physician, 56%, ($n = 89$), alternative models were described such as advanced paramedics ($n = 7$), 4%, critical care paramedics, ($n = 4$), 2%, nurse and/or general practitioner, ($n = 1$), 0.6%, with many combinations of multidisciplinary teams including doctors, nurses, and paramedics. The remainder of responses varied from telephone support to consultant-led oversite. Some of the respondents reported the question to not applicable, not known to their practice ($n = 11$), 7%, as some respondents are university based academic roles.

Patient safety framework

The following graph summarises the patient safety framework responses ($n = 325$). The most frequently cited frameworks were Clinical Audit (36.0%) and Continuous Professional Development (28.0%), followed by Clinical Governance (11.7%). Other frameworks, including Mandatory Training, Professional Registration/Regulation, and various quality assurance measures, were mentioned less frequently (Fig 1). Figs. 2, 3, 4, 5, 6, 7, 8, 9.

Paramedic regulation model

This question asked respondents to describe the level of regulation pertaining to their practice within their organisation and/or jurisdiction with ($n = 9$), models provided. Of these responses, 52% ($n = 82$) reported an independent regulatory body with 31% ($n = 49$), reporting state regulation. National registration with national regulation was described by ($n = 12$), 8%, of respondents with ($n = 6$), 4%, describing to have regional regulation. A small

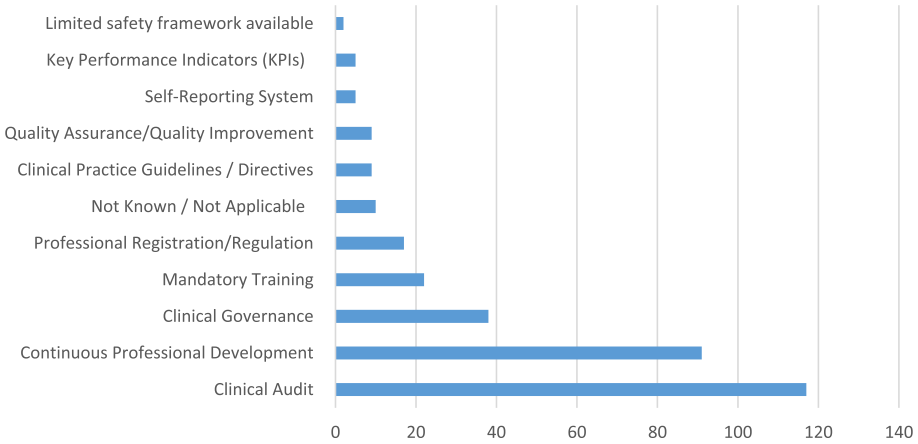


Fig. 1 Patient safety framework

No.	Ambulance Service	Country	n=	No.	Ambulance Service	Country	n=
1	Latrobe Community Health Service - Victoria	Australia	1	32	REVA Global Medical Solutions, Dublin	Ireland	1
2	South Australia Ambulance Service	Australia	1	33	Search and Rescue Services	Ireland	1
3	Sean Mannix, New South Wales	Australia	1	34	National Ambulance Service	Ireland	44
4	St John Ambulance	Australia	5	35	Dublin Fire Brigade	Ireland	6
5	Victoria Ambulance Service	Australia	17	36	Irish Coast Guard	Ireland	3
6	Queensland Ambulance Service	Australia	9	37	Irish Defence Forces	Ireland	1
7	New South Wales Ambulance Service	Australia	4	38	Wellington Free Ambulance	New Zealand	1
8	Victoria University	Australia	2	39	Northern Ireland Ambulance Service	Northern Ireland	2
9	Australian Capital Territory, Ambulance Service	Australia	1	40	Oslo University Hospital	Norway	1
10	British Columbia Emergency Health Services	Canada	2	41	St John Papua New Guinea	Papua New Guinea	2
11	Government of Canada	Canada	1	42	Did not answer	Saudi Arabia	2
12	Medavie Health Services West, Alberta	Canada	1	43	Scottish Ambulance Service	Scotland	4
13	Frontenac Paramedics	Canada	1	44	Atlantic Medical Response	South Africa	1
14	Blandford Group Practice	England	1	45	Eastern Cape State Ambulance Service	South Africa	1
15	East of England Ambulance Service	England	1	46	ER24	South Africa	1
16	LIVES	England	1	47	South Africa Paramedics	South Africa	1
17	Middlesex - London Paramedic Services	England	1	48	Netcare 911	South Africa	2
18	Northwest Ambulance Service	England	1	49	Western Cape Emergency Medical Services	South Africa	1
19	Peter Franklin - Surrey	England	1	50	Service Communal de la SÃ©curitÃ©	Switzerland	1
20	Somerset Foundation Trust	England	1	51	Ambulance Tasmania	Tasmania	1
21	South Central Ambulance Service	England	1	52	AMR Central Mississippi	USA	1
22	London Ambulance Service	England	5	53	Franklin Fire Department, Massachusetts	USA	1
23	NHS Ambulance Service	England	4	54	Lockland Fire Department, Cincinnati	USA	1
24	Northeast Ambulance Service	England	2	55	Metro EMS, Kentucky	USA	1
25	Hospice	England	1	56	Munhall EMS, Pennsylvania	USA	1
26	Sirona Care and Health, Somerset	England	1	57	Penn Hills EMS, Pennsylvania	USA	1
27	Johanniter Unfallhilfe eV Offshore Rescue Medical Services	Germany	1	58	St Vincent's Hospital EMS, Massachusetts	USA	1
28	Rettungsdienst Friesland, EMS	Germany	1	59	Welsh Ambulance Services	Wales	2
29	UKSH - Institute for Emergency Medicine	Germany	1				
30	Berliner Feuerwehr	Germany	1				
31	Germany	Germany	1				
			Total		59 Organisations	16 Countries	158

Fig. 2 Respondents organisation & country of origin

No.		n=	%	No.		n=	%
1	Non-urgent patient transport service	105	15.8	31	Community, palliative care, chronic pain, HART team (High risk)	1	0.2
2	Community Engagement Liaison	127	19.1	32	Consultant Paramedic for Education	1	0.2
3	Flight Paramedic	79	11.9	33	Critical Care Paramedic	1	0.2
4	Retrieval Paramedic	55	8.3	34	Director of Care	1	0.2
5	Primary Care Paramedic	35	5.3	35	Dual role Firefighter / Paramedic	1	0.2
6	Urgent Care Paramedic	34	5.1	36	ED Ramp Paramedic	1	0.2
7	Neonatal Retrieval Paramedic	25	3.8	37	EMT Paramedic	1	0.2
8	Mental Health Paramedic	21	3.2	38	HART Paramedic	1	0.2
9	Emergency Department Paramedic	18	2.7	39	HEMS Critical Care Paramedic	1	0.2
10	Rural Health Paramedic	17	2.6	40	High Acuity Paramedic	1	0.2
11	Health Education Paramedic	15	2.3	41	Intensive Care /Intensive Care Flight Paramedics	1	0.2
12	General Practice Paramedic	14	2.1	42	Intensive Care Paramedic	1	0.2
13	Industrial Paramedic	14	2.1	43	Pallative, Social, Wound Care etc	1	0.2
14	Palliative Care Paramedic	12	1.8	44	Pathfinder AP	1	0.2
15	Emergency Response Paramedic	13	2.0	45	Rural Remote / Paramedic Practitioner	1	0.2
16	Wound Care Paramedic	11	1.7	46	Ship based paramedics, combined safety roles and paramedics, emergency room paramedics and administrative and management	1	0.2
17	Fall Prevention Assessment Paramedic	9	1.4	47	Specialist Practitioner mix of Urgent Care and Wound Care	1	0.2
18	Minor Injuries Unit Paramedic	9	1.4	48	Specialist Trauma Paramedics (Clamshell Thoracotomy etc)	1	0.2
19	Hospital Ward Paramedic	4	0.6	49	Specialist paramedic Advanced and Consultant	1	0.2
20	Chronic Pain Management Paramedic	3	0.5	50	Stroke service	1	0.2
21	Preventive Care Paramedic	3	0.5	51	Telehealth Paramedic	1	0.2
22	Prison Service Paramedic	3	0.5	52	Telephone Triage and Remote Consultation	1	0.2
23	Research Paramedic	2	0.3	53	Telephone Video Assessment Paramedic	1	0.2
24	Social Inclusion/Social Care Paramedic	2	0.3	54	USAR -Urban Search & Rescue	1	0.2
25	Clinical Hub - telemedicine, alternative care pathways and secondary triage	2	0.3	55	Not Applicable / Not Known	3	0.5
26	Extended Care Paramedic (ECP)	2	0.3		Total	665	100%
27	Advanced Paramedic	1	0.2				
28	Aquatic	1	0.2				
29	CBRIE - Chemical,. Biological, Radiological, Incendiary and Explosive Incident.	1	0.2				
30	Clinical Lead Clinical Support Paramedic	1	0.2				

Fig. 3 Current paramedic roles

cohort of respondents reported the question not applicable to current role, ($n = 2$), 1.3%. The remaining responses consisting of less than 1% ($n = 1$), described regulation provided by medical director, national registration, provincial regulation, state and federal regulation.

> *"Germany has 16 state EMS regulations and about 400 ambulance service areas with their own organisation and governing rules, there is no state-wide data collection and scientific research has been under development since the professionalization of the paramedic profession in 2014 but is still insufficient to a large extent.... the emergency medicine specialty is still being prevented. Overall, many structural and political barriers to professionalising out-of-hospital emergency care—with increasing demand, as well as increasing cost pressures and staffing shortages"P51.*

Discussion

Paramedicine is an evolving profession shaped by diverse healthcare systems, regulatory frameworks, and educational models worldwide. The findings of this study highlight significant variation in professional roles, educational standards, and governance structures, reflecting the complexity of paramedic practice in different regions. These variations, while indicative of the adaptability of paramedicine, also present challenges for workforce mobility, standardisation, and professional recognition.

Global healthcare landscape

The global healthcare landscape is undergoing rapid transformation, influenced by demographic shifts, epidemiological changes, and increasing healthcare demands. As a frontline profession, paramedicine plays a crucial role in responding to these evolving needs, from

		n=	%
1	Community Paramedics	33	15.7
2	Not Applicable / Not Known	51	24.3
3	Mental Health Paramedics	19	9.0
4	Critical Care Paramedics	19	9.0
5	Paramedic - increase capacity	14	6.7
6	Emergency Department Paramedics	7	3.3
7	Advanced Care Paramedics	6	2.9
8	Primary Care Paramedic	6	2.9
9	Research/Academic Paramedics	4	1.9
10	Urgent Care Paramedics	4	1.9
11	Extended Care Paramedics	3	1.4
12	General Practice Paramedics	3	1.4
13	Rapid Response Service	3	1.4
14	Search And Rescue Paramedics	2	1.0
15	Clinical Hub	2	1.0
16	HEMS	2	1.0
17	Low Acuity Paramedic	3	1.4
18	Independent Prescribing Paramedics	2	1.0
19	ED/Minor Injuries Paramedics	2	1.0
20	Cardiac Arrest Specialist	1	0.5
21	Clinical Leadership Roles	1	0.5
22	Consultant Paramedic	1	0.5
23	Development of ED role to Registrar level	1	0.5
24	Diagnostic Imaging	1	0.5
25	ECP Trajectory 2023 - SJWA	1	0.5
26	Emerging Threats	1	0.5
27	Falls Assessment Team	5	2.4
28	Local Referral Pathways	1	0.5
29	Management	1	0.5
30	MICAS	1	0.5
31	Military	1	0.5
32	Offshore Medic	1	0.5
33	PACER (Police Ambulance Combined Emergency Response for Mental Health)	1	0.5
34	Palliative Care - expansion	1	0.5
35	Preventative Roles	1	0.5
36	Public Engagement Officers	1	0.5
37	Remote Paramedics	1	0.5
38	Retrieval	1	0.5
39	Secondary Telephone Triage	1	0.5
40	Social Work	1	0.5
	Total	210	100

Fig. 4 Future paramedic roles

emergency and disaster response to chronic disease management and community-based care [30]. The expansion of paramedic roles into areas such as critical care, mental health, and community paramedicine reflects the profession's capacity to adapt to emerging healthcare priorities [31, 32].

Societal needs and evolving roles

Paramedicine is increasingly recognised as an integral component of healthcare systems, bridging the gap between emergency medicine and primary care [33, 34]. Collaborative models such as community paramedicine, which involve paramedics working alongside primary

No.		n=	%	No.		n=	%
1	Not Applicable / Not known	43	16.1	45	Expedition - Travel Companies	1	0.4
2	Primary Care	18	6.7	46	GP Services - Out of Hours	1	0.4
3	Emergency Department	17	6.4	47	Hazardous Area Response	1	0.4
4	Community Care Programmes	17	6.4	48	Health and Safety Role	1	0.4
5	Mental Health	16	6.0	49	Health Bus in Outreach Communities	1	0.4
6	GP Practice	14	5.2	50	Health Emergency Coordination	1	0.4
7	Research/Education	13	4.9	51	Home Care	1	0.4
8	Palliative Care	11	4.1	52	Hospital at Home	1	0.4
9	Urgent Care	8	3.0	53	Hospital based Triage Roles for Paramedics	1	0.4
10	Hospital Integration	6	2.2	54	In-bush/Rural Nursing Clinics	1	0.4
11	Geriatric Care Paramedic	6	2.2	55	Injury Unit	1	0.4
12	Critical Care	4	1.5	56	Intensive Care Unit (ICU)	1	0.4
13	Search and Rescue (SAR)	3	1.1	57	Low Acuity Resource Allocation	1	0.4
14	Alternative Care Pathways	3	1.1	58	Management of Vaccination Clinics	1	0.4
15	Advanced Clinical Practitioner	3	1.1	59	Management Roles	1	0.4
16	Community Education Paramedic	2	0.7	60	Marine	1	0.4
17	Fall Risk Mitigation	2	0.7	61	Mentor	1	0.4
18	Health Promotion	2	0.7	62	Military	1	0.4
19	Independent Prescribing	2	0.7	63	Multi-discipline - similar to Nurses	1	0.4
20	Retrieval	2	0.7	64	Natural Disaster Management	1	0.4
21	Rural and Remote Care	2	0.7	65	Non-Clinical Management Positions	1	0.4
22	School Based Paramedics	2	0.7	66	Nurse Paramedic	1	0.4
23	Telehealth - Care Facility/Home	2	0.7	67	Outpatients	1	0.4
24	Clinical Hub	2	0.7	68	PACER (Police, Ambulance, Clinician Emergency Response)	1	0.4
25	HART Response Teams	2	0.7	69	Paediatric Retrieval	1	0.4
26	Insurance - Consultant	2	0.7	70	Pandemic Response	1	0.4
27	Medical Assessment Unit	2	0.7	71	Pathology	1	0.4
28	Standardisation of Paramedic Roles Internationally	2	0.7	72	Peer Support	1	0.4
29	Airport based Bio-Security Roles	1	0.4	73	Physicians Associate Paramedic	1	0.4
30	Align closer with the diverse Nursing opportunities	1	0.4	74	Anaesthesia Sedation services	1	0.4
31	Anaesthetic Assistant	1	0.4	75	Public Health Media Relations	1	0.4
32	Armed Response Support	1	0.4	76	Quality Assurance	1	0.4
33	Assisted End of Life Care	1	0.4	77	Radiology	1	0.4
34	Blended Specialist Model	1	0.4	78	Remote Paramedic	1	0.4
35	Car Seat Installation	1	0.4	79	Remote Telephone Triage	1	0.4
36	Care in Space-serving Astronauts /Space Tourism	1	0.4	80	Repeat caller identification and mitigation	1	0.4
37	Clinic Based Paramedics	1	0.4	81	Royal Flying Doctor Service	1	0.4
38	Consultant Paramedics	1	0.4	82	Sales Representative	1	0.4
39	Control Room - Rotational	1	0.4	83	Social Outreach Programs	1	0.4
40	CPR Education	1	0.4	84	Sports Medicine	1	0.4
41	Dog Peer Support	1	0.4	85	Tele-Physician/Paramedic/Nurse	1	0.4
42	Emerging Threat - Social inclusion	1	0.4	86	Transfer patients from hospital to hospital	1	0.4
43	Expanded Scope of Practice	1	0.4	87	Working within Hospital Specialty Wards	1	0.4
44	Expansion of Primary Health Care Services	1	0.4		Total	267	100

Fig. 5 Aspirational future paramedic roles

		n=	%
1	Paramedic	67	42.4
2	Advanced Paramedic	33	20.9
3	Critical Care Paramedic	6	3.8
4	Critical Care Flight Paramedic	5	3.2
5	Emergency Care Practitioner	4	2.5
6	Lecturer in Paramedicine	4	2.5
7	Paramedic / Manager	4	2.5
8	Primary Care Paramedic	3	1.9
9	Extended Care Paramedic	3	1.9
10	Community Paramedic	2	1.3
11	Intensive Care Paramedic	2	1.3
12	Medical Director	2	1.3
13	Mobile Intensive Care Ambulance (MICA) Paramedic	2	1.3
14	Director	2	1.3
15	Advanced Care Paramedic, Urgent Care	1	0.6
16	Advanced Care Paramedic 2	1	0.6
17	Associate Professor	1	0.6
18	Chief Executive Paramedic	1	0.6
19	Clinical Service Improvement	1	0.6
20	Community and Primary Care Paramedic	1	0.6
21	Consultant Paramedic	1	0.6
22	Critical Care Paramedic & Manager	1	0.6
23	Deputy Chief	1	0.6
24	Doctor	1	0.6
25	Duty Officer Operations/Intensive Care Paramedic	1	0.6
26	Emergency Care Practitioner/Primary Care Paramedic/Community Paramedic	1	0.6
27	Emergency Medical Technician	1	0.6
28	Flight Paramedic - Rescue	1	0.6
29	Medical Operations Manager	1	0.6
30	Mobile Intensive Care Paramedic/Remote Paramedic/Community Paramedic	1	0.6
31	Nurse (Bsc.), EMT	1	0.6
32	Paramedic, ALS/Clinical Instructor/Paramedic Educator/Remote Paramedic	1	0.6
33	Research Paramedic in Health Care Research; M.Sc., M.A./Doctoral Candidate	1	0.6
	Total	158	100

Fig. 6 Practitioner title

care providers, public health agencies, and social services, have demonstrated potential in improving healthcare access and patient outcomes. These models illustrate the profession's ability to extend beyond traditional emergency response roles, addressing gaps in healthcare provision, particularly in underserved communities [35, 36].

Healthcare priorities and resource constraints

Resource allocation and healthcare priorities vary across regions, affecting paramedic practice and professional development. In some countries, paramedics face challenges such as limited training opportunities, equipment shortages, and fragmented regulatory frameworks. Addressing these disparities requires a comprehensive approach that considers both immediate clinical needs and broader healthcare system reforms to support professional growth and enhance service delivery [37–39].

Technological innovation

Technological advancements are reshaping paramedic practice, offering opportunities to enhance patient care and operational efficiency [40, 41]. Mobile health technologies, telemedicine, and advanced prehospital diagnostics enable paramedics to deliver more precise and timely interventions. These innovations are not only improving patient outcomes but also redefining the paramedic's role within integrated healthcare systems. However, the integration of new technologies requires appropriate training, infrastructure, and regulatory support to ensure their effective use in diverse healthcare settings [42–44].

Heterogeneity in education, regulation, and practice

Despite global advancements in paramedicine, significant variations persist in education, regulation, and

		n=	%
1	Paramedic led with CPGs	73	46.2
2	Paramedic led with CPGs and Medical Oversight	29	18.4
3	Paramedic led with Medical Oversight	16	10.1
4	Specialist Paramedic with Medical Oversite	11	7.0
5	Physician led and/or with CPGs	5	3.2
6	Paramedic with SOPs and/or Medical Oversite	5	3.2
7	Multidisciplinary team model	2	1.3
8	Paramedic sole responder model, offshore	1	0.6
9	Paramedic led Fire EMS model	1	0.6
10	Paramedic led with EMT model	1	0.6
11	Paramedic led dual ALS model	1	0.6
12	Non-ambulance community care including remote triage and urgent care response	1	0.6
13	Dual Models, Emergency Ambulance Care and Interfacility Transfers	1	0.6
14	Physician led with Paramedic with SOPs and Medical Oversight	1	0.6
15	National law with independent activities and skills according to the training curriculum	1	0.6
16	Local ambulance care models: Comprehensive BLS(EMS); ALS(APC) and emergency physician	1	0.6
17	HEMS Paramedic model with PGD and medical oversite	1	0.6
18	Physician and Paramedic/Flight Nurse team model	1	0.6
19	EMT-B & Paramedic or Dual Paramedic, SOPs and Medical Oversite	1	0.6
20	Paramedic led with CPGs and PGDs, SOPs and guidance	1	0.6
21	Physician led CPGs at State level	1	0.6
22	Urgent Care within GP surgery	1	0.6
23	Volunteer Service with CPGs minimal live paramedic/clinical oversight	1	0.6
24	Paramedic with Internal Clinical Governance	1	0.6
	Total	158	100

Fig. 7 Ambulance care model

professional recognition. Different countries follow distinct prehospital care models, such as the Anglo-American and Franco-German systems, each with its advantages and challenges [45–48]. Even within regions with national regulation, such as Australia, the UK, and the ROI, discrepancies in educational pathways, clinical governance, and registration requirements affect the standardisation of practice [2, 49, 50]. For example, in ROI, constraints within the national registration system limit paramedics' ability to work independently or across different healthcare sectors, unlike in neighbouring regions like Northern Ireland and the UK [51]. These regulatory differences impact career progression, cross-border mobility, and the overall professional development of paramedics [52–55].

Balancing homogeneity and diversity

While efforts to standardise paramedic education and practice globally could enhance workforce mobility and quality assurance, achieving complete homogeneity presents challenges. Standardisation must be balanced with the need for local adaptation, recognising the diverse healthcare environments in which paramedics operate. Rather than imposing a rigid global framework, fostering collaboration and sharing best practices across regions may offer a more effective approach to advancing the profession while maintaining flexibility to address region-specific needs [56–65].

Conclusion

The evolution of paramedicine is influenced by global healthcare trends, technological advancements, and regional healthcare priorities. The profession's ability to

		n=	%
1	Physician	89	56.3
2	Physician and/or Paramedic	11	7.0
3	Not applicable / Not Known	11	7.0
4	Medical Director	10	6.3
5	Advanced Paramedic	7	4.4
6	Critical Care Paramedic (CCP)	4	2.5
7	Paramedic	4	2.5
8	Advanced Critical Care Paramedic and Physician	2	1.3
9	ALS or MICA Paramedic	1	0.6
10	CCP, Physician or Medical Directors	1	0.6
11	Intensive Care Paramedic	1	0.6
12	Escalation Senior Paramedic, Clinical Team Manager, CCP, Clinical Directorate	1	0.6
13	Clinical Support Paramedic	1	0.6
14	Nurse and/or GP	1	0.6
15	Consultant Paramedic	1	0.6
16	Doctor, Paramedic, Pharmacist, Mental Health Nurse, Specialist Paramedic (SP or AP)	1	0.6
17	Emergency Care Paramedic	1	0.6
18	Physician, Critical Care Paramedic, Registered Nurse (for Mental Health)	1	0.6
19	General Practitioner (GP)	1	0.6
20	Internal, senior MICA, Clinical support officer. External, receiving hospital physician.	1	0.6
21	Medical Director, Critical Care Paramedic	1	0.6
22	Physician , and Paramedic Chief Officer	1	0.6
23	Intensive Care Paramedic, and receiving Physician	1	0.6
24	Physician/Paramedic/Nurse or other AHP combination	5	3.2
	Total	158	100.0

Fig. 8 Ambulance care model

adapt to emerging challenges, expand its scope of practice, and integrate into broader healthcare systems is crucial for its continued development. Rather than striving for absolute standardisation, recognising paramedicine as a dynamic and flexible profession allows for innovation and responsiveness to local healthcare needs. This study underscores the need for ongoing dialogue between regulators, educators, and policymakers to support the professionalisation of paramedicine while respecting the diversity of global healthcare systems. By investing in education, strengthening interdisciplinary collaboration, and embracing technological advancements, paramedicine can continue to evolve as a vital component of modern healthcare, delivering high-quality, patient-centered care across diverse settings.

Limitations

This study offers a snapshot of global paramedicine challenges but has limitations. The sample size and recruitment methods may limit generalisability, as participation was voluntary and not fully representative of all regions. Anonymised responses prevented linking data to specific jurisdictions, restricting subgroup analysis. Additionally, variations in paramedic roles and titles across regions posed challenges in interpretation. Further research with targeted sampling is needed to explore these complexities in greater depth.

Recommendations for further research

Future research should focus on addressing the limitations identified in this study by incorporating subgroup analyses to explore variations in paramedic roles across different jurisdictions, regulatory frameworks, and models of medical oversight. A longitudinal approach could provide insights into how the profession evolves over time, particularly in response to regulatory changes and advancements in education and scope of practice. Additionally, qualitative studies involving in-depth interviews

		n=	%
1	Independent Regulatory Body	82	51.9
2	State Regulation	49	31.0
3	Regional Regulation	6	3.8
4	National Registration / Regulation	12	7.6
5	Not Applicable to Current Role	2	1.3
6	National and State Regulation	2	1.3
7	Provincial Regulation	2	1.3
8	Medical Director	1	0.6
9	State and Federal Regulation	1	0.6
10	State Regulations Onshore/Offshore Medical Oversight	1	0.6
	Total	158	100

Fig. 9 Paramedic regulation

or focus groups with paramedics, educators, and policymakers could offer a more comprehensive understanding of professional identity, challenges in standardisation, and the impact of emerging healthcare demands. Comparative studies between paramedicine and other regulated healthcare professions may also help identify strategies for achieving greater global consistency. Finally, further research into the integration of paramedics into non-traditional healthcare settings, such as community-based care and mental health services, could provide valuable insights into the future direction of the profession.

Abbreviations

AAP	Associate Ambulance Practitioners
AHP	Allied Health Professional
AHPRA	Australian Health Practitioner Regulation Agency
ALS	Advanced Life Support
AP	Advanced Paramedic
APC	Australian Pharmacy Council
AVA	Ambulance Victoria Australia
BLS	Basic Life Support
C	Consultant
CA	Clinical Advisor
CBRIE	Chemical,. Biological, Radiological, Incendiary and Explosive Incident
CCFP	Critical Care Flight Paramedic
CCP	Critical Care Paramedic
CHC	Corporate Helicopters
CP	Community Paramedic
CP	Consultant Paramedic
CPC	Continuing Professional Competence
CPGs	Clinical Practice Guidelines
CPR	Cardio Pulmonary Resuscitation
CRP	Community Resuscitation Paramedics
CSO	Clinical Support Officer
CT	Clinical Tutor
CTE	Clinical Team Educator
CTL	Clinical Team Leader
DC	Doctor Car
ECP	Extended Care Paramedic
ECP	Emergency Care Practitioner
ED	Emergency Department
EMALB	Emergency Medical Assistants Licensing Board
EMS	Emergency Medical Service
EMT	Emergency Medical Technician
EMT-B	Emergency Medical Technician Basic
EMT-P	Paramedic EMT
FCT	Frequent Callers Team
FP	Flight Paramedic
GMR	Global Medical Response
GOC	Government of Canada
GP	General Practitioner
HALO	Hospital Ambulance Liaison Officer
HART	Hazardous Area Response Paramedic
HARU	High Acuity Response Unit
HCPC	Health and Care Professions Council
HEMS	Helicopter Emergency Medical Service
HPCSA	Health Professions Council of South Africa
ICP/SAR	Intensive Care Paramedic / Search & Rescue
ICU	Intensive Care Unit
IHP	Intermediate Health Provider
KPI	Key Performance Indicators
LARU	Local Area Assessment and Referral Unit
LCHS	Latrobe Community Health Service
MA	Masters of Arts
MAU	Medical Assessment Unit
MB PNG	Medical Board, Pappa New Guinean
MHP	Mental Health Paramedic

MICA	Mobile Intensive Care - Road and Air
MOH KSA	Ministry of Health, Kingdom of Saudi Arabia
MRV	Medical Escort Retrieval
MSc	Master's Degree
MUA	Monash University Australia
NREMT	National Register of Emergency Medical Technicians
P	Paramedic
PACER	Police, Ambulance, Clinical Emergency Response
PCNZ	Paramedic Council of New Zealand
PGDs	Patient Group Directions
PHECC	Pre-Hospital Emergency Care Council
PHPTD	Pre Hospital Paramedic for Tower Direct
PP	Pathfinder Paramedic
PTL	Paramedic Team Leader
PTO	Patient Transport Officer
RAP	Remote Area Paramedic
RCSI	Royal College of Surgeons Ireland
ROI	Republic of Ireland
RP	Research Paramedic
RPPEO	Regional Paramedic Program for Eastern Ontario
SCOPC	Saskatchewan College of Paramedics Canada
SOPs	Standing Operating Procedures
SORP	Special Operations and Rescue Paramedic
SP	Specialist Practitioner
SPCP	Specialist Palliative Care Paramedic
SREC	Social, Research Ethics Committee
SWORBHP	South-western Ontario Regional Base Hospital Program
TP	Tactical Paramedic
UCC	University College Cork
UCP	Urgent Care Paramedic
UK	United Kingdom
USAR	Urban Search & Rescue

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-025-07113-x.

Supplementary Material 1

Acknowledgements
The author wishes to acknowledge the participants that contributed their time to this study and the co-authors for their support.

Clinical trail number
Not applicable.

Authors' contributions
The main body of the research and manuscript was conducted by the corresponding author FF. Co-authors CD, EC, AM, IOG, SK all contributed to draft versions of the manuscript, editing and survey design.

Funding
The author declares that no funding was received.

Data availability
All data and materials are available upon request to the corresponding author FF.

Declarations

Ethics approval and consent to participate
Ethics was approved by the University College of Cork, Republic of Ireland, Social, and Research Ethics Committee (SREC).

Consent for publication
All authors have read and approved this manuscript and have consented to its publication.

Competing interests
The authors declare no competing interests.

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Received: 16 October 2024 Accepted: 4 April 2025
Published online: 23 April 2025

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