

**Box S1. Search strategy: Medline (Ovidsp)**

- 1 Allied Health Personnel/ and emergenc\*.mp.
- 2 Emergency Medical Technicians/
- 3 (paramedic\* or ((emergency or ambulance) adj3 (technician? or practitioner? or staff\* or personnel or workforce))).tw.
- 4 1 or 2 or 3
- 5 exp General Practice/
- 6 general practitioners/ or physicians, family/ or physicians, primary care/
- 7 Primary Health Care/
- 8 Community Medicine/ or Community Health Services/ or Rural Health Services/
- 9 After-Hours Care/
- 10 Ambulatory Care Facilities/
- 11 Office Visits/
- 12 ((family or general) adj3 (practi\* or doctor? or physician?)).tw.
- 13 (primary adj (care or healthcare or "health care")).tw.
- 14 (community adj2 (care or medicine or service?)).tw.
- 15 ("out of hours" or ooh or walkin or walk-in).tw.
- 16 ((health\* or medical or ambulatory) adj2 (centre? or center? or clinic?)).tw.
- 17 \*Triage/
- 18 triage.ti.
- 19 (Remote Consultation/ or Triage/) and Telephone/
- 20 exp Call Centers/
- 21 (helpline? or help line? or hotline? or hot line? or call centre? or call center?).tw.
- 22 (telephone? adj3 (service? or centre? or center? or triage)).tw.
- 23 ((enhanc\* or expand\*) adj3 role?).tw.
- 24 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23
- 25 4 and 24
- 26 ((community or primary care or primary health care or primary healthcare) adj3 paramedic\*).tw.
- 27 25 or 26
- 28 limit 27 to yr="2004 -Current"

## **Box S2. A priori definitions and screening criteria**

Studies were selected for inclusion against strict eligibility criteria. This was to ensure that the results would neither be too broad, thus introducing an over-inclusion threat, nor to narrow and introducing an over-exclusion threat [1]. Justifications for the eligibility criteria are set out below.

### Population

This scoping review focussed on paramedics working within the United Kingdom (UK) only. The College of Paramedics defines a paramedic as follows:

*“A paramedic works autonomously as a generalist clinician across a range of health care settings, usually in emergency, primary or urgent care. They may also specialise in clinical practice, education, leadership or research” [2]*

The role of paramedics in the UK is different to other countries, even those within the Organisation for Economic Co-operation and Development (such as Australia, Canada, Ireland and the United States of America (USA)). UK paramedicine is a graduate entry profession, with its title protected in law and nationally regulated by the Health and Care Professions Council (HCPC). The scope of practice is autonomous from the point of registration, and paramedics are able to work in other healthcare settings outside of the ambulance service [3]. There is currently no national regulation for paramedics in Canada [4] or the USA [5], with paramedics in different states or jurisdictions undertaking a markedly different scope of practice despite the same umbrella title. Paramedics in Ireland are registered, but do not operate within a similar scope of practice to their UK counterparts [6]. Australia remains the closest professional comparison in terms of regulation and scope of practice, yet their paramedics remain almost exclusively employed by the ambulance service [7], even in their provision of primary care.

With these differences in mind, UK paramedics are quite unique. Therefore, this scoping review sought to map the current publications regarding paramedics in primary care within the National Health Service (NHS), in order to determine the direction of a contemporary research agenda for paramedic practice in NHS primary care.

### Intervention

Search terms describing scope of practice were not added due to aiming to retrieve all studies focusing on paramedics in primary care, regardless of clinical presentation or assessment. Therefore, the eligibility criteria focused on:

- Information relating to role;
- Scope of practice;
- Education/Training/Skills/Competencies
- Work within health and social care systems;

- Patient and carer satisfaction;
- Clinician satisfaction;
- Costs.

### Context

In the original review, Ball (2005) outlines the role of paramedics working in an urgent care capacity within UK ambulance services. Given the recent policy changes for NHS primary care [8–10] , this review sought to focus only on paramedics working fully or partly in primary care settings. Primary care is defined as the first contact care, typically within the patient’s own community [11] . *Minor injuries units, out-of-hours services, urgent care centres and walk-in centres* also provide first-contact care within a community, but these are recognised to fall within the urgent care umbrella of NHS services, where there is a need, or perceived need, for care the same day [12] . In the absence of any formally defined distinction between primary and urgent care, and the similarity in that each of these settings provide first-contact care within a community, work within these contexts was deemed appropriate within the eligibility criteria.

### Study design

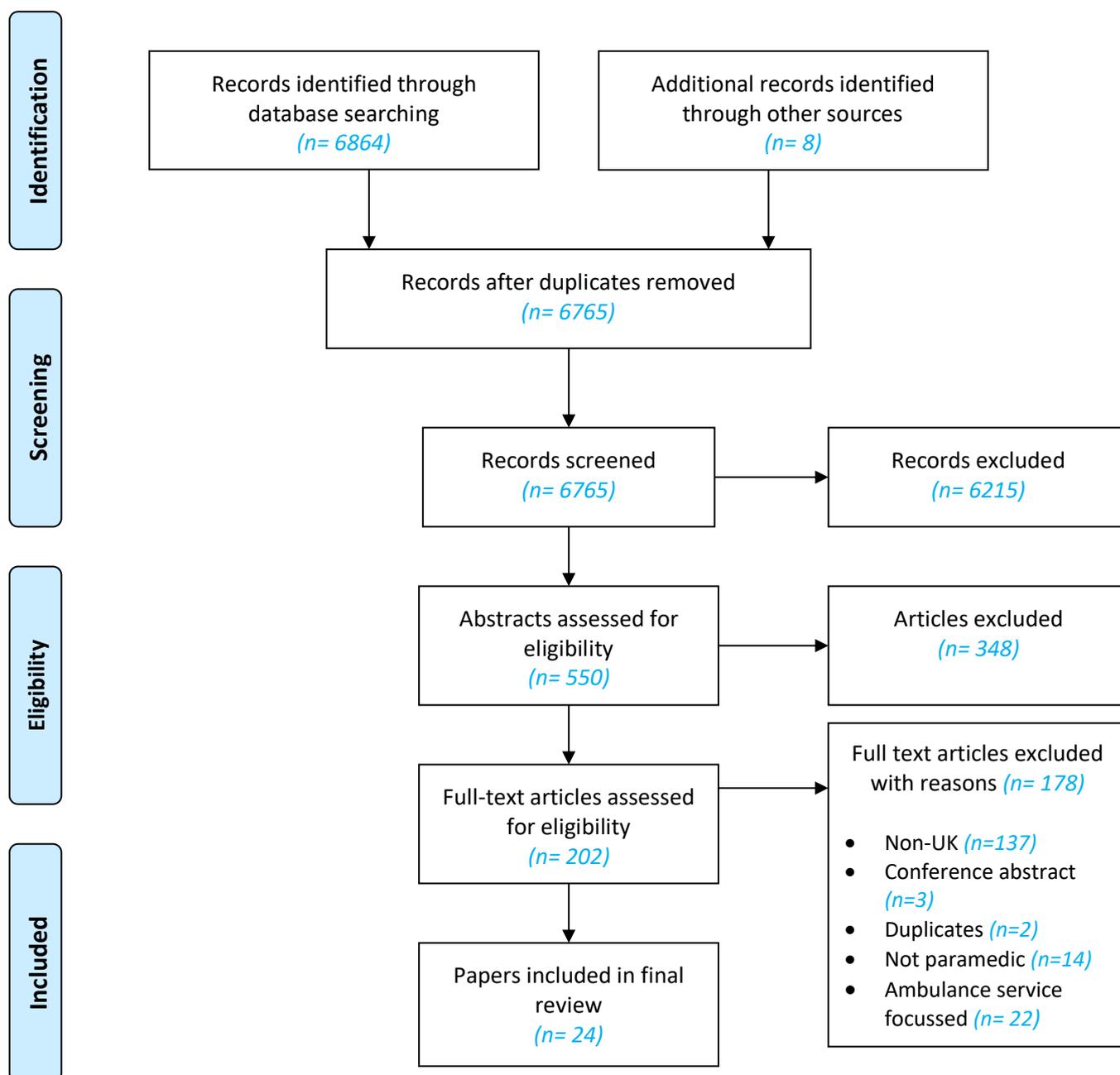
Given the nature of the scoping review is to map the extent, range, and nature of research activity in a topic area [13] , there were no limits placed on study design or type (quantitative or qualitative). Any literature that presented information relevant to the purpose of this review was considered for inclusion, in order to identify themes and gaps in the existing publications on this subject [14] .

### **References**

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Figure S1. PRISMA-SCR Flowchart.



**Table S1. Charting the Results**

<b>Citation</b>	<b>Population</b>	<b>Concept</b>	<b>Context</b>	<b>Study Design</b>
Abrams et al., 2018 [35]	Paramedics; Emergency Care Practitioners	Role	Early visiting service (home visiting)	Protocol
Brown, 2017 [22]	Paramedic Practitioner	Role; Training; Interaction within multidisciplinary team	General practice	No comparator - Case study
Clarke, 2018 [34]	Paramedic	Scope of practice; Role; Pay; outline of a typical day	General practice	Local guidance document
Daly, 2013 [23]	Paramedic	Skill set; Interaction within multidisciplinary team	General practice	No comparator - Case study
Eaton, 2017 [24]	Specialist Paramedics	Role	First Aid unit (rotational from ambulance service)	No comparator - Case study
Halter et al, 2007 [13]	Emergency Care Practitioners (Paramedics)	Patient satisfaction	Out-of-Hours care in Bromley (London)	Retrospective comparator - Telephone administered questionnaire (n=81 patients)
Hill, McMeekin, & Price, 2014 [21]	Emergency Care Practitioners	Role; Process of care; Training	General practice; Ambulance service	Systematic Review
Lattimer et al, 2010 [14]	Paramedic Practitioners;	Skills; Competencies; Workforce	Home visiting service; Urgent care (Out-of-Hours)	Retrospective comparator -Literature review; interviews

	Emergency Care Practitioners (Paramedics); Primary Care Paramedics			(n=129 patients; n=120 staff)
Mason et al, 2006 [15]	Emergency Care Practitioners (77.4% Paramedics)	Core skills; training; outcomes	Minor Injury Unit; Walk-in-centre; Primary care; Emergency department; Ambulance services	Retrospective comparator - Questionnaire (n=14 sites); interviews with individual strategy leads (n= 12); economic analysis (n=14 sites);
Moule et al, 2018 [16]	Paramedics	Role (skill set); Education	Out-of-Hours	Historical Control - Mixed-methods evaluation: Interview; questionnaire data (n=2)
NHS England, 2015 [30]	Paramedics	Skill set; Interaction within multidisciplinary team; Indemnity	Home visiting service	Report
NHS England, 2017 [25]	Paramedic Practitioner	Role: Health assessment	Home visiting service	No comparator - Case study
NHS England, 2019 [5]	First Contact Community Paramedics	Role	General practice	Report
NHS England, 2019 [31]	Community Paramedics	Interaction within multidisciplinary team	Primary Care Networks	Report
NHS Wales, 2015 [32]	Paramedics; Advanced Paramedics	Interaction within multidisciplinary team	Primary care; Community services	Report

Northumberland Clinical Commissioning Group, 2016 [33]	Community Paramedics; Advanced Paramedics	Interaction within multi-professional team	Home visits; minors clinics in general practice	Local strategy plan
Proctor, 2019 [17]	Paramedic Practitioners	Health assessment (elderly patients)	Home visiting from general practice	Retrospective comparator – Qualitative face-to-face semi-structured interviews (n=8 patients)
RSM UK Group, 2017 [18]	Specialist Paramedic Practitioner	Patient satisfaction; GP satisfaction	Home visiting service	Retrospective comparator – Qualitative interviews (n= 2 GPs; n= 1 specialist paramedic); Online survey (n=19 GPs; n= 38 patients)
Scott & Carney, 2004 [26]	Emergency Care Practitioners (Paramedics)	Education pathways; Scope of practice; knowledge	General practice	Commentary
Spence, 2017 [27]	Paramedics	Role; What paramedics can bring to general practice	General practice	Commentary
Spencer, 2016 [28]	Paramedic	Role; outline of a typical day	General practice; Home visiting	Commentary
Turner & Williams, 2018 [19]	Specialist Paramedics	Role; Type of intervention	Rotational work through general practice and the	Retrospective comparator - Qualitative

			Ambulance Service	interviews (n=30 clinical staff)
Turner et al., 2015 [20]	Extended Paramedic Roles	Workforce; Skill mix	General practice (rotational from ambulance service)	Rapid Review
Woollard, 2006 [29]	Paramedic	Role; Education requirements	Secondment to general practice from ambulance service	Commentary

## **Box S3. Summary of Findings**

### ***Titles***

The paramedic profession is regulated by the HCPC and the title is protected in law. The College of Paramedics outlines the nomenclature alongside education level: Paramedic (Bachelors' Degree) Specialist Paramedic (PgCert); Advanced Paramedic (Master's Degree) or Consultant Paramedic (Doctorate), and does not associate them with the setting in which they work [38]. The papers in this review found that paramedics working in primary care operate under a variety of titles, which contradicts the titles outlined by the paramedic professional body [5,14,17,21,22,26,35,31,33].

### ***Clinical work environment***

As well as variation in title, variation in clinical environment in which paramedics were deployed was also found. Paramedics were found to be working in:

- Home visiting services [14,17,18,25,30,35];
- Minors units [15,20,21,24,30]
  - First aid units
  - Minor injury units
  - Minors departments in hospitals
  - Walk-in-centres
- General Practice [5,14,15,19,22,27,28,31,33,34];
- Out-of-hours services [13,16,24].
- A rotational role into any of the above settings, whilst retaining the ambulance service as the main employer [15,18–21,24,29].

### ***Reducing General Practitioner Workload***

In some cases, the role of paramedics in primary care settings was specifically reported to decrease general practitioner workload by assessing and treating urgent, non-complex, patients [5,18,22,23,27,28]. However, in other cases, issues with patient management and supervision extended patient consultation times and increased workload [14,15,23,26,33]

### ***Patient safety***

There is some evidence in this review to suggest that paramedics can safely assess and treat patients in primary and urgent care [20]. Potential problems may be encountered with the range of patient's paramedics can safely manage and the degree of supervision they will need to do so. However, patient safety was not a focus within any of the studies reviewed, and this warrants further research.

### ***Clinical activities in primary care***

The search did not focus on scope of practice for paramedics, but it was clear that the existing paramedic skillset is used to undertake general health assessment, with acknowledgement that paramedic specific skills (such as 12-lead ECG interpretation) and the ability to provide high-acuity or emergency care [23,24,27,28] was an advantage of paramedics working in primary care settings.

### ***Role & training***

This review found no evidence of the optimal role of the paramedic in primary care, nor any standardisation of training programmes. This is likely related to the inconsistencies in the application of the title, and the lack of correlation between title, role and education level, in contrast to that outlined by the College of Paramedics. The absence of a well-defined role for paramedics makes the development of training programmes to prepare paramedics to work in these settings difficult. Research is needed into the best use of the paramedic resource in primary care to inform and develop the right training for the future.