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A Retrospective Descriptive Analysis of Interventions Provided by Advanced Paramedic Staff Working in Primary Care in Northern Ireland V.2

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Abstract

The Paramedic profession in the United Kingdom (UK) is traditionally associated with the provision of emergency care within an ambulance service. Within these services and Emergency Medical Systems (EMS) they respond to life-threatening emergencies through the 999 call system.

However, since 2002, Paramedics in the United Kingdom have increasingly worked across the health system, with many choosing to work in a primary care setting. Workforce data for Northern Ireland is not available, however according to NHS England data, in May 2024, 1,076 full time equivalent (FTE) paramedics worked in General Practice in England (NHS England 2024a) which compares with April 2024 when NHS England calculate that 17,236 FTE paramedics work for an ambulance service (NHS England 2024b). Whilst these are English figures, it indicates the extent to which Paramedics are moving into non-traditional roles. Despite the role existing since 2002, and an ever-increasing shift towards paramedics working in General Practice, it has been highlighted in many previous studies (Eaton et al 2020, Eaton et al 2021, Stott et al 2024, Wagstaff and Mistry 2024) that there is a current gap in the evidence base regarding many facets of the paramedic role in general practice.

The existence of a variation of employment and deployment models which include who the employer is, either a GP, Primary Care Network or Ambulance service and how the paramedic is utilized by the GP (Eaton et al 2021, Stott et al 2024, Schofield et al 2020) has been identified as one of the most significant obstacles to adequate evaluation and research of the impact and benefit of the paramedic role in primary care. Furthermore, there is also a shifting regulatory framework for all non-physicians working in primary care, with different regulators adopting contrasting approaches. The Health and Care Professions Council (HCPC), as the regulator for paramedics in the UK, have recently updated their advanced practice regulation guidance and have decided against introducing specific regulation for those working at an advanced practice level (Gledhill 2024). The HCPC (Gledhill 2024) stated “the case for additional regulation of advanced practice had not been made and that remains our position. We are working with our stakeholders to develop that common understanding of what advanced practice is while ensuring we do not stifle innovation and the development of advanced practice roles”. In conjunction with the variance of use and deployment methods for paramedics in General Practice, a key finding of the study by Stott et al 2024 was that there is no universal paramedic scope in general practice, which could lead to confusion both across different practices and within practices as to the impact a paramedic can have in general practice and their role in it.

The situation for general practice in Northern Ireland is fraught, with sustained pressure on services resulting in 2023 seeing 14 surgeries hand back their GP contacts (Reid 2024). These challenges include workforce crises, staff retention and financial pressures. In addition, the Royal College of General Practitioners Northern Ireland (RCGPNI) published a GP retention strategy titled “A Workforce Fit for the Future” (RCGPNI 2024) which outlined how to maintain GP services, with an emphasis on the building of a sustainable wider multi-disciplinary team.

A systematic review of the contribution of paramedics in primary care (Eaton et al. 2020) concluded that, “there is insufficient detail regarding the clinical contribution of paramedics in these clinical settings. In addition, a mixed methods scoping study (Schofield et al 2020) also found that “The contribution of paramedics in general practice has not been fully evaluated. There is a need for research that takes account of the substantial variation between

service models". Whilst Eaton et al 2022 was a survey which looked at clinical work for paramedics in general practice and they self-reported the types of conditions they consulted on and their frequency of occurrence.

At the time of writing, no authors have reported on the scope of clinical work undertaken by a paramedic in general practice, demographics of the patients consulted, and potential outcomes for the patient and the practice. Thus the purpose of this study is to help to develop a greater understanding of the paramedic role in General Practice, the patient cohorts seen by an Advanced Paramedics, the outcomes associated with assessment by an Advanced Paramedic and the potential impact an advanced paramedic can have in general practice.

Guidelines

To ensure the study accurately reflects the role and impact of Advanced Paramedics in General Practice, specific inclusion and exclusion criteria will be applied:

Inclusion Criteria:

Included in the study will be any patient examined or assessed either virtually, in a face to face or in a home setting by an Advanced Paramedic Practitioner in any of the participating sites. These sites have been chosen using both Proximity-Driven Site Selection as these are locations where the PI currently works as an Advanced Paramedic, and due to the fact that there are very few further GP surgeries in Northern Ireland in a similar role.

Exclusion Criteria:

Any patient with a recognised data sharing opt out code on their notes.

Materials

Data will be collected through the EMIS Web computer system which is routinely used in all practices.

Demographic data of patients will include age, gender, type of consultation, clinical outcome, SNOMED CT codes, if GP support was required and outcome.

In accordance with Ulster University's Research Data Management Policy (Ulster University 2024b), research data will be retained for a minimum of 10 years from the date of any publication underpinned by the data. All electronic research data will be stored on a secure University one drive folder. Local GP practice level and University GDPR protocols will be adhered to.

Research Question

- 1 What are the demographic characteristics, consultation patterns, and clinical outcomes of patients assessed by Advanced Paramedics in General Practice, and how do the types of conditions managed and the level of required GP support vary across different patient demographics?

Aims and Objectives

- 2 Primary Aim
 - 2.1 To evaluate the demographic characteristics, consultation patterns, and clinical outcomes of patients assessed by Advanced Paramedics in General Practice.
- 3 Secondary Aims
 - 3.1 Understand the frequency and types of conditions managed by Advanced Paramedics in General Practice.
 - 3.2 Understand the frequency the level of GP support required following Advanced Paramedic consultation.
 - 3.3 Understand the demographic variability of patients consulting with Advanced Paramedics.

Study Design/Methodology

- 4 This study will be a retrospective data analysis of patient records if seen by an Advanced Practice Paramedic across several GP surgeries in Northern Ireland in 2023. This will be a multi-centre study using quantitative methods. Data will be collected through the EMIS Web computer system which is routinely used in all practices. This will be a descriptive analysis of patient contacts.
- 5 Demographic data of patients will include age, gender, type of consultation, clinical outcome, SNOMED CT codes, if GP support was required and outcome
- 6 There will be linked anonymity, with each practice being assigned a number and each patient contact being tracked by its EMIS number. This maintains anonymity as these

details can only be used to identify the patient if you have access directly to the specific GP computer systems for each practice.

- 7 SNOMED codes will be applied retrospectively to each patient contact. In SNOMED CT, concepts are arranged hierarchically, with more general 'parent' concepts and more specific 'child' concepts as you navigate downward. SNOMED International 2024a and 2024b indicate how SNOMED codes can be used in both low and high granular detail, allowing specific codes which may be assigned to be appropriately interpreted and appropriate analysis to take place allowing more generalisability of the very specific data which SNOMED coding can generate. This allows the hierarchical nature of SNOMED codes to be condensed, allowing analysis of both lower granular detail but also higher granular detail allowing the team to glean high level data.
- 8 This study proposes using MedCAT, a Natural Language Processing (NLP) tool, for coding structured and unstructured health data. It will be utilized with a SNOMED model trained on MIMIC-III which a publicly available database containing de-identified health data which is used for research and machine learning in healthcare (Johnson et al., 2016). Validated in various studies (Bean et al., 2020, 2023; Kraljevic et al., 2021; Shek et al., 2021), MedCAT extracts SNOMED codes from clinical text and can learn local synonyms and abbreviations.

Statistical Analysis Plan

- 9 Data will be presented as descriptive statistics to provide an overview of patient demographics, consultation patterns, and clinical outcomes. This analysis aims to inform future research by enhancing our understanding of the impact Advanced Paramedics have in General Practice, particularly regarding the types and frequency of conditions encountered.
- 10 Data Preparation and Cleaning: Patient data will be extracted from EMIS Web systems across five GP surgeries. Each patient will be assigned a unique anonymized identifier to ensure confidentiality. The EMIS number will not be removed before analysis as it will also greater understand of individual patient having multiple contacts. Data will be cleaned by documenting missing values without assumptions, and inconsistencies or duplicates will be addressed using predefined protocols.
- 11 Demographic Data: Demographic variables will include age, gender, classification of conditions (acute or chronic), and clinical outcomes. Age will be analyzed using mean, median, and standard deviation, while gender, condition type, and outcomes will be presented as proportions to illustrate distribution patterns.

- 12 Contextualizing with Existing Literature: Studies such as Hobbs et al. (2016) and De Dumast et al. (2024) provide valuable benchmarks, having analyzed GP consultation trends by age, gender, and consultation type. Our study will compare these findings to assess whether Advanced Paramedics consult with similar demographics, offering insights into their integration in primary care.
- 13 Statistical Measures: Continuous variables (e.g., age) will be summarized with descriptive statistics, while categorical variables (e.g., gender, condition type, GP support levels) will be analyzed using frequencies and percentages. This will provide insight into the prevalence of conditions and the support required from GPs.
- 14 SNOMED CT Code Analysis: MedCAT's NLP capabilities will extract SNOMED CT codes from clinical free text to identify prevalent health issues. These codes will be grouped into broader categories (e.g., diseases, symptoms, medications) to simplify analysis.
- 15 Advanced Analysis Techniques: Association rule mining will identify common combinations of SNOMED codes, while correlation analysis will explore relationships between demographics and outcomes. Comparisons across GP practices will highlight variations in patient profiles and outcomes. Temporal analysis will identify seasonal trends or shifts in consultation patterns.
- 16 Data Collection and Tools: Data will be organized using Microsoft Excel and analyzed in SPSS for robust statistical interpretation and visualization.
- 17 Sample Size Estimation: With an average of 20 cases per day over a four-day work week, accounting for absences, we anticipate analyzing up to 3,500 cases. Final numbers may vary and will be documented accordingly.
- 18 Data Visualization: Results will be visualized through bar charts for categorical data, pie charts for proportions, and histograms for continuous variables. Network diagrams and heatmaps may illustrate associations between SNOMED codes and demographics, providing clear visual insights into the findings.

Ethical Considerations

- 19 Despite the study being retrospective and no alteration to treatment will be made to any of the participants as a result of the study, ethical considerations in how the data is collected, who collects it, how it is stored and how it is used is vital to ensuring that we maintain the principles of good practice and ethical research throughout the duration of data collection, analysis and publication.
- 20 Best practice was followed and the NHS Health Research Authority (Medical Research Council 2022) tool was used to determine this study was research

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