

Carrying out research, critical appraisal, ethics and stakeholder involvement

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Introduction

The aim of this article is to describe the process of research methods process by explaining how to develop a research question, how to search recognised databases for relevant literature and what is involved in critically appraising an article.

Research skills are a requirement under the Health and Care Professions Council (HCPC)(2023) standards for paramedic registration, they must 'recognise the value of research to the critical evaluation of practice'. Research in medicine is important in order to improve the knowledge of clinicians by sharing data across the globe (Bhat, 2020). Because of their rapidly changing roles (Eaton et al, 2018), paramedics are required to critically analyse research in order to develop both clinically and professionally. Ellis (2022) expands on this, adding clinical governance; a crucial component of contemporary health care is understanding what you are doing, and why you are doing it.

Mendes (2019) highlights paramedics are expected to apply a strong evidence-based practice (EBP) and are required to be autonomous, questioning themselves in a given situation whether an intervention is the right one based upon their clinical assessment and gut instinct. However, Olausson *et al* (2022) notes that EBP has developed at a slow pace in paramedicine, and research with more paramedic involvement is required. Griffiths and Mooney (2012) emphasise the advantage of EBP is less time is wasted carrying out unnecessary and ineffective therapies, and

care is provided with far greater consistency. Healthcare is changing at a rapid pace, as is the role of the paramedic so, to ensure they provide EBP, paramedics must have proficient research skills.

What is research?

Establishing a hypothesis —a clear, verifiable assertion— that a researcher will make in their investigations is the first step in conducting research (Olaussen et al, 2022). Research is divided into qualitative and quantitative categories. Qualitative research focuses on a person's experiences and perceptions. Quantitative research focuses on numbers and statistics (Griffiths and Mooney, 2012). However, Neuman (2014) states that, despite the obvious differences in qualitative and quantitative research, they overlap a great deal.

A mixed method can also be used. Siriwardena and Whitely (2022) explain a mixed method approach is when at least one qualitative method and one quantitative method are used to collect data within the same study. McKim (2017) notes that, by enhancing the findings' validity, guiding the collection of data and aiding in knowledge development, mixed approaches bring value to research. There are also differences in the way data is collected. Qualitative data are generated by the researcher using techniques such as focus groups and interviews (Silverman, 2021). In contrast, quantitative data are obtained by carrying out observations, tests and reviewing retrospective data such as medical documents (Bergman, 2008).

Both methods have shortcomings. Gladas (2017) states that it is not uncommon to find bias in qualitative research is not uncommon. Bias is typically regarded as any factor that causes a study's findings to be distorted (Polit and Beck, 2012). Rahman (2016) recognises that quantitative research tends to only look at variables at a specific moment in time. Creswell (2018) disputes this, claiming that if the question proposed by a researcher is to look into the usefulness of an intervention, then quantitative research would be the best methodology.

A sampling strategy should be created after deciding on the participants, their characteristics and the location of the study. It should include the selection process, the measures and other details to be obtained, who will collect the data and how many participants there should be (Hedges and Williams, 2015). Different sampling types are used to determine the population of a study; the main ones used are simple random sample, cluster, stratified random sample, convenience, quota, snowball and purposive (Davies and Hughes, 2014). Sampling types are split into two categories: probability sampling (El-Masri, 2017) and non-probability sampling (Miller et al, 2010). Probability sampling is a technique for selecting a representative sample of an entire population. When it is not possible to obtain population lists, however, non-probability sampling is employed (Hedges and Williams, 2015). Each technique has its pros and cons.

Database search method

To develop a research question, a PICO tool, [population, intervention, comparison and outcome] (Methley et al, 2014) tool should be used to ensure a robust search strategy for a systematic review should be used (Frandsen *et al*, 2020). Nordenstrom (2007) notes that the research question must be clear and concise to be searchable in databases and to allow to an answer following a careful evaluation of the facts generated. Rathbone *et al* (2017) recognises that integrating the C into the I of the PICO framework, resulting in 'PIO', can considerably increase the efficacy of data filtering; this combination of C and I categories is widely used.

With the use of a research question and PIO framework, a search strategy can be constructed to explore databases identifying singular, peer-reviewed primary studies for critical appraisal. The MEDLINE and CINAHL databases are typically used in medical research. Siriwardena and Whitely (2022) emphasises these are fundamental and specialised bibliographic databases that are pertinent to the medical profession.

When conducting a primary search using basic terminology, focusing on the first two PIO items (Population and Intervention) is the favoured method. Frandsen *et al* (2020) recognise that the P and I elements should be included in the search

strategy at a minimum, and that the C and O elements have a lower recall across databases.

A search strategy should be balanced, incorporating sensitivity and specificity (Siriwardena and Whitely, 2022). To increase sensitivity, Boolean operators can be incorporated. The Boolean search technique allows users to combine words with operators—namely 'and', 'not' and 'or'—to exclude less relevant data and increase specificity (Saravanan, 2020). Truncations are used to include plurals and alternative spelling of words in a data base search. The initial search may produce a large volume of results.

Critical appraisal and the heirachy of evidence

A critical appraisal of research papers should be carried out. This helps determine how confident individuals can be in the results of a body of research by carefully and methodically evaluating studies' reliability or methodological rigour (Tod et al,2022). Critical appraisal plays an important role in allowing paramedics to integrate EBP into their work. A critical appraisal skills programme (CASP) tool, which is a general tool for evaluating the benefits and drawbacks of any research approach, can be used (Long eg al, 2020). Areas required for critical appraisal are efficiently covered by CASP tools (Nadleson and Nadleson, 2014).

It has long been understood that not every research strategy has the same risk of bias and error in its findings. Some research approaches offer stronger evidence than others when seeking solutions to particular topics, so the research methodologies used will have an impact on how valid the results are (Evans, 2003). The relative potency of findings from scientific study is ranked using a hierarchy of evidence, a heuristic approach. The evidence pyramid is a well-known example of an evidence hierarchy (Hoogeboom and Jette, 2011). Because of their lower possibility of bias, randomised control trials are at the summit of the evidence pyramid (Greenhalgh et al, 2014). However, Bowling (2014) disagrees with having a hierarchy of evidence, arguing that different research methods should be used for different types of inquiry.

The hierarchy of evidence is still extensively used to classify the possibility of validity, despite criticisms of this approach (Greenhalgh et al, 2014).

Ethics in research

Ethics are important in research as they define what behaviour is appropriate and inappropriate (Clark, 2019). Researchers must safeguard research participants, build trust with them, promote research integrity and prevent misbehaviour and improper behaviour that could reflect negatively on their organisation or institution (Israel and Hay, 2006).

Creswell and Creswell (2018) claim the ethical issues applied to research are extensive and need to be addressed throughout a study. The Nurnberg trials, which investigated the systematic mistreatment of underprivileged people during research experiments placed research ethics into sharp focus after the Second World War (Olaussen et al, 2022). Paramedics have responsibilities when conducting research, and researchers must ensure participants are aware they are involved in a research study and understand the benefits and risks involved (Griffith and Mooney, 2012). However, if consent cannot be gained at the point of data collection, it can be gained retrospectively when the patient has regained mental or physical capacity (Long and Johnson, 2007).

Siriwardena and Whitely (2022) stress that when researchers are choosing participants for studies, paramedics should be carefully considered in order to guarantee that the ethical requirements of confidentiality and informed consent are upheld. Griffiths and Mooney (2012) elaborate on this, stating as paramedics are in a position of authority and the patient could feel as though they have no choice but to comply, paramedics should ensure that great care is taken while obtaining consent to gather data while also treating the patient.

There are ethical concerns when conducting research. As Krinsky (2013) highlights, ethics can be affected by funding. Krinsky (2013) reported that study results could statistically correlated with funding sources, mostly in drug safety and efficacy trials, and the term "funding impact" was developed to describe this. Funding impact, also

seen in studies on chemical toxicity and cigarette use, is frequently linked, implicitly or explicitly to research bias (Krimsky, 2013). Researchers must refrain from placing someone in a situation where there is a conflict of interest, and must never exploit their status as academics to divert funds for their own personal or outside enterprise (Flynn and Goldsmith, 2016).

What are stakeholders?

Stakeholders are organisations, groups of people or other entities with an interest in how a piece of research develops (Boaz et al, 2018). Within research, the significance of stakeholders is increasingly being recognised. To ensure a research question has practical relevance, a broad range of stakeholders should be consulted (Siriwardena and Whitely, 2022).

Stakeholders are involved in study-related tasks including question preparation, selection criteria, participant recruitment, data collecting, analysis and identification and interpretation of findings (Concannon et al, 2019). The relevance of research is increased when communities are involved, and this may hasten the conversation of discoveries into better health outcomes (Joosten et al, 2015).

Health care professionals such as paramedics, midwives, and nurses are being more frequently involved in research due to their insight and as they are in a position to find solutions to clinical problems for the patients' benefit, whilst positively changing disciplines across the NHS (Deane and Clunie, 2021). Health care professionals should inform stakeholders of all relevant information including risks and benefits in order to gain full informed consent (Parahoo, 1991). More specifically, in the role of the research paramedic builds bridges between theory and practice, closing the gap between clinical and academic components (McClelland, 2013).

Jones and Jones (2009) add the modern paramedic role now includes specialised components, such as research into their roles, in addition to their specialised clinical training. In their role as researchers, paramedics have a duty to conduct high-quality pre-hospital research to enhance EBP for patients and to better serve other stakeholders (Perry, 2016).

Conclusion

At a time where rapid, widespread change is occurring throughout the healthcare sector, research skills are becoming increasingly essential for individuals in the paramedic profession. Paramedics must ensure they can critically analyse information in research studies prior to implementing changes in their practice (Griffiths and Mooney, 2012). Ensuring clinical practice is based on high quality research is paramount to optimum patient centred care and gaining the most advantageous outcomes for patients.

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