

A descriptive study of the future qualification level of paramedics in health education programs In Saudi universities

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Abstract

This descriptive analytical study aims to explore the future qualification level of paramedics in health education programs offered at Saudi universities, in light of the increasing expansion of emergency services and the continuous need for paramedics capable of responding effectively to critical cases. The study begins with an analysis of the nature of the current curricula and the extent to which they include the basic and advanced skills needed by paramedics, such as advanced cardiopulmonary resuscitation skills, managing multiple injuries, and working within multidisciplinary medical teams. The study also seeks to determine the extent to which these educational programs are compatible with the future requirements of the labor market and the standards of international bodies concerned with the qualification of paramedics. The study is based on an evaluation of the quality of practical and clinical training students receive during their university studies and the effectiveness of existing partnerships between universities and healthcare institutions in enhancing their practical skills. Finally, the study addresses the challenges facing health education programs, such as limited training resources, a shortage of field facilities, and insufficient training in high-fidelity simulation environments. The study as a whole seeks to identify the gap between the theoretical and practical skills that the student receives during the education stage, and what he actually needs when he joins the field work within ambulance and emergency systems. The results are expected to contribute to developing recommendations that support improving the efficiency of educational programs, developing curricula, and strengthening field partnerships, in order to ensure that paramedics are more prepared and responsive to the requirements of the future in the Kingdom of Saudi Arabia.

Keywords Paramedic training – Health education – Saudi universities – Clinical training – Future skills – Emergency programs – Professional competence – Medical simulation – International standards.

- introduction

The paramedic profession is a crucial pillar of the healthcare system, particularly in emergencies requiring rapid response and advanced life-saving skills. Given the vital role paramedics play in providing first aid and urgent medical care in the field before reaching the hospital, their level of training and competence is a key factor in determining the needs of patients and the injured. In the context of the rapid development of the health sector in the Kingdom of Saudi Arabia, a key objective of Vision 2030 the importance of

elevating paramedic standards becomes clear. This ensures that paramedics are qualified to the highest international standards to effectively address diverse health challenges and potential disasters. Saudi university health education programs play a leading role in preparing and graduating qualified paramedics. Therefore, it is essential to evaluate the quality of these programs through a thorough understanding of the current level of training for future paramedic students encompassing their knowledge of medical sciences and protocols, their practical and technical skills, and their behavioral skills, including how to handle pressure and adhere to professional ethics. This study specifically aims to describe and analyze the level of academic and practical training received by paramedic program students in Saudi universities by exploring the curriculum components and Clinical training environments and the extent to which students possess the knowledge and skills necessary to practice the profession immediately after graduation⁸

Discussion

By identifying the strengths that need to be enhanced and the shortcomings that need to be addressed this study provides a database for decision-makers in universities and health authorities to formulate effective development proposals for curricula, evaluation mechanisms, and practical training standards, ensuring that the future Saudi paramedic is fully prepared to provide the best levels of emergency ambulance care thus leading to enhancing the quality of health services provided to the Saudi community⁶

- The concept of professional training for paramedics and its importance in the healthcare system

refers to the comprehensive and organized process aimed at providing individuals with theoretical knowledge and practical skills. The necessary behavioral approaches for providing emergency and rescue medical care in pre-hospital situations. This training is not limited to the academic aspect represented by the study of anatomy, physiology, and emergency pharmacology, but extends to include intensive training in advanced procedural skills such as airway management and advanced cardiopulmonary resuscitation. Dealing with multiple traumas and injuries, the ultimate goal of this process is to build competence that allows the paramedic to quickly assess the situation, make critical and important decisions under pressure and implement immediate therapeutic interventions to ensure the patient's stability until they can be transferred to the appropriate healthcare facility. In addition, effective professional training depends on three main integrated components. Theoretical education in classrooms and laboratories, practical and clinical training in ambulances and emergency rooms, and continuous professional development. This field requires paramedics to commit to lifelong learning to keep up with the latest and constantly changing global medical protocols and guidelines. Training also includes developing non-clinical skills such as effective communication with patients and their families, teamwork within the emergency response team, and psychological resilience to handle stressful situations, ensuring the paramedic is a valuable asset. An integrated professional who has the ability to meet both the human and technical requirements of the profession^{2,8}

Therefore, advanced professional training for paramedics is the essential link between the scene of an accident or injury and the medical facility. Its paramount importance lies in ensuring the provision of high-quality and standardized care during the critical period that determines the patient's fate. A qualified paramedic is not merely a patient transporter but a clinical care provider trained to make life-saving decisions and perform complex interventions such as stopping bleeding, immobilizing injuries, and managing respiratory or circulatory failure. This training ensures that medical interventions in the field are based on scientific evidence. This significantly reduces mortality rates and long-term complications and effective professional training contributes to raising the efficiency of the entire healthcare system, as well-trained paramedics possess the necessary skills to prioritize. With high accuracy, patients are directed to the appropriate medical facility according to the type of injury, whether it be burn centers or trauma centers Etc, which prevents unnecessary congestion in general emergency departments. Their ability to initiate immediate and appropriate treatment reduces the patient's length of stay in the hospital and overall healthcare costs. In addition, training helps develop accurate clinical documentation skills which is vital to

ensuring continuity of care when the patient is handed over to the hospital medical team and to improve the internal evaluation and review process of emergency services 1,9

Furthermore, qualified paramedics represent a trusted source of healthcare in the community, especially during major crises and disasters. Their training enables them to work efficiently within disaster response teams and handle large numbers of injuries under exceptional circumstances. The knowledge and skills acquired instill trust and professionalism in citizens, making it easier for paramedics to perform their duties effectively in the most difficult conditions. In addition to the technical aspect, professional training includes the ethical and social aspect, which ensures that the paramedic deals with patients with respect and empathy, which is an invaluable element in building a positive relationship between the health system and society 7,6

- Components of health education programs in universities and their roles in preparing the future paramedic

The theoretical academic component is the solid knowledge base upon which all first aid skills are built and this component includes basic courses in biomedical sciences such as anatomy, Physiology. To understand the normal functions of the human body and how they are affected by injuries and diseases. It also includes specialized courses in emergency medicine, and these include Emergency pharmacology, trauma management, and advanced cardiopulmonary resuscitation. Dealing with multiple injury cases. The role of this component is to provide the student with the necessary scientific background to understand the mechanisms of diseases and injuries and to enable him to make informed clinical decisions that guide practical interventions in the field. The practical and clinical training component is the link that connects theory with application and is vital for acquiring professional competence. This component usually begins with simulation training in equipped laboratories where students practice basic and advanced procedural skills such as inserting breathing tubes, administering injections and fixing fractures in safe environments. Then comes the field clinical training stage where the student spends time under direct supervision in ambulances and in hospital emergency departments. The role of this component is to refine manual skills and develop the ability to assess quickly, work under pressure, and apply therapeutic protocols in realistic and authentic scenarios 4,6

In addition, the integrative and behavioral component focuses on the ethical, legal, and interpersonal skills necessary for professional practice. This includes courses or workshops on professional ethics, handling difficult situations, and effective communication skills with patients, families, and other medical teams. This component also enhances critical thinking, complex problem-solving, and the ability to work effectively within a multidisciplinary team, thus preparing the paramedic to be a professional. An official who not only possesses technical competence but also possesses Cultural and social awareness and the ability to provide care with empathy and respect. This enhances public confidence in ambulance services 6,3

- International standards for paramedic training compared to local standards in Saudi Arabia

International standards are adopted for the qualification of paramedics. Which are determined by specialized global bodies and professional organizations such as leading American and European agencies. Based on a competency-focused approach and style. Instead of just study hours, these competencies include several rigorous requirements in Advanced knowledge. Such as advanced airway control and emergency medication management procedural skills through The ability to carry out invasive procedures. Safe and field clinical training through These standards require a high minimum number of hours in emergency and hospital settings under direct supervision, and they also emphasize continuing education. The necessity of passing national licensing exams, which are updated periodically to ensure that the paramedic remains up-to-date with the latest developments in emergency medicine, is found in the Kingdom of Saudi Arabia. The Saudi Commission for Health Specialties is responsible. The task of developing and implementing professional qualification and classification standards for healthcare practitioners, including paramedics

technicians , and emergency medical services specialists demonstrates a clear trend in Saudi standards in ,this field towards aligning local outputs with high international standards In bachelor's degree programs the focus is on intensive academic and practical tracks that include an internship year or practical training of no less than 12 months, which is equivalent to the practical training requirements in the best international programs Some Saudi universities have adopted academic programs based directly on internationally recognized standards, such as adopting programs from Australian or Canadian universities, with the aim of establishing the first generation of Saudi paramedics at the level of a specialized paramedic 1,3

intersect with international standards in essence, as both emphasize the importance of evidence-based practice The requirement for paramedics to undergo a comprehensive theoretical and practical evaluation before obtaining a license is emphasized , but procedural details may differ, such as the program duration and the number of required clinical training hours Saudi authorities (years Bachelor's + 1 year internship 4) are working to increase and standardize these requirements to ensure full coverage of all competencies ,Current efforts in Saudi Arabia, supported by Vision 2030 and the Health Transformation Program represent a step towards integrating standards to ensure that Saudi paramedics are not only locally qualified but also possess the necessary expertise But it must be accredited and qualified to practice efficiently in any global health system8,7

- Professional and cognitive competencies required for practicing field first aid

form the theoretical basis for making sound clinical decisions under pressure, where the paramedic must possess a deep knowledge of physiology Pathology To understand how injuries and diseases affect the body, specialized knowledge includes mastering advanced cardiopulmonary resuscitation (CPR) protocols Understanding the mechanisms and classifications of trauma In-depth knowledge of emergency pharmacology, its dosages, and side effects is essential Possessing this knowledge enables the paramedic to immediately analyze clinical problems such as cardiac arrhythmias or respiratory failure and select appropriate, evidence-based therapeutic interventions Professional competencies include the ability to apply theoretical knowledge to practical, skillful procedures in a field ambulance environment These competencies include the ability to perform life-saving procedures accurately and quickly, such as advanced airway management, including tracheal intubation and the insertion of intravenous and bone lines And removing cardiac fibrillation Cardiac rhythm synchronization Stabilizing and evacuating trauma victims These skills require high manual dexterity and the ability to use specialized medical equipment efficiently while maintaining sterilization and safety at all times to minimize risks to the patient 9

In addition, behavioral competencies are no less important than knowledge and skill in this field, as the paramedic must have the ability to lead and make decisive decisions at the scene of the incident and work effectively within a multidisciplinary team, such as dealing with firefighters or police It also includes effective communication skills, whether to convey accurate clinical information to the hospital through delivery reports or to calm and reassure the patient and his family in moments of anxiety and tension Psychological resilience, high professional ethics , confidentiality and empathy are essential measures to ensure that the paramedic can deal with the emotional pressures of work and is committed to achieving the highest standards of humane care 8

- The impact of practical training and clinical simulation on improving paramedics' skills

Practical training and clinical simulation are key elements in building the technical skills of paramedics as they provide a safe and repetitive environment for practicing invasive and advanced medical procedures Through practical training in laboratories and clinical training in the field and hospitals, students master essential and critical skills such as tracheal intubation and securing blood vessels Complex airway management, as well as high-fidelity clinical simulation, allow for the repetition of rare and dangerous scenarios such as complex cardiac arrests or major injuries This enables students to perform these procedures frequently , achieving a level of automatic proficiency without endangering the patient's life This repetition not only hones manual skills but also builds the self-confidence necessary to work

effectively under pressure. The impact of training and simulation extends beyond mere manual skills to the higher cognitive abilities of the paramedic. The simulated scenarios are designed to reflect the complexity and uncertainty of a real emergency environment when working with sophisticated mannequins. Those who respond to medical interventions and exhibit physiological changes are forced to apply theoretical knowledge in a practical context, thus developing critical thinking and problem-solving skills. Post-review sessions also help. Which follows each scenario in analyzing the decisions made, identifying strengths and weaknesses, and understanding the impact of each action, thus enhancing the ability to make quick and decisive clinical decisions when facing actual emergencies in the field 6,3

Therefore, practical training and simulation play a crucial and pivotal role in developing behavioral and leadership skills, which are essential for the success of any rescue operation. Paramedics are trained to work as an integrated unit within the emergency response team, which enhances effective communication skills, role distribution, and clinical leadership when dealing with crises. These training environments also contribute to instilling professional conduct, including adherence to ethics, stress management, and empathy for the patient. This integration of training ensures that the future paramedic is not only technically qualified but also An effective team member and a responsible leader who can manage the entire situation efficiently and professionally 5,1

- The role of faculty members and training facilities in the quality of emergency medical training

Faculty members in health education programs are the primary drivers of quality emergency medical training. Their role extends beyond simply transmitting theoretical information; it encompasses professional role models and clinical mentorship. Faculty members must be specialists with extensive field experience in emergency medicine, enabling them to connect theory with real-world practical application. They are also responsible for continuously developing and updating curricula to align with the latest international protocols. Regarding the use of interactive teaching methods Such as problem-based learning that develops students' critical thinking skills, ensuring that students not only memorize information but also acquire clinical competence and the ability to make decisions under pressure, as represented by training facilities, whether within the university or partner institutions. The nurturing environment in which skills are honed. These facilities include high-fidelity simulation laboratories. Equipped with advanced mannequins that allow students to practice complex scenarios in a safe and controllable environment, and most importantly, field clinical training sites such as emergency departments and ambulance centers. The role of these facilities is to provide diverse and wide opportunities for students to be exposed to real and different emergency situations under direct supervision. These environments also ensure that the training covers the full range of competencies required for effective professional practice 7,6

Therefore, the quality of emergency medical training depends on the integration and harmony between the role of faculty members and the quality of training facilities. Excellent facilities cannot be effective without qualified trainers who know how to utilize their potential, and vice versa. This integration ensures a smooth and flexible transfer of information from the classroom to the simulation lab. Then to the real field , the university's role is to develop comprehensive and standardized evaluation mechanisms for student performance in all these environments and to ensure that academic and practical standards meet the requirements of professional licensing. This harmony is what produces a future paramedic who not only possesses knowledge but also has the skill and professionalism necessary to serve the community 7,6

- Challenges facing paramedicine students in university health education programs

Emergency medical students in health education programs face a significant challenge : an intensive academic workload and the need to absorb a vast amount of medical knowledge in a relatively short period. They are required to master the fundamentals of biomedical sciences such as physiology and anatomy. In addition to advanced emergency medical science and ambulance protocols, the nature of the profession requires them to quickly transition from theoretical study to practical application, which puts pressure on students to link complex concepts with procedural interventions simultaneously. Some students also find

b) Difficulty in keeping up with the constant updates in emergency care protocols which requires a doubled effort. In self-directed learning, the challenges associated with clinical and field training are among the most significant obstacles facing students. These challenges include Limited opportunities for quality training. Some medical or emergency facilities may not provide a sufficient number of diverse and critical cases necessary to achieve full competence and quality of supervision. The level of supervision and guidance may vary from one supervisor to another in the field, which affects the quality of experience gained, as well as psychological stress and risks. During field training, students are exposed to difficult and psychologically stressful work environments including dealing with serious injuries and death 7,6

In addition, other challenges include behavioral and professional aspects of the profession. Students may struggle to develop effective communication and empathy skills with patients and their families under time pressure and in emergency situations. They may also find it challenging to integrate effectively into multidisciplinary healthcare teams in emergency and hospital settings. Furthermore, some future graduates may face challenges related to the full recognition of the paramedic's professional role in the community and within the healthcare system as a specialized professional, not merely a transport technician. This may affect their enthusiasm and professional ambition 7,4

- The extent to which the curriculum is suitable for the requirements of the job market in the field of paramedicine

Aligning curricula with labor market demands is essential for the success of paramedic graduates. The main challenge lies in ensuring that the theoretical and cognitive content students receive at universities accurately reflects and continuously updates actual paramedic practices and protocols in the field. Curricula must be designed not only to cover basic sciences but also to include modern intervention techniques, new emergency medications, and the handling of common and localized types of injuries. If the curriculum is not up-to-date, graduates may find themselves with knowledge that does not align with the standard procedures followed in ambulance services and hospitals. This leads to a knowledge gap that affects their performance and competence immediately after graduation. The suitability of the curriculum is not limited to the theoretical aspect alone, but extends to the adequacy of the practical and training components. The job market demands paramedics with strong practical skills and the ability to manage crisis scenarios with high efficiency, such as advanced resuscitation and airway management. Therefore the curriculum must provide a sufficient number and quality of clinical and field training hours, and these opportunities should be in training facilities that adhere to the highest quality standards. If the curriculum reduces practical training hours or does not focus on the leadership and communication skills necessary for teamwork, which are important skills in the field. The graduate will suffer from a skills gap that negatively affects his readiness for immediate and effective engagement in the labor market 9,6

To ensure ongoing relevance, universities must rely on close and continuous partnerships with entities responsible for the labor market, such as the Saudi Red Crescent Authority and hospitals. This partnership is essential for conducting periodic curriculum reviews based on feedback from field practitioners and the evolving needs of the healthcare sector. Curricula that do not include feedback mechanisms from employers or that fail to update their requirements based on advancements in emergency medicine, such as developments in communication technologies or new equipment, will result in graduating paramedics with inadequate qualifications. Theoretical However, it does not meet the actual job requirements, therefore flexibility in developing curricula in response to labor market demands is one of the important factors in the quality of paramedic training 5,2

- The relationship between qualification level and the efficiency of field response and quality of ambulance services

is the most direct and influential factor in the efficiency of field response. A highly qualified paramedic possesses in-depth knowledge and advanced clinical skills that enable them to assess the situation with

exceptional speed. Making the right clinical decisions under psychological and environmental stress is a crucial aspect of this training, ensuring that the paramedic can perform life-saving procedures such as airway management or hemorrhage control. Accurately and effectively, the more comprehensive and focused the training is on realistic simulations and field exercises, the faster and more precise the paramedic will be at the scene of an accident. This reduces the time spent providing initial care and improves the patient's readiness for transport. Furthermore, the quality of ambulance services is directly linked to the effectiveness and quality of the paramedic's training. Paramedics trained according to the latest international protocols and possessing proficiency in technical and behavioral skills significantly reduce the likelihood of medical errors. In the field, they also provide stable and standardized pre-hospital care which positively impacts the fate and lives of patients, both in terms of reducing mortality rates and limiting long-term complications. Therefore, a qualified paramedic improves the patient's chances of survival and ensures that the treatment journey begins correctly and safely from the first moment of contact with emergency services.^{6,7}

Therefore, raising the level of paramedic training leads to an improvement in the overall performance of the healthcare system. A qualified paramedic has the ability to guide patients correctly directed to specialized medical facilities such as trauma or stroke centers, ensuring the efficient use of healthcare resources and reducing unnecessary overcrowding in general emergency departments. Furthermore, proper training ensures that paramedics possess the skills for accurate documentation and clear communication with hospital staff, thus guaranteeing continuity of care. This complementary relationship confirms that investing in the training of ambulance personnel is not just an investment in an individual but an investment in the efficiency and effectiveness of the entire national health system.^{7,5}

Study Methodology

The study adopted a descriptive approach, collecting data related to the current and future qualification level of paramedics in health education programs at Saudi universities, then presenting, organizing, and interpreting it in order to arrive at an accurate picture of the reality of educational programs. The descriptive approach is based on describing the phenomenon as it is in reality in terms of the nature of the curricula, training methods, and the level of professional readiness of the students, without interfering with the variables or trying to control them, which allows for a comprehensive understanding of the actual reality of paramedic training programs.

- Results and Recommendations

Results

A discrepancy was noted in the extent to which academic curricula are aligned with modern international standards for emergency medicine, as some programs lack periodic updates to advanced first aid protocols in their theoretical courses.

- The students' results in the theoretical assessments for basic sciences, anatomy and physiology showed a good level, indicating the strength of the basic academic component in most universities.
- The study revealed that a percentage of students have difficulty in linking complex theoretical knowledge, such as emergency pharmacology, to rapid clinical application during simulation reflecting a challenge in transferring knowledge from the classroom to the field.
- The study demonstrated that clinical simulation programs play an effective role in raising the level of advanced procedural skills such as airway control. Students, especially in programs that offer high-fidelity simulation facilities and expert supervision.
- The study showed that there is a disparity in the quality and type of clinical field training among partner facilities, with quality opportunities concentrated in major hospitals and emergency centers. This creates a disparity in exposure to critical situations among students.

- The study showed that the biggest challenge lies in dealing with psychological and environmental pressures in the field, such as disasters or mass casualty incidents, which requires incorporating intensive training on psychological resilience and behavioral support into the rehabilitation program
- The study clarified that the programs strive to meet the requirements of the Saudi Commission for Health Specialties. However, some programs have not yet reached the level of field training hours recommended in the best international standards for achieving full competence

Recommendations

- Universities must regularly update their theoretical curricula to ensure full compliance with the latest global emergency protocols and the standards of the Saudi Commission for Health Specialties. Especially in the fields of advanced emergency medicine and crisis management
- Educational pathways that focus on scenario-based critical thinking should be introduced. To train students to connect theoretical knowledge of pharmacology or physiology Through rapid procedural interventions in the field
- The need to integrate advanced courses in the ethics of emergency medical practice and legal responsibilities related to intervention in emergency situations. To enhance behavioral and professional competencies
- Strategic partnerships should be established between universities, the Red Crescent Authority, and referral hospitals. To increase the number and quality of cases that students are exposed to, with a focus on critical trauma cases and rare cases
- must be established for the qualifications of clinical supervisors in the field to ensure that high-quality and consistent guidance is provided to students and that supervisors receive training programs on effective assessment and feedback methods
- The need to continue investing in high-fidelity simulation laboratories and to increase the hours dedicated to simulation training that focuses on complex and leadership scenarios to enhance decision-making skills under pressure
- should be provided to help students cope with the psychological stress and scenes of trauma and critical injuries they experience during field training
- should be conducted between universities and major employers such as the Saudi Red Crescent and hospitals to measure the suitability of program outcomes to actual labor market needs and to adjust curricula accordingly. Based on these results

Conclusion

I aimed Study to evaluate level qualification Students Programs ambulance and emergencies in Universities Saudi Arabia and extent Their readiness Professional and the theory To get involved in market the job within system Services ambulance Nationalism And on Her head body Al-Hilal red The Saudi, and the study has shown that the level Rehabilitation Academic For students Programs ambulance and emergencies in Universities Saudi Arabia good from where Knowledge Theory But he Needs to Strengthening greater in Aspects Applied And the field as It turned out presence contrast between Universities in quality Training practical and number hours The app Clinical and confirmed Results importance to merge Decisions Skills ambulance Advanced and simulation realism For accidents Emergency within Curricula Study addition to development skills communication and taking decision Work under Pressure and recommended the study Necessity Unification Standards Training between Universities and activation Accreditation Academic National For programs ambulance and emergencies To ensure Graduation cadres Distinguished Capable on presentation Services ambulance High Quality Keep up Aspirations sector Healthy in Kingdom And vision Kingdom 2030

References

1. Scholtz, D (2020) Qualifications development for an unknown future *Journal of Curriculum Studies*, 52(3), 413-427
2. Kondratieva, I , Malina, N , & Rogacheva, T (2023) Final qualification work of a future engineer: Innovations and traditions In E3S Web of Conferences (Vol 431, p 09018) EDP Sciences
3. Chen, Z , Han, C , Gao, M , Kandukuri, S Y , & Zhou, K (2022) A review on qualification and certification for metal additive manufacturing *Virtual and Physical Prototyping*, 17(2), 382-405
4. Bell, A , Hammer, S , & Seymour-Walsh, A (2021) The role of educational theory in the future development of paramedicine as a profession: an integrative review *Australasian Journal of Paramedicine*, 18, 1-10
5. Knox, S , Brand, C , & Sweeney, C (2023) Perceptions of paramedic educators on assessments used in the first year of a paramedic programme: a qualitative exploration *BMC medical Education*, 23(1), 952
6. Wheeler, B , & Dippenaar, E (2020) The use of simulation as a teaching modality for paramedic education: a scoping review *British Paramedic Journal*, 5(3), 31
7. Bell, A , Galligan, L , & Latham, J (2021) Numeracy in paramedicine education: A literature review *Adults Learning Mathematics International Journal*
8. Shannon, B , Baldry, S , O'Meara, P , Foster, N , Martin, A , Cook, M , & Miles, A (2023) The definition of a community paramedic: an international consensus *Paramedicine*, 20(1), 4-22
9. Okoh, C M , Moczygemba, L R , Thurman, W , Brown, C , Hanson, C , & Baffoe, J O (2023) An examination of the emerging field of community paramedicine: a national cross-sectional survey of community paramedics *BMC Health Services Research*, 23(1), 516
10. Eaton, G , Wong, G , Tierney, S , Roberts, N , Williams, V , & Mahtani, K R (2021) Understanding the role of the paramedic in primary care: a realist review *BMC medicine*, 19(1), 145