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REVIEW ARTICLE

COMPARISON OF PARAMEDIC COMPETENCIES IN THE CZECH REPUBLIC, POLAND, SLOVAKIA AND GERMANY

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Summary

The profession of paramedic has become an integral part of the health care delivery system in the Czech Republic. It is a profession belonging to the group of regulated professions, with clearly defined rules for education and practice itself.

This study attempted to map how the competences and professional training methods of RNs differ in the Czech Republic, Poland, Germany and Slovakia, which are the closest states to the Czech Republic and also have a similar approach to the pre-hospital care system. There is a real assumption that the principles of training paramedics and their competence will not differ significantly within these EU states. The study was carried out as a research, overview. A content analysis of the current legislation was carried out, regarding the education and work content of paramedics in the environment of the Czech Republic, Germany, Poland and Slovakia.

As part of the comparison of these states, it was found that the education and the system of activity of a paramedic differ in details, given by national legislative specifics. Especially in the areas of ZZ competences, it was found that paramedic is the most limited in the conditions of the Czech Republic. However, these limits should not have a major impact on the quality of care provided within the prehospital care, due to the dense network of RZP stations and the low arrival times of crews with doctors.

Key words: competentions; paramedics; prehospital care; European Union

Introduction

A paramedic is a regulated profession, meaning fulfilling specific regulations, legal norms, and guidelines are necessary to practice this profession (1). The competencies of a paramedic, which serve as a basis for their professional training, are defined in Decree No. 55/2011 Coll. on the activities of healthcare workers and other professional workers. This decree also addresses the competencies of paramedics who obtain specialized expertise (paramedics with a specialization in urgent medicine), which enhances their professional portfolio.

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The Czech prehospital care environment is specific in its traditionalist approach, based on the principles of the French-German healthcare system. According to Tsiarchristas (2015) (2), a common characteristic of this system is that the responsibility for a patient lies with the doctor. The work and level of involvement of non-medical personnel in the treatment process are influenced by national legislation and the competencies granted to non-medical personnel (hereafter referred to as NMP) in specific countries. The paramedic training system is also directed towards this aspect.

This study aims to map the differences in competencies and the process of professional training of paramedics in the Czech Republic, Poland, Germany, and Slovakia, as these countries have a similar approach to the prehospital care system and are closest to the Czech Republic. It is a sensitive topic, frequently chosen by students in the Paramedic field for their final papers. The breadth of competencies and their practical application extends not only to the provision of prehospital care but also to areas such as medical law, public health, and others. However, due to the challenging personnel situation affecting many medical fields, it is essential to discuss how to address the potential shortage of doctors in the positions of emergency medical teams and how to address this scarcity through appropriate preparation and practice for paramedics. This problem will also need to be addressed in the Czech Republic's Armed Forces Medical Service, which will also be required to implement systemic measures to ensure prehospital care at the medical Role 1 level, considering the shortage of doctors in these positions.

Suppose we focus on the concept of competence itself, according to Havlíčková and Žárská (2012) (3). In that case, it can be defined as an individual's ability to act positively and continually develop their potential based on predetermined rules (abilities, knowledge, skills, experiences, attitudes, values, etc.) within a specific context of diverse activities and life situations, coupled with the possibility and willingness (motivation) to make decisions and take responsibility for those decisions. Responsibility is a crucial attribute that is fundamental to non-medical personnel (NMP) competencies. Štětina (2014) (4) states that competencies precisely determine the framework of activities that individuals (part of the Integrated Rescue System) can perform under normal circumstances or during extraordinary events on the territory of the Czech Republic. Competencies help protect individuals belonging to the Integrated Rescue System. In the case of their violation, they also determine the severity of the punishment, which could lead to job loss or legal proceedings.

Competence, therefore, represents the delineation of the scope of work for paramedics in prehospital and hospital care. It is a list of activities they can perform, either with a doctor's indication or without a direct doctor's indication, based on the decision of the treating paramedic (5). The outputs from comparing paramedic competencies can serve as partial starting points for further planned systemic changes in the provision of prehospital care and the overall configuration of the healthcare system in the Czech Republic.

Methods

As the primary research method, a content analysis of the applicable legislation regarding education and the work content of ZZ in the environment of the Czech Republic, Germany, Poland, and Slovakia was used.

Regarding the Czech legislation, it mainly involved Act No. 96/2004 Coll. (6), Decree No. 55/2011 Coll. (7), Decree No. 391/2017 Coll. (8), and other related documents. As for the German legislation, it included the Act on Emergency Medical Technicians (Gesetz über den Beruf der Notfallsanitäterin und des Notfallsanitäters, hereafter NotSanG) (8). Polish legislation was represented primarily by Act No. 191/1410 on the State Emergency Medical Services from 2006 (Państwowe ratownictwo medyczne) (9) and the Minister of Health Regulation from December 16, 2019, on medical rescue activities and other non-medical rescue activities that may be provided by paramedics (W sprawie medycznych czynności ratunkowych i świadczeń zdrowotnych innych niż medyczne czynności ratunkowe, które mogą być udzielane przez ratownika medycznego) (10). The issue of paramedic competencies in Slovakia is addressed primarily in Act No. 578/2004 Coll. (on healthcare providers, healthcare workers, professional organizations in healthcare, and on amendments to certain laws) (11) and Decree No. 151/2018 Coll. (12).

Furthermore, available internal standard operating procedures (SOP) of paramedics from each country were analyzed. Lastly, data from previous studies on this topic were evaluated using databases such as WoS, PubMed, and Scopus.

Using keywords (paramedic, system of work, health care law, competence of paramedics, education of paramedics), publications dealing with the issue of competence of paramedics in the Czech Republic, Poland, Slovakia, and Germany were searched. Although 116 professional publications dealt with the case, none contained a comparison between the selected countries. In the Czech environment, there is no professional article dealing with the issue; only 58 sources were found - final diploma theses of students.

It can be stated that this comparison is missing in the professional literature, and the only publication dealing with this framework was the study by Dúason, Ericson, and others (2021), who pointed to the necessity of a European uniform framework for education and competencies of paramedics (35).

Information concerning paramedics in each country was categorized into three common areas to allow for subsequent comparison. These areas included paramedic education in each country, the system of activities (professional practice), and the scope of their competencies.

To define the research question, the PICO format was used, which represents a uniform, systematic method of identifying individual elements of a clinical problem (36). The question was subsequently described as "In what interventions they differ and which interventions they have in common (I) by the paramedics (P) of the Czech Republic, Poland, Slovakia, and Germany (C), enabling the quality provision of pre-hospital care (O).

Results

System of paramedic education

In the Czech Republic, paramedic education is at the university level, primarily at the bachelor's degree level (Bc.). This education entirely replaced the previous training provided at secondary or higher vocational schools. An individual can gain the professional qualification to practice as a paramedic if they meet the requirements stated in §18 of Act No. 96/2004 (6), which include being a healthcare worker with specialized competence as a general nurse according to §5, with specialized competence in intensive care nursing, and having been a member of an emergency medical service team for at least half of their weekly working hours for a total of five years in the last six years.

However, before commencing their work as a paramedic, the graduate must, according to §18 of Act No. 96/2004, complete an internship at an acute inpatient department or an emergency admission unit in a healthcare facility, which must be done within one year.

In the Federal Republic of Germany (hereafter Germany), several levels of non-medical personnel provide prehospital emergency care. These levels include Rettungshelfer (RH), Rettungssanitäter (RS), and Notfallsanitäter (NFS). RH is the lowest level, functioning as the entry-level for further training. The closest to the Czech paramedic is NFS, for which the conditions and conclusion of the NFS study program are defined by the decree NotSan-APrV 4280 from 2013 (13). This is also a three-year university-level study program.

In Poland, paramedic education has also been standardized as a three-year university-level study program (14). The curriculum for the paramedic study program is defined by the Minister for Science and Higher Education regulation from 2019, Appendix No. 8 (13). The study is divided into six semesters, during which students must complete both theoretical and practical training. After completing the study program, paramedics are required to undergo a six-month specialized internship at a healthcare facility (15). Poland is preparing an amendment to Act No. 191, which will regulate prehospital emergency care and the competencies of paramedics.

While Slovakia offers secondary-level paramedic education in addition to university-level education, it can only be considered partially equivalent to the other mentioned countries. Slovak paramedics, comparable to their Czech, Polish, or German counterparts, must also complete a university-level bachelor's degree study program for urgent care. The study program is governed by Decree No. 296/2012 [16]. Unlike the Czech Republic, Slovak paramedics cannot work in Intensive Care Units or High Dependency Units but only in hospital emergency departments.

Table No. 1 provides an overview, demonstrating that the educational systems in the compared countries are relatively similar.

States	Hourly teaching allowance	Hourly allowance for compulsory professional internships
ČR	3300	1800
SRN	1920	1960
PR	2415	960
SR	3370	1850

Table 1. Overview of Hour Allocation for Paramedic Education.

The System of Paramedic Work in Different Countries

The Czech Republic has a system of prehospital care based on the collaboration of two components, forming a cohesive system. This includes the Medical Dispatch Center (Zdravotnické operační středisko, ZOS), which coordinates and cooperates with the response teams or crews.

As Franěk (2015) (17) describes, the ZOS can be considered the "brain" that manages the entire system. ZOS operates at a high level and is fundamental in ensuring high-quality and effective prehospital care. Operators at ZOS receive emergency calls and make decisions regarding the urgency of the response. This work is demanding and essential for the functioning of the Integrated Emergency System.

Regarding the emergency response teams, there are several types of crews. One of them is the Rapid Medical Assistance (RLP) team, consisting of a paramedic (ZZ) and a physician. This type of team is sometimes replaced by the "rendez-vous" (RV) system, where the paramedic arrives first at the scene, and the physician comes separately after being alerted by the paramedic. The physician then assesses the situation and provides additional medical expertise.

Another option is the Rapid Medical Assistance (RZP) crew, which operates with a paramedic only. It enables the paramedic to provide care to the patient within their paramedic scope of practice.

In the Czech context, there is also the option of the Helicopter Emergency Medical Service (LZS) crew, a specialized team combining the advantages of swift medical care, expert treatment, and accessibility. LZS is particularly utilized to shorten patient transport times and expedite the availability of medical care at hospital facilities (18).

The emergency medical services system in Germany is built similarly to the one in the Czech Republic. It also consists of two main components: the operation centers (referred to as Leitstelle) and the mobile response teams. The German operation centers (Leitstelle) function on the same principles as the Health Emergency Medical Service Operations Center (Zdravotnické operační středisko - ZOS) in the Czech Republic.

Regarding the mobile response teams, there are several types:

KTW (Krankentransportwagen) is a crew intended for transporting patients who are not in life-threatening situations. It consists of only two emergency medical technicians (EMTs). KTW is often used primarily as a transportation service. RTW (Rettungswagen) is the equivalent of the Czech RZP (Rychlá zdravotnická pomoc). The equipment of the crew, the type of vehicle, and the personnel arrangement are similar. NEF

(Notarzteinsatzfahrzeug) is equivalent to the Czech RV (Rychlá vozidla) system and transports a physician to the incident scene. The helicopter rescue service in Germany (RTF/ITH) also functions similarly to its Czech equivalent.

In summary, Germany and the Czech Republic have similar structures in their emergency medical services, with cooperation between operation centers and mobile response teams. The types of teams deployed for different situations, such as KTW, RTW, NEF, and helicopter service, are similar in both countries.

In Poland, the system of providing prehospital emergency care (PNP) is based on the collaboration of two key components: the operational center and the response teams. However, unlike the rendezvous system used in the Czech Republic, this method is not utilized in the Polish system.

The response teams in Poland are categorized into several types. The Type S team, known as the Mobile Intensive Care Unit, consists of a three-member specialized team comprising a doctor and paramedics. Then, there is the Type P team, which is similarly equipped to the Type S vehicle but does not include a doctor. It is primarily used for non-life-threatening emergencies (19).

The Type N team is exclusively used for transporting and resuscitating newborns and infants, often involving the transfer of premature babies or infants requiring specialized care in an intensive care unit (20).

The last variant is the Type T team, which is used solely for transporting patients not in critical condition. It is also utilized for transporting organs and blood products, and the team usually consists of a driver and a paramedic (19). As for the air rescue service, it operates on similar principles to the Air Ambulance Service (LZS) in the Czech Republic.

The Slovak Emergency Medical Service system operates on the so-called Franco-German model and is based on the same principles as in the Czech Republic. Paramedics treat patients directly at the scene and, depending on the severity of their medical condition, transport them to hospitals for further treatment (21). The system can also be divided into two collaborating components: the operational center and the response teams.

The Rapid Medical Assistance (RZP) is the equivalent of the Czech RZP, where only paramedics are part of the crew. It provides prehospital emergency care for patients who are not in life-threatening conditions. Rapid Medical Assistance (RLP) is similar to the Czech RLP, with a team of paramedics and a doctor. The equipment and the presence of a doctor enable interventions in acute, life-threatening situations. A particular version of RLP is RLP/MICU, equipped as an intensive care unit, including an incubator, and is used in the most critical cases. The Helicopter Emergency Medical Service (VZZS) is primarily intended for patients in critical condition when it is necessary to minimize their transport time. The personnel typically consist of a doctor, a paramedic/nurse, and a pilot (22).

Thus, it can be stated that the system of paramedic activities in the individual examined countries is similar and does not differ in essential details.

Competences of Paramedics

Although the training and education system seems similar among the compared countries, significant differences can be found in competencies. In all countries, the issue of EMT (Emergency Medical Technician) competencies is addressed through legislation, where specific procedures and under which conditions EMTs are allowed to perform are clearly defined. This includes Decree No. 55/2011 (Czech Republic), laws §2a NotSanG, §4 Abs. 2 NotSanG (Germany), Dz.U. 2022 pos. 863 (Poland), and Decree No. 334/2010 Z. z. (Slovakia). Each of these legislative acts clearly outlines the specific procedures and practices that EMTs can perform within the conditions of their respective countries. They also specify the medications that EMTs can administer and under what circumstances.

Table 2 provides a comparison of selected paramedic competencies in the respective countries. The procedures marked with "yes" can be performed independently, those marked with "indication" can be performed independently after a doctor's indication, and the procedures marked with "no" are not allowed for paramedics to perform independently.

Actions	States compared			
	Czechia	Germ.	Poland	Slovakia
laryngeal mask	indication	yes	yes	yes
endotracheal intubation	indication	yes	yes	yes
coniopuncture	no	yes	yes	yes
coniotomy	no	yes	yes	yes
puncture of tension pneumothorax	no	yes	yes	yes
intravenous access	yes	yes	yes	yes
intraosseous entry	indication	yes	yes	yes
ECG recording and waveform evaluation	yes	yes	yes	yes
cardiac stimulation, cardioversion	indication	yes	yes	yes
defibrillation	yes	yes	yes	yes
monitoring of basic vital functions	yes	yes	yes	yes
delivery management in the field	yes	yes	yes	yes

Table 2. Overview of some procedures that paramedics can perform.

The competence of paramedics to administer selected medications corresponds to the performed professional procedures. This is also illustrated by Table No. 3.

Medicament	States compared			
	Czechia	Germ.	Poland	Slovakia
Crystalloid solutions	yes	yes	yes	yes
Glucose 40%	yes	yes	yes	yes
Oxygene	yes	yes	yes	yes
Andrenalin	indication	yes	yes	yes
Nitrates	indication	yes	yes	yes
Atropine	indication	yes	yes	yes
Adenocor	indication	yes	yes	indication
Naloxon	indication	yes	yes	yes
Heparin	indication	yes	yes	yes
Non-opiate analgesics	indication	yes	yes	yes
Benzidiazepines	indication	yes	yes	indication

Table 3. Overview of medications that paramedics can administer independently.

Discussion

In education, it is evident that the systems of Emergency Medical Technician (EMT) training do not differ significantly in a broad sense. In all cases, it involves a three-year university study, and its structure is anchored in national legislation. A separate topic for consideration could be comparing individual study programs to identify specific differences in EMT training more clearly. In terms of the number of instructional hours, Slovakia has the highest number, but the differences could be more remarkable.

An important finding is that all study programs strictly divide education into theoretical and practical components, both of which are equally important. In this regard, Germany (SRN) performs the best, but the difference could be more substantial. However, it is interesting that Poland has the lowest number of instructional hours in both training areas. This raises the question of the potential impact on the overall quality of provided care. For instance, Leszczyński and others (2022) reported that during the COVID pandemic, patients in Poland expressed minimal satisfaction with the provided prehospital care. Evaluating this aspect is complicated due to the absence of a system for assessing the quality of healthcare services in Poland (23).

Aftyka and others (2014) made an exciting discovery, confirming the differing roles of nurses and EMTs in Polish emergency medical teams. Despite having comparable competencies between EMTs and emergency nurses in Poland, the activities of medical rescue teams varied depending on whether the team leader was a nurse or an EMT (24).

The area of competencies for EMTs is the most debatable. Czech legislation is the most restrictive compared to neighboring countries, limiting the provided procedures and administration of medications to the greatest extent. From the compared data, it is evident that Czech EMTs have the smallest scope of competencies. Some procedures can be performed, but only upon a doctor's indication. A similar situation applies to medications.

Interestingly, in the neighboring countries, the indication by a doctor does not encroach upon EMTs' competencies. German NotSanG defines that the procedures that students learn and adequately master during their studies can be applied to patients in practice (8). There are no special conditions in Poland, and their legislation directly guarantees extensive competencies for EMTs. In Slovakia, according to Decree 334/2010, there is a system of written authorization where EMTs must demonstrate their skills and qualifications for individual procedures once every maximum of five years. If successful, they can perform all procedures specified by their legislation (25). An undeniable fact is that, in the Czech context, a doctor is the holder of expertise in prehospital emergency medical care.

The question is, what benefits arise from a wide range of EMT procedures? Procedures such as tension pneumothorax puncture or cricothyrotomy are life-saving interventions taught and practiced as part of EMTs' educational preparation. However, it needs to be statistically documented how often these procedures have been required in Czech prehospital care and whether there has been any impact on the patient's health due to time delays. Likewise, there needs to be documentation on how often these life-saving procedures are performed by EMTs in neighboring countries. According to the Association of Rescue Services of the Czech Republic, there were 635 emergency medical teams and 318 emergency medical stations in the 14 regions of the Czech Republic in 2022 (26). The distribution density is relatively high. In 2022, there were approximately 141,000 emergency medical responses in the Czech Republic (26), indicating that the arrival of a doctor to the patient is fine within legislative limits. On the contrary, it even happens that the medical rescue team arrives at the scene before the rapid response ambulance, and the doctor performs these life-saving procedures anyway.

It is possible that it would be advantageous to transfer these procedures to the "doctor's indication" category, which could prevent potential time delays if the rapid response ambulance (RZP) team arrives at the scene first. However, this would require adequate and continuous practical training for EMTs, as more than just practicing these skills during their educational preparation may be required.

The use of a laryngeal mask only, according to the doctor's indication, is debatable. It secures the airway, where, unlike an endotracheal tube, the mask ends in the supraglottic area. Complications associated with a laryngeal mask are significantly fewer than those associated with an endotracheal tube or the use of a manual resuscitation bag (27). Modern single-use supraglottic devices are available, which have a high success rate when inserted by EMTs (28). Using a laryngeal mask could be a viable alternative for airway management, in contrast to endotracheal intubation, which should indeed remain the responsibility of an experienced physician in prehospital care (PNP). Given that the success rate of intubation in field conditions ranges from 75 to 98% (29), the benefit of allowing EMTs to perform intubation in the Czech context is not evident.

A similar discussion is also raised regarding the use of intraosseous access. This method is inherently suited for prehospital care (PNP) settings. The guidelines of the European Resuscitation Council recommend intraosseous access during resuscitation if intravenous access proves difficult or impossible. Despite these recommendations,

this technique for obtaining access is rarely used (30). Intraosseous access can be established more quickly than IV access and has a higher success rate on the first attempt (31). Moreover, it has been demonstrated that serum drug concentrations for medications administered via intraosseous access are equivalent to concentrations administered through peripheral intravenous lines (32). Therefore, performing this procedure, which is already taught in schools, could be allowed for EMTs based on their own decision.

The differences in competencies between Czech emergency medical technicians (EMTs) and EMTs in neighboring countries regarding the administration of medications are even more significant. Among the selected administered medications, Czech EMTs can independently administer only crystalloid solutions, oxygen, and a 40% glucose solution in cases of verified hypoglycemia. All other medications can only be administered under the indication of a physician. Foreign EMTs do not have such limitations. However, in prehospital care (PNP), the prompt and appropriate administration of a specific medication is a crucial factor for the patient's further prognosis. For example, the administration of adrenaline and adenosine has long been established in recommended procedures for PNP in cases of cardiac arrest with shockable rhythms (33).

By adopting this approach, the breadth of competencies for each specific procedure that EMTs can or cannot perform under given conditions can be commented on and assessed. A crucial argument to consider is the shortage of physicians serving in emergency medical services (EMS). Suppose a decrease in the number of physicians is proven to impact the availability of prehospital care (PNP). In that case, it is appropriate to consider increasing the specialized competencies of non-medical personnel. In such a case, more than merely acquiring specialized qualifications would be required, and an adequate system of continuous professional training for EMTs in essential skills would need to be established. This is a potential path to cost savings, as the cost of EMT labor is lower than that of physicians. However, ensuring that the overall quality of care provided in PNP is not compromised in this process is essential.

To identify the reasons for the differences in competencies among the investigated countries, it would be appropriate to compare the individual study programs of the countries under examination. Potential differences in the time allocation for teaching various topics could explain the competency variations among emergency medical technicians (EMTs).

EMTs belong to regulated professions, and Directive 2005/36/EC of the European Union applies to them. According to Article 22(b) of this directive, each EU member state, following specific procedures of each member state, shall ensure further education and training so that individuals who have completed their education can keep pace with the developments in their profession to the extent necessary for maintaining a safe and effective practice of the profession (34). Education, therefore, should be provided by the state. Although this is a national responsibility, the result should be the compatibility of this profession among the individual EU member states. Unfortunately, EMTs are not covered by the possibility of obtaining a European Professional Card (EPC), which would guarantee this compatibility. However, it can be stated that among the countries included in this study, compatibility exists, although the practice and preparation systems differ in specific details. Increasing the competencies of Czech EMTs could further deepen this compatibility.

Conclusion

The training system and the practice of the emergency medical technician (EMT) profession are crucial for ensuring a high level of quality in prehospital care. A comparison of the Czech Republic, Germany, Poland, and Slovakia has found that the education and the system of EMTs differ in detail due to national legislative specifics. Particularly in the area of EMT competencies, it was observed that EMTs in the Czech Republic face the most limitations. However, these limitations should not significantly impact the quality of prehospital care due to the dense network of emergency medical stations (EMS) and the short response times of teams with physicians. Increasing EMT competencies could have a positive impact, especially regarding financial savings, addressing personnel challenges, and enhancing mutual compatibility within the EU, as the EMT profession falls within the group of regulated professions. This issue deserves further examination, especially regarding EMT education, the composition and content of study programs, and the potential benefits or risks that could arise from allowing EMTs to perform procedures currently limited to the portfolio of a physician.

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Conflict of Interest

The authors declare that they have no conflicts of interest regarding the publication of this article.

Adherence to Ethical Standards

This article does not contain any studies involving animals performed by any of the authors. This article does not contain any studies involving human participants performed by any of the authors.

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