

Use of the educational mobile applications by emergency medical services personnel.



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ABSTRACT

INTRODUCTION: The specificity of work in the emergency medical service requires making quick and accurate diagnostic and therapeutic decisions on the spot. To this end, a variety of educational materials proves to be helpful. This study describes the role of mobile applications used on a daily basis by the Emergency Medical Services (EMS) team.

MATERIAL AND METHODS: We conducted a survey in 2018 among EMS workers using an on-line questionnaire. The surveyed group consisted of 91 people (paramedics, nurses and doctors). We expressed the results of our research in the form of arithmetic mean and mean standard errors. We also used the Chi-square test for independence and considered results significant at the $p < 0.05$ level.

RESULTS: Mobile applications are used by 96.7% of respondents ($n=88$), regardless of gender ($\chi^2=0.184$; $p=0.668$), occupation ($\chi^2=1.163$; $p=0.559$) or length of service ($\chi^2=7.449$; $p=0.114$). The vast majority (92.3%; $n=84$) consider them necessary in everyday work. Applications for smartphones are most often used (91.2%; $n=83$), especially in the field of pharmacotherapy. The majority of study participants (68.1%) indicate the need for new graphic mobile applications, especially in the field of paediatric patient management.

CONCLUSIONS: The majority of EMS workers nowadays use teaching aids in their daily practice and use is not dependent on sociodemographic factors. Respondents most often use smartphone applications that incorporate pharmacotherapy. Further work on making mobile applications available is desirable.

KEY WORDS: mobile applications, teaching aids, ambulance, medical personnel, emergency medical service

INTRODUCTION

The scope of Emergency Medical Service (EMS) work requires specialty knowledge, restraint and the ability to deal with life-threatening situations. In such circumstances, the need for reaching the correct diagnosis, evaluating the patient and finally implementing appropriate management becomes invaluable. Medical personnel use a variety of didactic materials based on modern technological solutions in both the pre-graduate education and continuing education phases [1].

The generation of new and improved mobile applications has helped EMS clinicians perform their daily work. Therefore, more and more EMS clinicians use these applications, which serve as a resource to confirm care plans at the point of care. Improvement of skills learned during the course of medical education is possible thanks to both simulation systems [2, 3] as well as modern mobile applications as teaching aids. Portable multimedia devices, including smartphones, offer communication capabilities and access to data, providing the necessary information searched for by the user, thus fulfilling the function of "portable computers" [4]. On-call emergency personnel should benefit from best practices that allow them to access up-to-date information needed in their daily medical practice. In this paper, we attempt to assess the use of mobile applications by practicing EMS clinicians, identify those most commonly used, and the users' needs in this area.

MATERIAL AND METHODS

We conducted the survey in 2018 among EMS clinicians using an on-line questionnaire. The surveyed group consisted of 91 people (paramedics, nurses and doctors) working in the EMS. We expressed the results of our research in the form of arithmetic mean and mean standard errors. We also used the Chi-square test for independence and considered results significant at the $p < 0.05$ level.

RESULTS

Study group

The study involved 91 people: 70 men (76.92%) and 21 women (23.08%). The mean age for the studied population was 33.23 years ($SD \pm 7.45$). The questionnaire was filled in by 76 paramedics (83.52%), 12 nurses (13.19%) and 3 doctors (3.29%). The majority of respondents (33%) reported 1 to 5 years of

professional experience, while 25% reported 11 to 20 years and 24% reported 6 to 10. Only 12% of respondents reported having less than one (1) year of professional experience. Eighty-four (92.31%) also stated that they considered mobile applications necessary in their everyday work.

Use of teaching aids

Eighty-eight respondents (96.70%) use various forms of mobile applications in their everyday work. Therefore, we used Chi-square to understand the relationship between the use of mobile applications and covariates of interest (Table 1). We found no significant correlation between the use of mobile applications and gender ($\chi^2=0.184$; $p=0.668$), occupation ($\chi^2=1.163$; $p=0.559$) and seniority ($\chi^2=7.449$; $p=0.114$). More than 90% of respondents use smartphone applications that are easy, fast and available on most current phones in the market. Pharmacological wheel diagrams and respondents' own notes are also commonly used (Figure 1). We also analysed the types of applications EMS clinicians use. The "Leki u Dzieci" was the most commonly used application, with 78% of respondents indicating they used it. More than half of the respondents also use "EMPENDIUM" (60%) and "RM Algorytmy" (55%). Up to a third of EMS clinicians use "Protokoły Ratownicze" (31.87%) and "RSO" (30.77%), and 25% use "EKG Ratunkowe" and 20% use "DR WIDGET". Figure 2 includes the complete list of mobile applications used by EMS clinicians.

| gender | does not use | use | totality |
|-----------------|--------------|--------------|----------------------|
| men | n=2 (2,2%) | n=68 (74,7%) | n=70 (76,9%) |
| women | n=1 (1,1%) | n=20 (22,0%) | n=21 (23,1%) |
| totality | n=3 (3,3%) | n=88 (96,7%) | n=91 (100,0%) |

| occupation | does not use | use | totality |
|-------------------|--------------|--------------|----------------------|
| paramedisc | n=2 (2,2%) | n=74 (81,3%) | n=76 (83,5%) |
| nurses | n=1 (1,1%) | n=11 (12,1%) | n=12 (13,2%) |
| doctors | n=0 (0,0%) | n=3 (3,3%) | n=3 (3,3%) |
| totality | n=3 (3,3%) | n=88 (96,7%) | n=91 (100,0%) |

| seniority | does not use | use | totality |
|----------------------|--------------|--------------|----------------------|
| < 1 year | n=1 (1,1%) | n=10 (11,0%) | n=11 (12,1%) |
| 1-5 years | n=0 (0,0%) | n=30 (33,0%) | n=30 (33,0%) |
| 6-10 years | n=1 (1,1%) | n=21 (23,1%) | n=22 (24,2%) |
| 11-20 years | n=0 (0,0%) | n=23 (25,3%) | n=23 (25,3%) |
| > 20 years | n=1 (1,1%) | n=4 (4,4%) | n=5 (5,5%) |
| totality | n=3 (3,3%) | n=88 (96,7%) | n=91 (100,0%) |

Table 1. Relationship between the use of mobile applications and covariates

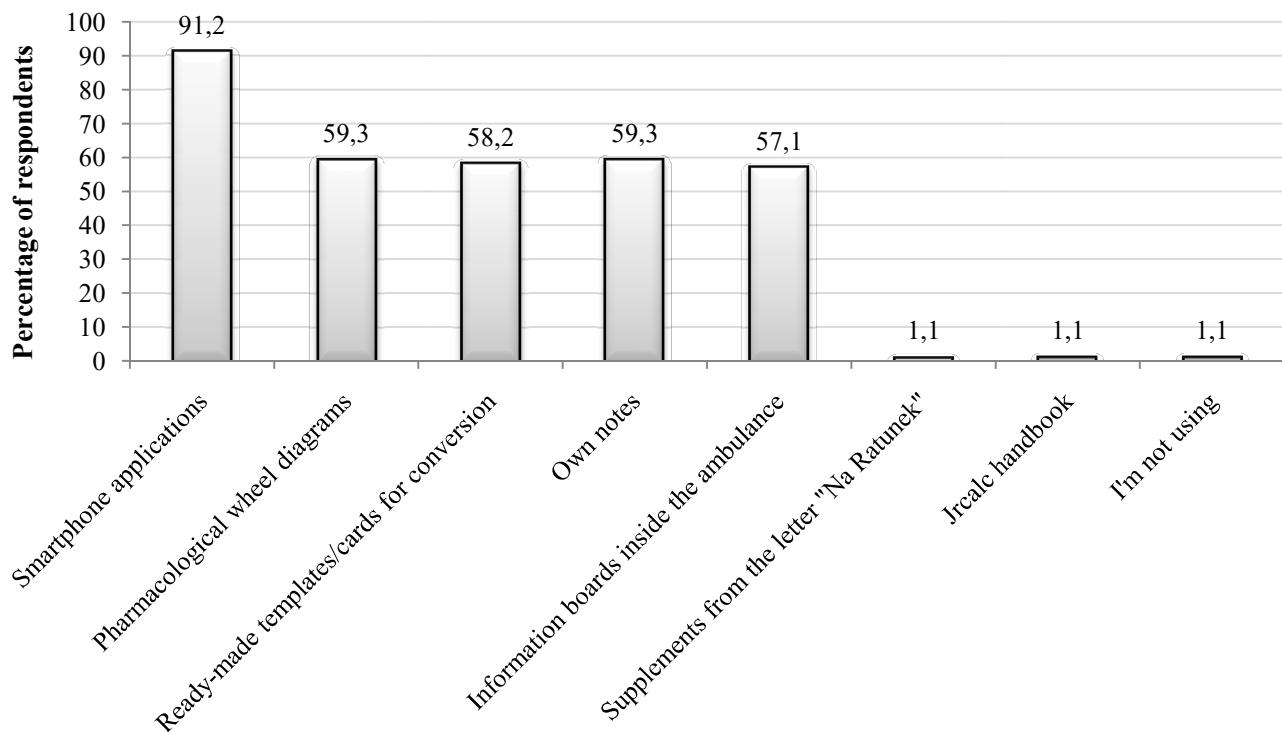


Figure 1. Teaching aids used by emergency medical service staff

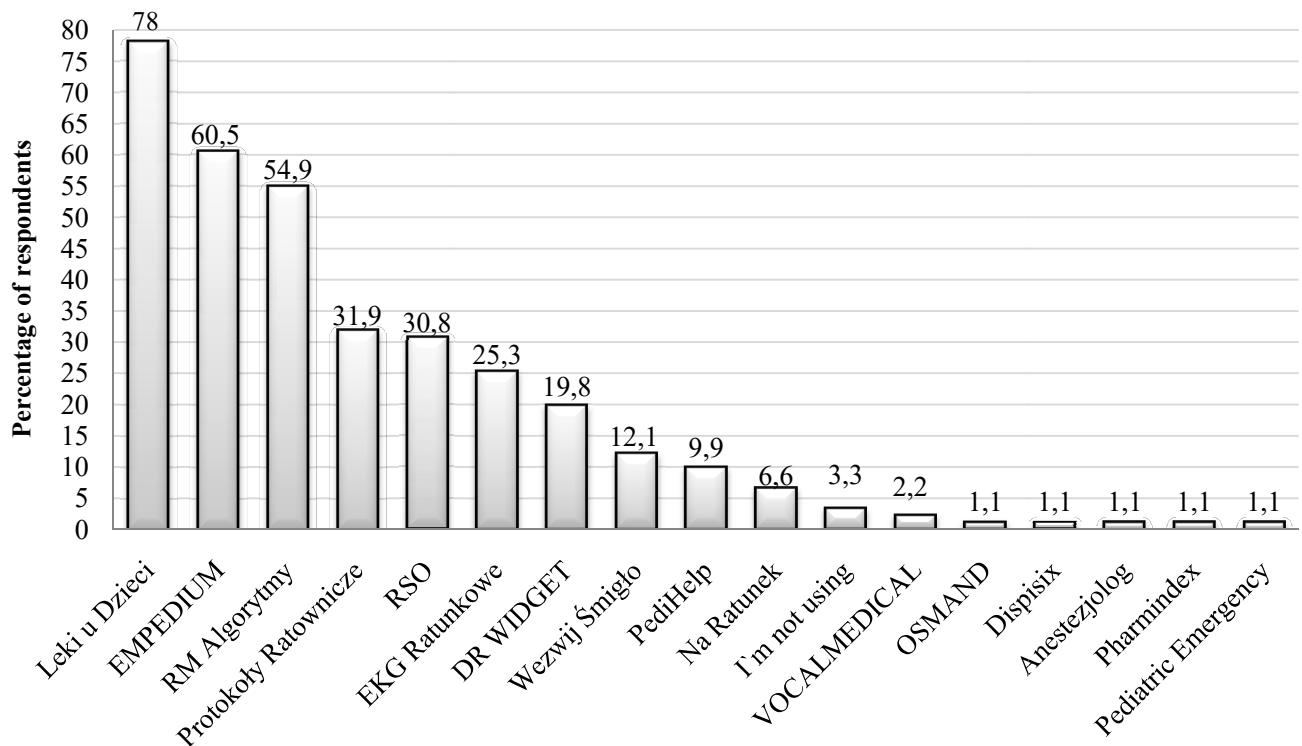
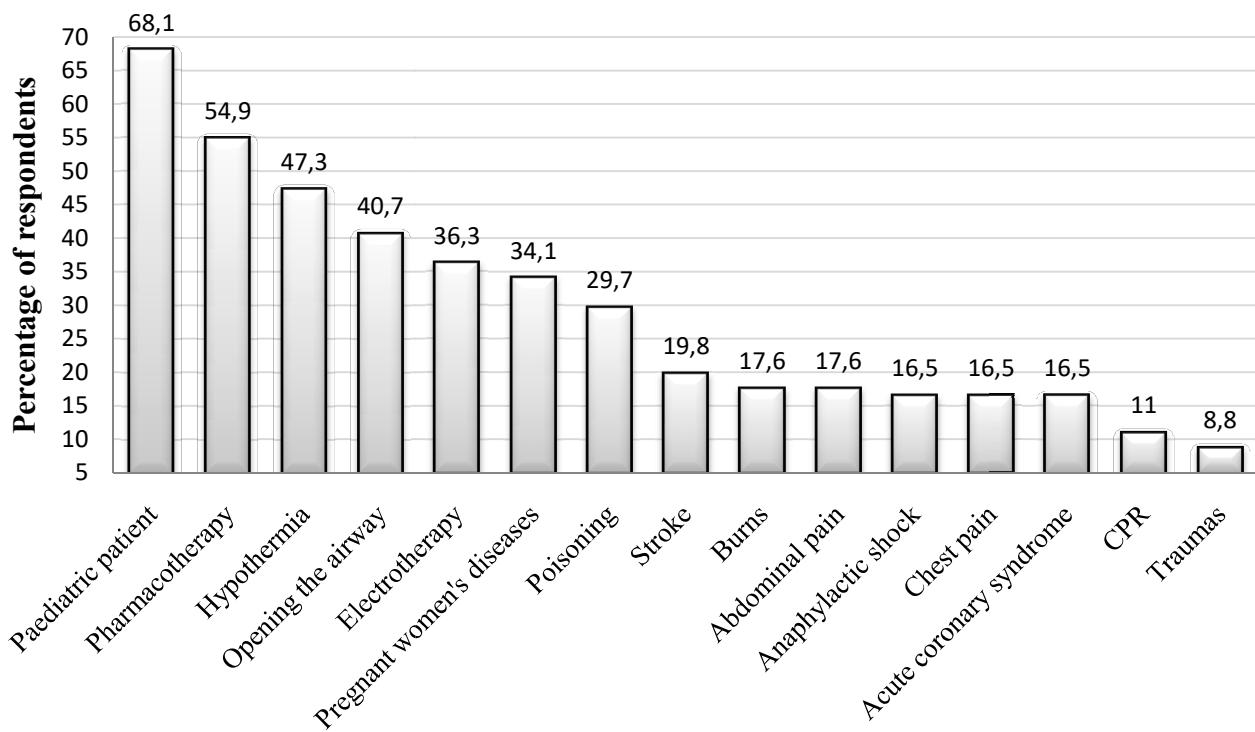


Figure 2. Names of mobile applications used by emergency medical service staff**Figure 3.** Thematic scope of the demand for teaching aids in the emergency medical service

The last issue raised in the study is the recognition of the need for the development of new mobile applications, based on the most salient subjects identified by respondents. The majority of study participants identified subjects related to the paediatric patient and pharmacotherapy as most demanded among EMS clinicians, with 68% and 54.9%, respectively. Slightly less than half of respondents identified topics related to hypothermia (47.3%), followed by airway patency (40.7%), electrotherapy (36.3%) and pregnancy-related diseases (34.1%). Cardiac-related topics and trauma were among the topics perceived to have low demand among EMS clinicians. We present a detailed list in Figure 3.

DISCUSSION

Clinical practice, whether as a paramedic, nurse or doctor in EMS, is difficult and challenging. Stress and fatigue resulting from long shifts or difficult cases compound the daily struggles EMC clinicians face during patient treatment and transport, which can have an impact on clinicians' performance. It is important for clinicians to focus on their patients during treatment and transport, and make the right decisions based

on accurate information, which is available through mobile applications. This information can be invaluable in difficult situations.

The vast majority of respondents in our sample use mobile applications on a daily basis, regardless of gender, work experience or occupation. The majority of respondents rely on mobile applications, most often those related to pharmacotherapy. Drug dosage calculations can be challenging [5], especially during critical care situations and rescue operations, which may explain the popularity of such helpful applications among EMS clinicians. However, we need to pay special attention to the substantive quality of didactic mobile applications. We can do this by controlling and improving the reliability of the information contained in the applications [6].

There is a need to create new thematic mobile applications necessary in the daily work of medical personnel [7, 8]. Even when most respondents identified paediatric patients as the topic with most demand among EMS clinicians, other emergencies including resuscitation, opening the airway, pharmacotherapy, electrotherapy, stroke, anaphylactic shock, hypothermia, burns, injuries, poisoning, pregnant women's diseases, abdominal pain, chest pain, acute coronary syndrome are also important in EMS practice. Our results can guide efforts by health technology firms and help identify areas of demands for new mobile applications, and improve the quality and effectiveness of medical care in EMS settings.

CONCLUSIONS

Mobile applications are widely used by the majority of EMS clinicians and its use is not dependent on sociodemographic factors. Respondents most often use smartphone applications related to pharmacotherapy. Additional research in the field of mobile applications can help identify those that are more desirable to EMS clinicians, especially for the management of paediatric patients.

Disclosure statement

The authors did not report any potential conflict of interest.

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