A Swiss Knife for EMS: Artificial Intelligence Embedded Tablets and Drones

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Mini Review

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ABSTRACT

Emergency medicine is an incredibly diverse career, and there is no doubt of the multiple functions that a single member of a veteran emergency medical services team will need to be capable of. Artificial intelligence has emerged as an important and challenging subject of research in computer science in the past few years. With a significant number of students and researchers studying it frequently, advancement in this area is progressing rapidly. Most research has documented the use of artificial intelligence in emergency medicine, namely in the form of glasses. However, there is a significant demand for a comprehensive utility-based product that can be used by an EMS team. The main objective of this paper is to describe the functions of an EMS team, complement those functions with different features on a theoretical AI embedded tablet designed just for EMS, and to see whether it is even possible as a whole. This paper will be citing secondary data as its main source of claims. To be able to properly implement such an invention will allow us to solve issues within emergency medicine concerning inefficient communications and dangerous situations quicker. The conclusion of this paper is that applications of artificial intelligence to make the turbulent jobs of EMS any better with inventions should be a paramount mission of researchers in computer science and medicine.

Keywords: EMS; Emergency medicine; Artificial intelligence; Computer science; AI application

INTRODUCTION

The high-pressure environment of first responders: Why should we use AI here?

EMS is clearly one of the most stressful careers, and the strict guidelines for how long to prepare for a call (60 seconds, usually getting out of bed) and how long to transport patients (240-480 seconds, including primary and secondary assessments and more, depending on if it is EMS or ALS) can provide evidence as to why there is a lack of personnel throughout the United States. Combining such demanding guidelines with the low wages and high turnover rates, it directly contributes to the current employment crisis that EMS agencies around the United States are experiencing. From a recent survey comparing 2019 to 2023, it was reported from EMS agencies that applications had dropped by 13%, and over 27% of agencies had a drop of over 25% in applications to become first responders. To further support the argument that the high-pressure environment of first responders is only getting more and more turbulent, MCIs, or Multi-Casualty Incidents involving firearms increased by 31% from 2019 to 2022. Within the US, 90% of the deadliest mass shooting incidents have happened after 2007, further supporting the argument that first responders must keep up in any way possible, and sacrificing more of their own bodies should not be the solution–technology is. This leads us to our research paper, which will cover a jack-of-all-trades solution for EMS teams which involves an armored tablet for communications and drones to be

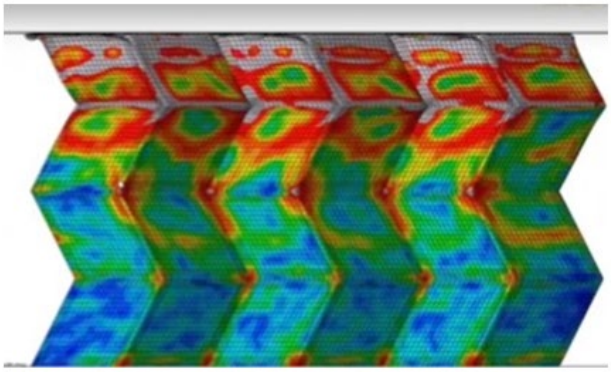
sent to EMS teams in need of specific medications, tools, or more.

LITERATURE REVIEW

AI-embedded tablet

The field of emergency medicine is undoubtedly a difficult career, with over 91% of emergency physicians reporting in a 2024 survey that they or a co-worker has experienced violence in the past year. This leads us to our first feature within the Swiss Knife's Tablet, where it should be armored enough that it can dissipate force in a way much more efficiently than normal tablet cases. There are multiple designs which can achieve the job, however the best one that would absorb kinetic energy, is a folded shape that looks like a Z of squares (Figure 1).

Figure 1. Diagram of AI-embedded tablet.



Latching onto the argument that emergency medicine is an incredibly violent career is another feature which should be added which is a button to alert law enforcement, fire department, or the ED of danger. Multiple companies have already implemented such a feature but only for law enforcement, the main company being Silent Safety, a company which developed an app which can silently alert the police with the press of a button at your hiding spot. This is most beneficial within home invasions and domestic abuse cases. Without a doubt, this would be able to allow the first responder more time to flee instead of multitasking, reporting the incident through radio and escaping the area. Multi-taskers lose 5-15% of cognitive efficiency while focusing on two situations at once, making the job of being a first responder much more dangerous.

Medical personnel dedicate over 50% of their time towards documentation [1,2], and this is where artificial intelligence comes in with one solution, with natural language processing. The way that natural language processing can be important within situations for first responders is by documenting what is happening straight from the dialogue, where the first responder can verbally report the situation and this can be sent straight to the hospital. The two main voice assistants already released for medical professionals are Suki and Dragon Medical One, both claiming a 72% decrease in the amount of time documenting patients, which means more time towards treating them. When the report is completed, the tablet can automatically send the report to the hospital with the specifics and this provides more time for the first responders to treat the patient and less towards reporting what is happening.

The tablet's main function however will be the ability to call in for supplies from drones, with a drone design which will be covered in the next section.

DISCUSSION

Drones in EMS

To follow the Swiss Knife procedure, supplies can be quickly delivered with little to no delay from traffic or busy areas from drones, and will reach the patient as soon as possible. There are many designs for drones, and the main which can be rapidly refilled is the XMR emergency rescue Medevac and resupply UAV by Plymouth rock (Figure 2).

Figure 2. Diagram of drones in EMS.

The reason for using drones within EMS is due to the fact that one in ten patients in rural areas wait 30 minutes for EMS arrival due to the challenging terrain and distance away from busy areas [3,4]. The response time for EMS can be more than 14 minutes on average in rural, high traffic, remote, or geographically challenged areas [5-7]. Multiple time-critical medical emergencies, such as cardiac arrest, stroke, and more require quick EMS response to allow the patient to keep an intact mental state afterwards. After each minute without resuscitation the chances of neurologically intact survival decreases by 10% [8]. This only proves how important the challenge of time is to save patients. The amount of closings of trauma centers in rural areas has also impacted quick EMS response negatively [9]. This is where drones come into play, with their relatively inexpensive designs and incredibly fast deliveries, a specific study had found that drone-AED delivery times had saved 16 more minutes of transport when compared to a standard ambulance. In all tests conducted by the study, the drone delivered the AED 1.8 to 8 times faster than ambulances [10]. In another study regarding drone delivery of asthma inhalers, epi pens, and more, they discovered that a drone reduced the average delivery time by 78.8% [11].

CONCLUSION

Undoubtedly, these statistics prove that utilizing a drone to deliver a specific medical treatment with a press of a button is one of the most efficient ways to transport medication. Tied along with an AI-embedded tablet to further make documentation and communication quicker, this can be the next most important pair of technology for EMS. We must continue to research and find ways to make the workload of EMS much lighter, and with the introduction of the Swiss Knife– a combination of AI-embedded armored tablets and medication-carrying drones, there is no doubt of the amount of lives that will be saved in time-critical emergencies.

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