

Effects of Emergency Medical Care Network on Different Groups of People

A Research Paper Submitted to the
Department of Engineering and Society

Presented to
The Faculty of the
School of Engineering and Applied Science
University of Virginia
In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Biomedical Engineering

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Spring, 2022

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction and Methods

Pre-hospital care has been increasing as the population has been growing and chronic diseases have been rising (Vuilleumier et al., 2021). Consequently, the need for emergency care service has also become increasingly more important within the healthcare system as it is vital in reducing preventable deaths and disabilities (Rocha et al., 2017). However, there is an imbalance of healthcare services all around the world and the gaps between different regions are expanding (Riley, 2012). There are three fundamental functions of a healthcare system; improving the health of the population, responding to people's expectations, and providing financial protection against the costs of ill health (Razzak & Kellermann, 2002). Unfortunately, not all countries are able to successfully abide by these fundamentals. Therefore, implementing basic emergency medical care outside of the hospital could contribute to achieving those fundamentals and improving the healthcare system within that area. However, it could also create changes within society and further marginalize people.

In this paper, I will focus on the unintended consequences of emergency medical services (EMS) through the use of an interactive sociotechnical analysis (ISTA) framework. I will focus on the comparison of the EMS system from all around the world and examine how they affect their societies. Lastly, I will explore the possibility of implementing a new EMS system into those areas that lack this service.

I review EMS systems in several countries located in North America, Africa, Europe, Asia, and the Middle East in order to pinpoint places with and without this service (Page et al., 2013; Roudsari et al., 2007). I compare the economies of these countries via GDP along with accessible education, population growth, and healthcare to further examine the possibility of incorporating EMS (World Population Review, 2022). Overall, I compare EMS systems based on the regulation

and standard of the National Registry of Emergency Medical Technician (National Registry of Emergency Medical Technicians, 2022).

Emergency Medical Services (EMS)

EMS is a system that provides emergency medical care to members of their community outside of a medical facility. EMS Systems emergency medical technicians (EMTs) to identify public health problems and issues along with treating serious illnesses or injuries. The whole system is very intricate and it does not exist in isolation. It involves both public and private agencies/ organizations, hospitals and facilities of all types of specialties, communication and transportation networks, and highly trained professionals from all fields. Overall, it serves as the crossroad between health care, public health and public safety (NHTSA, 2022).

While the EMS system is becoming more advanced and accessible to the public, it still has many shortfalls and imbalances around the world. For instance, rural areas have limited EMS due to its large geographic and sparsely populated area. This causes longer travel times, difficulty navigating the terrain and limited trained personnel (RHlhub, 2022). Other areas lack the financial needs to provide these services such as developing countries. The emergency medical care in these areas lack the infrastructure and training, and often have a shortage of resources to serve the local demand (Razzak & Kellermann, 2002). Therefore EMS could be perceived as a luxury to the rich and fortunate rather than a public service for all people needing urgent medical attention. This is evident in places where the economy and the healthcare system allows EMS to be abundant. EMS in those areas experience a higher call volume due to the system in place. People in well-served communities will most likely have healthcare coverage and they know that help will come no matter what. Because of that, they neglect what the EMS system is there for. The patient no longer

is able to distinguish when the service is appropriate but rather use it based on their convenience (Dejean et al., 2016).

In this paper, I focus on the available pre-hospital treatment provided by EMS and the impact it has on society. I also discuss the implementation of EMS systems in communities where EMS is limited. I use Interactive Sociotechnical Analysis (ISTA) framework to analyze different interactions among subcomponents of the EMS sociotechnical system (Harrison et al., 2007). I used prior studies and research to draw attention to consequences of EMS. In the following sections, I discuss five types of interactions. Implementing new EMS to existing social systems, technical and physical infrastructures that mediates EMS use, social systems that mediates EMS use, effects of present EMS on the social system, and interaction of new EMS changes with the present EMS.

Interaction 1: New EMS Implementation in Existing Social System

Many places, especially those in developing countries, are lacking prehospital care. According to the World Health Organization, around 90% of global injuries occur in the lower-middle income countries with approximately 5.8 million deaths per year (Nielsen et al., 2012). The statistics for these areas are extremely high due to the absence of a well-organized prehospital care/EMS. Their existing social system cannot support EMS systems, resulting in an underdeveloped prehospital care system (Suryanto et al., 2017).

Lower-income and developing communities struggle to maintain prehospital care due to limitations of their social and health care systems. Therefore many worldwide organizations such as World Health Organization (WHO), United Nations Children's Fund (UNICEF), United Nation and World Bank have stepped in to provide extra support. They all have both contributed money

and personnel, in hopes of implementing pilot programs and jumpstarting the emergency medical care system (Razzak & Kellermann, 2002; Suryanto et al., 2017).

Some programs have been very successful. For instance, Sierra Leone was able to launch the first National Emergency Medical Service (NEMS) in the country through the help of WHO. The program was able to increase access to healthcare not only to those living near hospitals but also to the underserved rural communities. It was able to overcome existing barriers in terms of geographical accessibility and transportation ability. At the end, the existing social system and government was able to sustain the program and continue on developing their prehospital care (Caviglia et al., 2021). On the other hand, others failed to address the country's limited resources and ability to continue on with the program. Northwestern Cambodia and Northern Iraq had training programs implemented into their society for three years. The intervention resulted in a significant reduction of mortality rates after establishing a prehospital system. However, after handing over the program to local authorities, their social system could no longer carry the program out. They suffer from inadequate financial support, lagging infrastructure and absence of trained personnel. The foreign activities did not account for the existing social structure, thus resulting in a failed program (Husum et al., 2003).

Despite the lack of success in certain programs, the use of prehospital care through EMS systems has been proven to reduce mortality rates and increase healthcare access to different classes of people. In order to continue implementing these new EMS programs and allow them to be successful in those developing countries, the priorities and diligence should be more focused on the existing social system (Razzak & Kellermann, 2002).

Interaction 2: Technical and Physical Infrastructure mediation of EMS Use

A number of factors impact an EMS system and potentially prevent prehospital care from being successfully carried out. The infrastructure affect EMS system success. These obstacles provide an inefficient process of getting emergency care to the people therefore degrading the EMS service. This section will discuss existing infrastructures and how they affects EMS success.

Six main barriers affect the development of emergency care systems in low-middle income countries along with high income countries. The six main barriers include culture/community, infrastructure, communication/coordination, transportation, equipment, and personnel (Kironji et al., 2018). This review consisted of review articles, observational studies, qualitative studies, quantitative studies, report articles and policy papers all involving out of hospital emergency care (OHEC).

The first barrier involves different cultures that reside within a community. Several studies have shown that a patient's decision to seek care in certain areas is not solely their own decision but may also be influenced by their immediate and extended family, and local leaders. This is particularly seen in cultures where women have a lower social standing (Jammeh et al., 2011; Kironji et al., 2018). Other communities are more familiar with traditional approaches and the patients end up not being aware of when they should seek out professional emergency care (Bhopal et al., 2013; Cham et al., 2005; Kawuwa et al., 2007).

The second barrier is the physical infrastructure where poor road conditions and poor road networks can impede emergency medical care. The lack of separate roads for emergency vehicles, lack of road signs, eroded terrain, narrow roads and larger distances to cover all contribute to poorer EMS performance (Jammeh et al., 2011; Cham et al., 2005; Wilson et al., 2013). This problem can get exponentially worse during rainy seasons or snow seasons or at night time in

many communities. Certain communities reported to not have any emergency medical center available and if there were some available, it would not match the required level of care for certain patients (Adewole et al., 2012).

The third barrier involves communication between the patient and EMS providers. Various communities lack the knowledge of an emergency number or have a reliable number due to a flawed uniform dispatch (Elbashir et al., 2014). Others lack trust in their system and would rather take on the responsibilities themselves based on the inability to refer them to an appropriate facility (Siddiqui et al., 2008). Overall, this barrier exists where there is not a system in place where information and communication can be passed on easily and in an organized fashion.

The fourth barrier refers to areas where there is a lack of vehicles or financial resources to keep those transportation means in working order (Jammeh et al., 2011; Cham et al., 2005; Siddiqui et al., 2008). Because of that, the distance and time to get to the patient and transport them to the appropriate facility becomes a challenge (Adewole et al., 2012; Bhopal et al., 2013; Elbashir et al., 2014).

The fifth barrier refers to low-middle income communities where lack of equipment and medication causes the patient to receive less care (Arreola-Risa et al., 2000). In other places, where there is proper equipment, the personnel's knowledge does not match the skill level needed thus having the same result (Mock et al., 2010).

Lastly, there are barriers in terms of trained personnel. These places lack the resources to give appropriate training for their providers (Elbashir et al., 2014). This in turns results in personnel incapable of identifying the problems and carrying out the needed treatment (Radjou et al., 2013; Roy et al., 2012). In the end, all of these barriers cause a delay in providing OHEC to the public and causes a divide in those who can access this service.

Interaction 3: Social Systems Mediation of EMS Use

EMS systems are created due to a community's desires and needs. This section will focus on current social systems that mediate how EMS systems are used. A healthcare system is only useful if the patient arrives at the right place at the right time, thus making EMS an important component to the healthcare field. Unfortunately, this is not the case in most low- middle income countries. It is often ignored in those places due to the government set up (Razzak et al., 2008).

The emergency medical system in low and middle income countries, especially developing countries, serves a critical function in the health care system. However, the government in those places tend to pay less attention to the health of their citizens due to financial limitations. Higher income communities fund the government more making them a higher stakeholder (Kobusingye et al., 2005), allowing them to reap more benefits from EMS systems. As time goes on, the gaps widen and more differentiation can be seen through qualitative and quantitative studies (Aluisio et al., 2020; Nguyen et al., 2019). Despite a noticeable difference, the system still diverts their focus away from policies regarding low-middle income population, resulting in the current social system dictating what EMS service will be available and where it will be accessible.

Interaction 4: Effects of Present EMS on the Social System

There are communities and places where the EMS system has an abundance of available resources. This pertains to communities with sufficient funding for supplies and medications, accessible insurance cover for all citizens who seek it, ample amount of trained personnel in the right field, available education for the people and first responders, and access to the right corresponding health care facilities. EMS systems in those places have more effect on the community as they earn trust based on their efficiency and capabilities (Kobusingye et al., 2006).

Therefore, the fourth type of interaction being analyzed is the effects of the present EMS system and the relationship it gains within the community to the social system in place.

Many reviews of evidence within the emergency medical care field show extensive gaps of global knowledge on low income countries' healthcare. There is very little knowledge on how to create a system that would benefit the population residing in those countries (Kobusingye et al., 2006). However there have been studies showing the effects of EMS on the community and their social system. In the low-middle income population, the dominant pattern shows EMS to have an inadequate response time. Sometimes, the people who call for help would have to wait hours on end for EMS to finally arrive. At that point, the patient would rather rely on their close family or even themselves for help. Communities in those positions are seen to rely more on home remedies and practice rather than entrusting the system (Glass, 2001; Kobusingye et al., 2006). EMS have also been observed to have a position of power amongst the public. During big disasters or calls involving more than just one or two patients, EMS workers put up the famous yellow tape. This phenomenon causes the public to be pushed back into a secondary position rendering them to feel helpless and sending them into a panic mode (Glass, 2001). On the other hand, higher income populations are seen to have a faster EMS response time. The faster intervention prevents the onset of preventable deaths and results in a lower mortality rate. The EMS staff in these areas are from regulated companies, which also provides the public with better skilled personnel (Hsia et al., 2018). They're able to give higher standards of care, act with reasonable discretion and have more knowledge on dealing with the public. People in higher income areas tend to have more trust with the EMS system and view it as a tool rather than an anchor. The type of EMS service provided for the people has the potential to impact society.

Interaction 5: Interaction of New EMS Changes with the Present EMS

EMS is continuously changing and updating every day as society is becoming more technologically advanced and the increase in population leads to the realization of the need for this service. It wasn't until the mid 1960s when EMS services started to rapidly accelerate. Before that time, the EMS system did not receive much notice nor innovation (Bass, 2015). As the EMS system evolves, it has to integrate with the current EMS system.

The EMS system did not start out as a uniform structure but rather a variety of services rendered by different organizations. Since there was a lack of governmental regulation and standard in most parts of the country, the process was rather slow to develop. New medical training and devices took a long time to integrate into the field (Shah, 2006). Most of the time progress is not spread evenly across different communities. Some places would be successful with new advances, while other places struggle to integrate them. It wasn't until political leaders saw the national health crises of limited emergency care and began to develop a more cohesive system thus allowing various aspects of emergency health service to combine. Although EMS is more organized and coordinated today than ever before, it still requires a considerable amount of time to incorporate new technology and practices. EMS personnel usually don't get a say into what is needed but rather wait for the government to deem something necessary (Bass, 2015). Overall, the EMS system has benefited the healthcare field and decreased the number of casualties. However, the statistics could be better if new innovations and inventions can be incorporated at a faster pace.

Discussion/ Conclusion

EMS serves as a gateway between the people and higher medical care during emergency times. Personnel within the EMS system administer skills in order to stabilize patients when no health care provider can access them, provide an efficient transport mode to the correct medical

facility, and overall increasing the patients chances of survival. As population continues to increase, the need for EMS and other medical services will also necessarily increase. Therefore the EMS system will become more important in serving the community. However, not all places will have the same access to care. Each country and community runs differently. Some are more abundant in resources and have a faster progression. Others are still developing and figuring out a system that will fit into their society.

The ISTA framework used in this paper discusses the 5 interactions where EMS will have an impact on the community. It also analyzes how society is impacting the EMS field. The first interaction took a look at how implementing an EMS system will affect the society. The use of this service is shown to have a positive impact on the community. However, different communities come with different needs. Each program needs to be adjusted to the social system and their people. If not, the system will fail and prevent further progress from occurring. Customizing the needs of each place will not only reduce mortality rates but yield accessible healthcare to most citizens. The second interaction went into the technical and physical infrastructures of a community and the impact of it on the EMS system. There were six barriers identified and each serves a purpose in creating an adequate EMS. If any of the 6 are deemed to be insufficient or lacking, it would result in a delay of care. Consequently, increasing the mortality rate and decreasing the advancement in the healthcare field. The third interaction talked about how a social system in place could determine what type of services will be available for the people. At times, a government could lack the funds or power to create an EMS system for all residing there. It can only do as much as the people who can support the government. This in turn creates a divide of service amongst the different income groups. The fourth interaction presents the effect of what EMS does to the society at hand. It discusses the various nature of an EMS system. Some are more well equipped than others. In those

places, emergency care is given at a higher quality and the people are more willing to trust the service as well as a higher frequency use of the service than a system that lacks the resources. The fifth and last interaction addresses the incorporation of new changes within the EMS system to the current EMS system. It shows that the field is progressively growing but the process is not being integrated in as quickly as it should be. This is resulting from the history of EMS.

Overall, this framework demonstrates how the EMS system is deeply intertwined with the communities around it. One type of interaction can change how a system works and creates unintentional consequences to society. The EMS system is not a closed loop but rather it works hand in hand with the social system to create a network. This network benefits the health of the community. It provides an accessible access point to healthcare for everyone. Therefore, a more systematic approach should be created in order to make this service available to a wider portion of our society. A systematic approach where the social system is considered when creating an EMS/pre hospital system. More research and development will also be needed to improve the quality of services in those developing countries. What type of tools will they need and what resources will be more useful to them. Consideration where these communities are located should be put forth due to the fact that different circumstances can lead to different health problems. Some countries will experience more trauma calls than others and others might have more medical calls. If both are successful and a prehospital system can be established, EMS care will greatly improve the lives of patients.

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