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THE BENEFITS AND CHALLENGES OF TELEMEDICINE IN EMERGENCY MEDICINE

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Abstract

The utilization of telemedicine in the emergency department (ED) is supported by both positive and negative evidence, which has generated doubt regarding the efficacy of these systems. We conducted a comprehensive literature review on systematic reviews in order to present a synopsis of the advantages and obstacles associated with the implementation of telemedicine systems in the emergency department.Systematic evaluations of telemedicine applications for the emergency department were discovered in the PubMed, Web of Science, Scopus, Cochrane Library, and Google Scholar databases. Before data items were extracted and evaluated, each review was evaluated critically by two authors. A study was conducted and reported on the most highly suggested technologies, practicality, advantages, and obstacles associated with the implementation of telemedicine systems.The main findings of eighteen investigations with different methodological quality were summarized. Twelve of the eighteen studies included in this collection exhibited a significant degree of bias in their research. Real-time video conferencing was identified as the most effective delivery method in nine of the papers, resulting in cost savings for eight of the papers that examined the subject. However, technical and infrastructure challenges arose in six of the studies that examined the implementation of telemedicine for emergency departments.Robust evidence exists to support the notion that telemedicine has a beneficial effect on the provision of patient treatment. Nonetheless, the implementation of telemedicine faces numerous obstacles that have the potential to hinder progress and compromise patient safety. In conclusion, notwithstanding the considerable potential of telemedicine systems, more robust evidence is required to validate their viability within the emergency department.

1. Introduction

The emergency departments (EDs), which operate with significant implications for patient satisfaction and other hospital departments, are among the most vital and delicate areas. Assessing a hospital's effectiveness in delivering services to the public is heavily dependent on the ED's performance. An estimated thirty million critically ill patients present to the emergency departments annually in the United States; these patients require immediate medical attention. As a result of the decreased time providers can spend with each patient, this volume of admissions contributes to an increase in medical errors (Trzeciak and Rivers 2003). Additionally, it lengthens treatment wait times, leading to congestion in emergency departments (Trzeciak and Rivers 2003).

The utilization of telemedicine to deliver healthcare services has expanded at a rapid rate in response to technological advancements that have decreased the price of essential equipment, rising healthcare costs, and patient expectations (Whitten et al. 2002).Telemedicine, as defined by Sood et al. (2007), involves the delivery of healthcare services remotely through the use of information and communication technologies, which possess significant potential for application. Recent research has identified several applications of telemedicine in the emergency department

(ED). These include the provision of specialized services to rural areas (Mohr et al. 2018; Ray et al. 2017; Ward et al. 2015; Zachrison et al. 2019), the mitigation of ED overcrowding (Letvak and Rhew 2015; Rademacher et al. 2019; Sun et al. 2018; Tolia et al. 2017), the enhancement of crisis management, the provision of specialized services to paramedics, and the reduction of the time between accidents and patients' arrival at the ED.

Nonetheless, numerous scholarly investigations in this field assert the necessity for additional research and the insufficiency of the present evidence (Ward et al. 2015; Brainard et al. 2016; Salmoiraghi and Hussain 2015; Kelton et al. 2018; Marsh-Feiley et al. 2018; Pak and Pak 2015; Rogers et al. 2017; Kimmel et al. 2019.(

Numerous articles have discussed the advantages and difficulties associated with the implementation of telemedicine technology in the emergency department; consequently, the efficacy of these systems appears to be indeterminate, giving rise to grave concerns concerning their deployment.

Extensive research has been conducted on the application of telemedicine in emergency departments (EDs), with numerous evaluations attempting to ascertain the viability of such systems in such environments. In many instances, however, the findings of these studies tend to contradict one another. Therefore, our objective is to arrive at a conclusion through the provision of a comprehensive synopsis of the systematic evaluations that have been conducted.By way of an overview, this study intends to present systematic evaluations pertaining to the implementation of telemedicine in the emergency department .

2. Materials

An extensive review of studies pertaining to the viability of telemedicine in the emergency department (ED) and a systematic search of databases including PubMed, Scopus, Web of Science, Cochrane library, and Google Scholar were conducted for this purpose. OpenGrey and OpenDOAR databases were also queried in an effort to locate gray literature. Furthermore, manual searches were conducted by perusing the reference lists of the studies that were included. The present evaluation was carried out in adherence to the PRISMA framework.

3. Technological Advances

As the most feasible telemedicine technology, one of the technologies was selected. Several articles noted that efficacy varied based on context and circumstance. For example, within cardiovascular disease centers, the video conference method (which combines real-time video and audio) and the store and forward method were consistently deemed the most effective approaches for assisting stroke patients prior to their arrival at the hospital. In the context of primary care, however, real-time audio consultation was determined to be the most effective method (Winburn et al. 2018). An alternative evaluation determined that a blend of video conferencing and store and forward was the most efficient and economical approach (Bashshur et al. 2016). A total of nine papers (du Toit et al. 2019; Eder et al. 2018; Gattu et al. 2016;

Marsh-Feiley et al. 2018; Salmoiraghi and Hussain 2015; Ward et al. 2015; Winburn et al. 2018; Culmer et al. 2019; Nadar et al. 2018) made reference to real-time video conferencing. Three papers (Marsh-Feiley et al. 2018; Winburn et al. 2018; Lazarus et al. 2020) addressed store and forward. Tele-monitoring was the subject of one paper (Kimmel The following papers failed to address the matter: Boggan et al. 2020; Brainard et al. 2016; Kelton et al. 2018; Pak and Pak 2015; Rogers et al. 2017; Guevorkian 2017; and Boggan et al.

4. Difficulties associated with the implementation of telemedicine in the emergency department

Despite the fact that each article examined the advantages of telemedicine in emergency departments (EDs), there are still obstacles to overcome. These obstacles range from implementation costs to technical and infrastructure concerns (Brainard et al. 2016; Gattu et al. 2016; Pak and Pak 2015; Rogers et al. 2017; Culmer et al. 2019; Guevorkian 2017). Determining the advantages of telemedicine programs that align with the particular objectives and requirements of each center is equally as important as addressing the obstacles that must be surmounted to ensure their optimal implementation.

5. The viability

Overall, telemedicine's application in emergency situations has demonstrated considerable promise. However, as a result of their inadequate study designs, the majority of the research studies were unable to validate the efficacy of telemedicine and concluded that additional research was necessary. The feasibility and effectiveness of telemedicine in emergency care have been substantiated by a substantial body of evidence, according to four publications (Winburn et al. 2018; Brainard et al. 2016; Bashshur et al. 2016; Ward et al. 2015). Nevertheless, three of the aforementioned studies (Ward et al. 2015; Winburn et al. 2018; Bashshur et al. 2016) exhibited a significant risk of bias (RoB).

Twelve scholarly articles concluded that additional research employing higher-quality evidence was necessary to validate the feasibility of this technology and supplement the findings of Salmoiraghi and Hussain (2015), Rogers et al. (2017), Kimmel et al. (2019), Kelton et al. (2018), Marsh-Feiley et al. (2018), Gattu et al. (2016), Pak and Pak (2015), Guevorkian (2017), Nadar et al. (2018), Lazarus et al. (2020), and Culmer et al. (2019). It was ascertained that seven of the aforementioned studies (Rogers et al. 2017; Salmoiraghi and Hussain 2015; Kelton et al. 2018; Gattu et al. 2016; Pak and Pak 2015; Lazarus et al. 2020; Culmer et al. 2019) had a high RoB in their investigations. A solitary publication, characterized by a low RoB, documented the presence of scant evidence substantiating the viability of telemedicine. Nevertheless, the article's primary emphasis was on remote triage rather than a comprehensive evaluation of all the approaches entailed (Boggan et al. 2020). Furthermore, with regard to feasibility and efficacy, one study failed to provide any results (du Toit et al. 2019).

6. Conclusion

There are numerous uncharted territories in which telemedicine continues to be understudied in the emergency department. This analysis has elucidated the advantages and obstacles encountered during the implementation and utilization of telemedicine in the emergency department. There was evidence of cost reductions for both the hospital and the patient in the majority of reviews. For instance, telemedicine can mitigate the challenges associated with chronic disease management, which necessitates ongoing follow-up, through cost reduction and alleviation of overcrowding. However, in the absence of the appropriate technical infrastructure, these systems will be incapable of delivering the anticipated results, which could result in decreased hospital output and extended treatment durations. While telemedicine has the capacity to significantly improve patient care in the emergency department, its viability remains uncertain and further research with more reliable evidence is required to corroborate its feasibility. This is due to the paucity of clinical trials and the low quality of studies that have examined the topic.

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