

A short review on the comparison of consultation systems and tools in the emergency department practice: Tele-consultation

Acil servis pratiğindeki konsültasyon sistemleri ve araçlarının kıyaslanması üzerine kısa bir derleme: Tele-konsültasyon

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SUMMARY

Emergency department (ED) consultation is an important part of acute patient care and one of the major determinants of ED length of stay (LOS). ED consultations between physicians who may not be in the same location frequently, require a tool to reach out one another and communicate. This paper reviews the historical change and development of consultation tools. The literature on ED consultation methods have been accumulating for the last two decades as the diversity of these methods has increased with technology. Most of the studies demonstrate that high tech systems are useful and safe to reach the consultant and share medical information flow. Moreover, the future of the area offers new developments regarding consultation tools that are hard to imagine yet like augmented reality.

Keywords: Consultation, teleconsultation, emergency medicine, length of stay, technology.

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ÖZET

Acil servis (AS) konsültasyonu, akut hasta bakımının önemli bir parçasıdır ve AS'de kalma süresinin (KS) ana belirleyicilerinden biridir. Aynı alanda bulunmayan hekimler arasındaki AS konsültasyonları, sıklıkla birbirlerine ulaşmak ve iletişim kurmak için bir araç gerektirmektedir. Bu makale konsültasyon araçlarının tarihsel değişimini ve gelişimini gözden geçirmektedir. Son 20 yılda AS konsültasyon yöntemleri ile ilgili yöntemlerin çeşitliliği arttıkça bu alandaki literatür de birikmeye başlamıştır. Çalışmaların çoğu, yüksek teknoloji sistemlerinin konsültana ulaşmak ve tıbbi bilgi akışını paylaşmak için yararlı ve güvenli olduğunu göstermektedir. Dahası, alanın geleceği, artırılmış gerçeklik gibi hayal edilmesi zor olan konsültasyon araçları ile ilgili yeni gelişmeler vadetmektedir.

Anahtar sözcükler: Konsültasyon, tele-konsültasyon, acil servis, kalış süresi, teknoloji

INTRODUCTION

Emergency departments (EDs) are 24-hour emergency care points of health care. They have to serve a broad spectrum of patients who need acute diagnosis, treatment, and/or interventions. It is inevitable that all these processes take a certain time to implement, termed as the length of stay (LOS) ^{1,2}. ED LOS correlates with crowding and complication rate in EDs. There is a growing literature which describes ED crowding and LOS determinants. Moreover, studies suggest that there is a vicious cycle between ED crowding and LOS ³⁻⁵. All the studies and efforts aim to improve safe and effective patient throughput in the EDs by breaking this vicious cycle.

LOS is affected by a variety of factors including demographic characteristics, aging population, high incidence of chronic conditions, avoidance of malpractice, high level of testing, consultation, imaging studies, as well as inappropriate use of levels of the health system and clinical practice of EDs (i.e., triage systems, facility feasibilities, medical staff competency, and organization) ^{1,6,7}. Among these factors, human factor-containing variables seem to be the hardest to fix like the consultation process.

Consultation is sometimes described as a patient's request for medical advice from a physician, but we will focus on the physician to physician consultation and the tools used during the communication. Emergency consultation can be described as the request of an emergency physician (EP) from a relevant and related department for the assistance, cooperation and taking over care of the patient on issues such as admission, diagnosis, discharge, follow-up, and intervention ⁸. Consulting circle consisting of at least two physicians (consultation requester and consultant) and one patient. It is a human-centered profession. And considering the working conditions of the EDs, it may turn to a challenging, exhausting, and a certain time-requiring activity for each side of this relationship.

Besides the human factors, the consultation process necessitates technical communication tool infrastructure. Physicians have always used some forms of communication devices for consulting one another (the common tools for the consultation that has been used in the literature are listed in Table 1). The forms and types of communication tools and devices have transformed with the effect of technology, and this transformation is even more apparent in the age of informatics we live in.

Table 1: The common tools for the consultation

Consultation tools
Letter
Telephone (domestic lines)
Pager
Fax
Computer-based consultation systems
Mobile phone
Smartphone
Web-based medical record programs

The physicians may need a second opinion in practice. It is not hard to imagine junior physicians consulting Hippocrates in his medical school/hospital on the Greek island of Cos around the 4. century BC. That can also be described as the first consultation performance in the history of medicine. Consultations between physicians have continued as a face-to-face interaction for centuries, and this has been the backbone of almost all consultation types. After the medieval ages, discoveries and technological developments have followed one other. For example, when the use of letter for long distance communication has gained popularity, this practice has manifested itself in the medical world, as well. Medical consultation by letter was a quite popular practice during the 18th and 19th centuries ⁹. However, it is not an emergency consulting option due to limited and time-requiring features.

With the advent of radio wave use, radio channels have become the major communication tool worldwide. The radio announcements have been used to reach emergent help or professional skills in the cases of wars or catastrophes despite limited use for medical purposes. Although no known study exists focusing on the use of radio for consultation, short and long-distance walkie-talkies are still used for consultations of the patients in war areas.

Invented in 1876, the telephone has gained a widespread use across the world in a short span of time. Ironically, one of the first recorded telephone calls by its inventor, Alexander Graham Bell, was about his medical help need after injuring himself with sulphuric acid ¹⁰. By the 1970s, the telephone has become a fixture in hospitals as well as homes. For the context of

hospitals, the popularity of telephones stems from providing an opportunity for instant, real-time voice communication among physicians without leaving the reference area. Nowadays, up to a quarter of all clinical consultations occur by phone¹¹. Despite its disadvantages, such as lack of face-to-face interaction, the telephone has eliminated the spatial problems such as local and global location limits. Fax technology, a related technology of telecommunication, has been used for the transmission of medical text and graphics data between two locations via telephone lines¹², in addition to medication order and pharmacy order systems, main areas of use for fax technology. The fax is not the only alternative use of telephone lines. Pager devices have been put forward as “cordless telephones,” which can receive a call and/or text message from a telephone call. The first patented pager was invented in 1949, and it became a popular tool of communication among public and physicians between 1980-2000. For medical use, pagers enabled users to see caller ID and take action due to the caller department.

By the 1980s, the computer era has begun, and since then, we have been witnessing the progress and development in computer technology. Needless to say, computer-based consultation systems have gained widespread use, as well. The fixed telephones, pagers, computers, laptops have got into the market and started to spread up all over the world by the millennial years. Of course, the most prominent change has been brought about with the advent of the internet, as well as the mobile and smartphones during the last 20 years. The medical staff has got their portable personal technologic devices as the rest of the world have done. It is more practical for physicians to use personal mobile/smartphones instead of fixed telephones or pager devices that were previously owned by the hospital. In terms of communication with smartphones, very significant improvements have been achieved.

Telemedicine is a relatively new concept, and in the world of internet, it develops with speed of light. Teleconsultation can be considered as one of the branches of telemedicine¹³. Thanks to computers, smartphones, and tablets, physicians who previously communicated with the other physicians only via an audible communication tool have become able to send the laboratory results, images of diagnostic techniques, videos, series of the images, and even show the patient's own or related pathology with video conversation. Moreover, the new tools help physicians to search for answers about the problems of concerning

patients in medical forums, portals, medical websites, instant medical chat groups, medical applications, and e-books. Even robotic surgical devices can be considered as a way of consultation when it is operated over long distances via internet connection. Augmented Reality (AR) as a consultation tool seems to have amazing advances for the future. AR is speculated about its potential to allow medical knowledge, skills, and expertise to be shared instantly and remotely.

Although a wide range of telecommunication systems exist, all of them are not suitable for emergency consultation due to some limitations. Within the context of EDs, actively used ones are domestic telephone lines, pagers, computer-based systems, mobile, and smartphones. Moreover, despite the long history of telecommunication for consultation, the literature in this topic has been a limited one until the 2000s. Most of the studies conducted in this topic have focused on the efficacy assessment of various communication systems and tools as well as comparisons between them. For example, Forsblom et al. found that bedside consultation is superior to telephone consultation¹⁴. As for the assessment of efficacy, Cho et al. found that the use of a computerized consultation system decreases ED LOS in comparison to mobile phones¹⁵. Several studies focused on triage outcomes, the effects on patient subgroups, and the comparison between telephone and pager systems^{8, 16-21}. The findings are somewhat controversial, but the general trend displays that pager systems have the ability to decrease LOS, although telephone consultation is sufficient most of the times. Although there have been many publications on LOS in ED and ED crowding, studies comparing the efficiency of various consultation tools during the consultation process have increased only with the use of mobile and smartphones. Most of these studies show that these high tech systems are useful and safe to reach the consultant and share medical information flow²²⁻³⁰.

CONCLUSION

The main determinants of consultation tool power are feasibility, size of the device, boosting of face-to-face interaction, transmittable amount of patient data, data type, user-friendly interface, and portability. Every consultation tool has advantages and disadvantages, but we can conclude that the consultation process is evolving with technological advancements.

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