

Telemedicine and Occupational Health

Teletıp ve İş Sağlığı

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ABSTRACT The advent of technology ushered in the era of telemedicine, revolutionizing healthcare access. Telemedicine leverages electronic information and communication technologies to bridge the gap in healthcare services due to geographical distances. Telemedicine's application extends to occupational health, offering solutions to challenges such as regional disparities, resource limitations, and geographic distances. Notably, telemedicine has played a crucial role during the coronavirus disease-2019 (COVID-19) pandemic, allowing healthcare workers to provide remote care and screen for occupational health issues. In occupational health, telemedicine offers remote diagnostics and consultations, quick problem resolution, enhanced awareness, and continuous health monitoring. However, barriers to its adoption include technological limitations, data security concerns, and legal complexities. To realize the full potential of telemedicine in occupational health, it is essential to address these challenges and ensure universal access, data protection, and compliance with legal regulations. Ultimately, telemedicine holds promise as a transformative tool for safeguarding employee health and enhancing workplace safety.

Keywords: Telemedicine; occupational diseases; occupational health; occupational health physicians

ÖZET Teknolojinin gelişimi teletıp çağını başlatarak sağlık hizmetlerine erişimde devrim yaratmıştır. Teletıp, coğrafi mesafeler nedeniyle sağlık hizmetlerinde oluşan boşluğu doldurmak için elektronik bilgi ve iletişim teknolojilerinden yararlanmaktadır. Teletıp uygulamaları, bölgesel farklılıklar, kaynak sınırlamaları ve coğrafi mesafeler gibi zorluklara çözümler sunarak iş sağlığına kadar etki etmektedir. Özellikle koronavirüs hastalağı-2019 (COVID-19) salgını sırasında çok önemli bir rol oynamış ve sağlık çalışanlarının uzaktan bakım sağlamasına ve iş sağlığı sorunlarını taramasına olanak tanımıştır. İş sağlığı alanında teletıp, uzaktan teşhis ve konsültasyon, hızlı sorun çözümü, gelişmiş farkındalık ve sürekli sağlık takibi sunmaktadır. Bununla birlikte, benimsenmesinin önündeki engeller arasında teknolojik sınırlamalar, veri güvenliği endişeleri ve yasal karmaşıklıklar yer almaktadır. İş sağlığı alanında teletibbin tam potansiyelini gerçekleştirmek için bu zorlukları ele almak ve evrensel erişim, veri koruma ve yasal düzenlemelere uygunluğu sağlamak çok önemlidir. Nihayetinde teletıp, çalışan sağlığını korumak ve iş-yeri güvenliğini artırmak için dönüştürücü bir araç olarak umut vaat etmektedir.

Anahtar Kelimeler: Teletıp; meslek hastalıkları; iş sağlığı; mesleki sağlık hekimleri

After the spread of computer and internet technology in the 1990s, scientists tried to facilitate public access to health in light of these technological developments. For this purpose, telemedicine uses electronic information and communication technologies to ensure and contribute to healthcare services when distances exist between participants. A 1925 cover of Science and Invention magazine illustrated a doctor examining a patient by radio, and it imagined a device that would allow remote video examination of a patient. Home monitoring was developed more extensively in the Mercury space program when the National Aeronautics and Space Administration started conducting remote physiological monitoring.¹

The most critical need for in-home care and community-based care is related to chronic diseases. Using technologies for chronic disease care management has been as-

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sociated with reduced hospitalizations, length of stay, and illness costs. Studies of technology-based home monitoring programs have shown specific improvements in the treatment of hypertension, congestive heart failure, and diabetes.² Apart from this, fields such as teleradiology, telepharmacology, teledermatology, and telepathology have also emerged over time.³ Hospital telemedicine is becoming widespread in two areas: stroke care and intensive care unit care. It includes telephone usage for dialogue between patients and clinicians, as well as highly experimental improvements such as telesurgery. The surgeon analyses sensorial information to comment on the robotic tools to complete surgery at a different location. Relatively expensive methods such as active videoconferencing support clinicians to examine, question, and counsel remote patients in real-time.⁴

Individuals' well-being at work is essential in supporting them with a livelihood and the basis for social insurance and social inclusion. Work is an essential factor for human life and has a potentially significant effect on an individual's health and well-being.⁵ Increasing technology intensity in the workplace, rapid changes, and the changing working environment due to globalization and digitalization are leading, among other things, to an increase in the number of self-employed people and the complexity of work and other areas of life.³ As a result, despite enforcing legal parameters for occupational health and safety, the occupational health and safety parameters installed by companies and imposed by the state reach even fewer employees during "new" or mobile work, and occupational safety in workplaces may be insufficient.⁶ Given workplace challenges, covering work trends towards good resilience, and changing employers' opportunities, improving individuals' health is progressively essential.⁷

TELEMEDICINE APPLICATIONS IN OCCUPATIONAL HEALTH

Telehealth programs are often implemented to implement an engineering understanding to problems such as local advantages in healthcare, decreased resources, and significant distances between areas. Some examples of telehealth applications used in occupational health include networking in healthcare, record systems for health, health portals, telemedicine, and personal wearable and portable communication systems.⁸

Projected health risks in developing countries include the increasing number of workers aged 65 and over, meaning that workers have lots of chronic diseases such as diabetes mellitus, cancer, increased B.M.I., and physical or

cognitive problems. The aggravated risk of contamination of infectious vectors and the emergence of potential risks (nanotechnology and new chemicals) in the workplace also suggest that significant health problems may occur.⁹ It is also necessary to take into account that mental health problems and comorbidities in the workplace include alcohol, drug use, and smoking. In the United Kingdom, the Work and Health Council's 2014 report planned for widened proceed toward occupational health services. In this strategy, there is a comprehensive expansion of occupational health services in the works. This expansion involves offering health coaching to employees to avert the onset of chronic illnesses, as well as providing assistance to employees already dealing with chronic health issues to handle their conditions while at work effectively. The report also emphasized the need to broaden the range of services designed to support individuals facing chronic illness or disability, helping them in their efforts to rejoin the workforce and secure paid employment.¹⁰

Telemedicine applications have been beneficial in occupational health during the coronavirus hastalığı-2019 (COVID-19) pandemic. In a study conducted in the United Kingdom, healthcare workers were screened by occupational health nurses. The purpose of this screening was to offer guidance on self-care measures or to make referrals for virtual phone consultations with a dermatologist for persistent moderate to severe skin conditions. Clinic photos, which were securely reviewed by dermatologists, were sent by patients from the hospital e-mail account. To date, most of the skin problems seen in 45 healthcare workers have included flares of pre-existing hand dermatitis, facial rashes, and eyelid deformity, possibly due to sudden latex allergy.¹¹ After the COVID-19 pandemic, the number of remote workers has increased rapidly. Before 2020, whether the home environment was ergonomically suitable for occupational health was evaluated by the employer's official. However, today, this evaluation can be made by videoconference or photographic method.¹²

One of the occupational health applications of telemedicine is eye health screenings. In Spain, remote screening programs have been designed to detect retinal diseases using handheld non-mydriatic cameras during periodic workplace examinations. Volunteers from the staff at job centers were chosen as the subjects for this study. Skilled technicians used specialized cameras to capture retinal fundus images. Afterward, both the images and associated data underwent anonymization procedures before being securely transmitted to a remote server. A group of retina specialists experienced ophthalmologists, conducted

remote image assessments using custom-designed software. They interpreted and generated reports on the findings within 24 to 48 hours. Notably, 7.8% of the workforce exhibited abnormalities when their retinal fundus images were examined.¹³

In 2013, a study was initiated in the United States to explore telemedicine consultations with occupational disease experts from private consulting firms. These consultations were aimed at serving healthcare providers within the Veterans Health Administration. In a span of six months, healthcare providers in the field of occupational health, responsible for the well-being of veterans, sought guidance from occupational disease specialists through telemedicine in a total of 65 instances. Following collaborative discussions, employee occupational health providers, despite a lack of formal training, consistently recognized intricate cases related to work and disability issues. The program has introduced an innovative systems management approach, designed to provide comprehensive occupational and environmental medicine expertise, extensive consulting services, and immediate training for vendors in real-time.¹⁴

BENEFITS OF TELEMEDICINE IN OCCUPATIONAL HEALTH

Employees need help accessing healthcare facilities while they are on duty. The development of technology and widespread internet access have enabled telehealth services to play an essential role in occupational health and safety practices. Today, telemedicine offers significant benefits in the field of occupational health. Telemedicine can play a vital role as an effective tool to protect employees' health and increase occupational safety in workplaces.^{15,16}

Telemedicine offers remote diagnostics and consultancy in occupational health, helping employees in the workplace to solve their health problems quickly. Thanks to telemedicine, employees can communicate remotely with specialized doctors, diagnose health problems instantly, and access the necessary treatment. It increases work productivity by enabling faster resolution of health issues in the workplace. Telemedicine can provide a better understanding of workplace risks and thus enable preventive measures to be taken. It can improve work safety, raise health standards, and reduce workplace accidents and occupational diseases.^{16,17}

Telemedicine provides a significant transformation in occupational health training and the provision of occupational therapy. It facilitates employees' awareness of occupational health issues by providing remote access.

Employees are encouraged to better understand and apply potential risks and safety procedures in their workplace. Thus, employees demonstrate safer behaviors at work. In addition, telemedicine enables training to reach a wider audience. In this way, it is possible to effectively reach all workplace employees and promote a culture of occupational health.^{18,19}

Telemedicine devices in workplaces can continuously monitor key health indicators of employees. This data is collected and can be analyzed through a remote health monitoring system. The system can automatically alert if an employee's health status shows an abnormal change. In this way, potential health problems at workplaces can be quickly identified and timely action taken to protect employees' health. The embrace of telemedicine systems by users paves the way for enhanced disease monitoring capabilities. Remote health monitoring offers the ability to improve occupational health and safety standards, as well as the ability to react quickly in emergencies.^{20,21}

BARRIERS TO TELEMEDICINE IN OCCUPATIONAL HEALTH

Telemedicine is a field that includes a series of technological innovations for the remote provision of medical services. However, there are some obstacles to the widespread use of telemedicine applications. Those have technical, legal, ethical, and social dimensions.²²

Telemedicine applications require a high-speed internet connection. However, internet access needs to be improved in many workplaces. Slow or intermittent internet connections can reduce the effectiveness of telemedicine as large amounts of medical data may need to be transferred. Telemedicine requires appropriate equipment, including computers, smartphones, or tablets. Some workers may also need these devices. In particular, older workers or those who need to be computer savvy may experience difficulties. Digital inequality makes it difficult to achieve universal adoption of telemedicine in occupational health. Inequalities may deepen for workers with limited access to technology. Utilizing telemedicine applications in areas with power outages or limited energy resources may take time and effort. Overall, infrastructure issues are a significant barrier limiting the universal adoption and broader reach of telemedicine.^{23,24}

Telemedicine applications that process the personal health data of employees at the workplace pose a severe risk of data misuse. In the event of a data breach, patient privacy and the trust of employees can be seriously jeopardized.

ardized. Developers should implement high data security standards and make continuous updates. Weak authentication processes can increase the likelihood of hackers infiltrating applications. Telemedicine applications enable data sharing between healthcare professionals, employees, and healthcare organizations. However, this data-sharing process should be well organized, and authorization should be done correctly. Otherwise, access may be granted to the wrong people. Training and raising awareness of employees and healthcare professionals on data security is essential. Standards and legal regulations regarding the processing and storage of health data can increase data security assurance. Data security is a critical factor for the success of telemedicine applications.^{25,26}

Copyright and intellectual property issues of medical content and software in telemedicine applications can be

essential legal issues for application developers. Many countries have specific tele-hospital laws and telehealth regulations. Application developers must comply with these regulations and obtain appropriate licenses. Telemedicine applications access employees' health data, which may be sensitive. Compliance with patient privacy and data protection laws is a legal requirement for telemedicine applications and aims to prevent unauthorized use of employee data. Healthcare providers may face legal liability for medical errors. Determining when and under what circumstances professionals are legally liable can be complex. All these legal barriers can limit the development of telemedicine applications and require developers to comply with complex regulations. The fact that each country has different legal regulations may further complicate this issue.^{27,28}

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