Telemedicine for COVID-19 in China

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Submitted to: JMIR Public Health and Surveillance
on: April 01, 2020

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Abstract

At present, COVID-19 has attracted the attention of the entire industry and society and the medical resources allocation process following COVID-19 outbreak is difficult. Telemedicine can eliminate the limitation caused by distance and provide high-quality expert services. It plays an important role in remote consultation, image transmission and information communication. In this viewpoint, we introduce how we use telemedicine to fight against pneumonia and explain the problems we found in our work in China. We hope to share our experience with the world and help other developing countries fight against the disease epidemic.

(JMIR Preprints 01/04/2020:19010)
DOI: https://doi.org/10.2196/preprints.19010

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Viewpoint
Telemedicine for COVID-19 in China

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Introduction

As a sudden public health event, coronavirus disease 2019 (COVID-19) has attracted the attention of the entire industry and society. Medical workers across the countries have all been working for fight against the COVID-19. How to use modern scientific and technological methods to maximize the treatment and prevention of diseases has become the focus of attention. Telemedicine (TM) employs a combination of enhanced hardware, digital medicine, image capture, and processing the diagnosis of disease which can eliminate the limitation caused by distance and provide high-quality expert services. Previous work has described the use of TM in disasters[1] and public health emergencies[2]. The medical resources allocation process following COVID-19 outbreak is difficult and the prevention and treatment of COVID-19 during outbreaks require new management approaches to keep the balance. Thus, TM is a good strategy for providing care to patients in COVID-19.

Telemedicine for COVID-19

Disparities in access to specialist care exist worldwide especially during epidemic period. Based on this background, experts could take advantage of TM to connect with the medical teams which rush up to help Hubei province and provide remote consultation and case discussion for critically ill patients. TM service no doubt increased the cure rate in the local area. Many critically ill patients have received emergency consultations and get better according to expert instructions. In addition to connection with Hubei, experts could also connect with treatment centers in less developed area such as rural area in order to establish an expert team and complete multidisciplinary treatment of critically ill patients. The consultation involves more than 10 departments including intensive care unit, department of respiratory, radiology, neurology, endocrinology, gastroenterology and so on which effectively make use of the comprehensive medical resources to most extent. Experts could gather in TM center or use a real-time, synchronous videoconferencing. Compared with the treatment of critically ill patients, the diagnosis and exclusion of suspected patients in primary hospitals are more difficult and often require the support of expert groups. In order to save time and serve more patients, we could use a remote consultation platform to connect experts with frontline health workers and share medical image, record data, and test results. What's more, the remote consultations avoid the spread caused by patient transfer, protect experts from exposure and save costs.

Additionally, the TM center could set up a platform for experts to carry out interpretation of the guidelines for the diagnosis and treatment of COVID-19 and methods for nosocomial infection control which has improved the ability of medical workers to fight against the Severe acute

respiratory syndrome coronavirus 2 (SARS-CoV-2) and protect themselves. Medical workers could share the opinion and experience with each other in order to achieve a more suitable treatment method. Psychologists provide psychological counseling for doctors at the frontline through videoconference to help them deal with stress and anxiety. In parallel, experts give lectures on how to protect susceptible population which would reduce people's panic about the epidemic. Besides, medical workers at frontline answer the questions from patients and suspected population through live video which saves the repeated workload and time of ward rounds and reassure the patients' emotions. Others could achieve the information they want through playback.

In order to avoid crowd gathering and cross-infection, many patients without COVID-19 infection cannot go to medical institutions for treatment. Due to lack of protective materials, the order of ordinary clinics has been disrupted. Under this background, the remote platform conduct consultations and guidance for patients with difficult diseases and carried out online medical activities. We also have an online outpatient service to offer treatment method for patients with chronic disease, mental illness or other diseases. It is convenient for patients to get treatment. Moreover, online service could prevent patients with mild symptoms from taking up high quality medical resources, increase the availability of doctors from less developed medical institutions as well as save time.

Barriers during epidemic application and widespread implementation

With the development of information technology, many medical institutions have established their own remote platforms. However, it is particularly important to break the barriers between different remote platforms to achieve rapid connection under sudden public event. In the future, we need to explore new technologies and new mechanisms to ensure the rapid connection among different remote platforms in emergency situations.

Besides, there are inconsistencies in the imaging platforms and medical record management systems, which increases the difficulty for experts to get related case information. Nowadays, the initiator needs to use a USB flash disc to send the images and medical records information to the receiver according TM system. In the future, we need to explore new approach to ensure the rapid transmission between different remote platforms.

In order to achieve real time response, the TM center should have personnel on duty 24 hours a day and expert groups are informed to be well-prepared for emergency severe case consultation. At present, we are developing and exploring more scientific response methods and mechanisms, such as reminders integrated with remote consultation systems, intelligent TM service automatic receiving systems and so on to improve work efficiency and save labor costs.

Investment should be increased so that it can cover more hospitals. The hardware and software construction and maintenance of TM service system and the technical training of engineers and medical workers also need financial support. In less developed areas, the lack of high-speed broadband access may account for the inability to reach underserved populations. However, with the promotion and implementation of 5G, we believe that TM would serve most residents.

Besides, many patients are still used to face to face pattern. The older who are less technologically adept or persons who have cognitive or physical limitations makes it difficult to interact with a TM platform and results in the application of TM rate is still low. In developed countries, TM has been widely used in chronic disease management[3]. Hollander et.al have suggested “direct-to-consumer telemedicine”, an approach to forward triage that allows patients to be efficiently screened[4] which could be further promoted in China and enabled patients to be monitored at home. Respiratory

symptoms, fever and epidemiological history are common characteristics of COVID-19 patients. Only moderate to high-risk patients would be advised to go to fever clinic which saves the work of triage in hospital and avoids exposure of nurses. On the other side, TM providers must be credentialed and must have a license to practice medicine which should be under supervision of relevant departments. Online training sessions should be provided for clinicians and patients who require just-in-time training or assistance during their first call. In addition, whether the costs incurred are included in medical insurance, ethical problems and network security issues in remote transmission also need consideration.

Solving the problems above will greatly enhance the role of TM in public health emergencies, and provide a reliable guarantee for the response and disposal of medical information technology in public emergencies in China.

Other application

With the development of communication technology, the 5G era has arrived. TM has not just stayed at the level of consultation. The use of 5G technology for remote robotic surgery and remote ultrasound examination has been achieved. As artificial intelligence technology goes on, robots are used to deliver medicines in the ward. It is believed that in the near future, remote ventilator regulation, intelligent ward inspection and handling systems will be implemented. Smartphone applications could assess respiratory rate and other physical indicators. Thus, the possibility of infection of medical workers during the epidemic period can be avoided to the greatest extent.

Synchronous network broadcast has been widely used. In February, the construction of the HuoShenShan and LeiShenShan hospital was shown through live video to all the people who care about Wuhan which undoubtedly inspire people. According to the news, experts in China also share the experience of fighting against COVID-19 with experts in other countries through video conference. President Xi connected with infectious ward in HuoShenShan hospital through video call and then expressed his concern about the patients and gratitude to medical workers.

Conclusion

During the epidemic period, TM not only plays a role in remote consultation, but also in image transmission and information communication, which greatly relieved the pressure of frontline medical staff. World is facing an increasingly severe situation of having more cases with COVID-19. To date, China is actively fighting outbreak of COVID-19, and has achieved certain results. Taking advantage of information technology and network technology and then establishing a real-time, efficient and convenient TM platform will comprehensively improve our ability to handle with public health emergencies, improve the diagnosis and treatment of critical ill patients, coordinate and optimize resource allocation, and avoid the spread of diseases caused by patient transfer projects. TM has the potential to allow care to be delivered to more patients, more regularly, and more efficiently than can a traditional model of care. Through the promotion of the methods and the analysis of the problems, in order to promote the establishment of a more effective TM system during the period of public health emergencies, promote the sustainable development of TM, and provide important information for responding to public health emergencies in the future. We hope to share our experience with the world and help other developing countries fight against the disease epidemic.

Conflict of interests

The authors declared that they have no conflicts of interest to this work.

Acknowledgement

This viewpoint was supported by the grant from the Liaoning Revitalization Talents Program (no. XLYC1807082), Shenyang Young and Middle aged Science and Technology Innovation Talent Support Program (RC190146).

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