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## Editorial

# Utilization of telehealth and the advancement of nursing informatics during COVID-19 pandemic



The COVID-19 pandemic has brought an unprecedented disruption to the world. Soon after the outbreak, there were no effective interventions that could stop the spread of the virus except the implementation of locking down [1], social distancing [2], and wearing masks [3]. Telehealth, which is defined as the provision and management of healthcare services for individuals in their homes, or care support facilitated remotely by healthcare professionals via digital media [4], played an essential role in balancing the care demands between social distancing and providing everyday care services in public. The concept of telehealth was first introduced in 1910 when people first tried to use an ordinary analog telephone network to transmit ECGs and EEGs [5]. With the pandemic, telehealth transformed the model of care and was perceived as more important than ever.

From the last decades or so before the pandemic, telehealth has been considered as a promising healthcare model. However, both the healthcare sector and the public sector were quite hesitant in using telehealth. With the extraordinary time brought by the pandemic, telehealth has been broadly adopted as an acceptable healthcare model globally. As the former chief digital officer of the United Kingdom (UK) National Health Services (NHS) has expressed, it is a 10-year-of change over ten weeks [6]. In August 2020, the WHO conducted a worldwide survey among 130 countries, in which 91 countries (70%) adopted telemedicine or teletherapy for mental health and psychosocial support [7].

Telehealth has also been used for triage and management of COVID-19 patients. Individuals with symptoms pertained to COVID-19 were initially consulted remotely via telephone or video to reduce the risks of virus spreading in some countries. A paper published in *BMJ*, describes the steps and strategies on how to choose and utilize appropriate telehealth technologies, which provided a guidance for supporting physicians or nursing practitioners to make remote consultation, such as taking a history remotely, performing remote physical examination, and making decision for remote management and providing advice or further in-person assessment [8].

In many countries, hospitalized patients were often sent home with devices such as pulse oximeters, along with instructions on how to self-manage their conditions [9]. A combination of telephone or video consultation is usually used to minimize the care burdens within the healthcare systems. Robots and tablet computers have been introduced in some hospitals to allow continuous monitoring and communication with patients while maintaining

social distancing [10]. Meanwhile, telehealth has played an important role in disease management, particularly for those with chronic diseases, such as diabetes. In the UK, telephone consultation and virtual wards have become the priority for the management of 3.4 million patients with diabetes. Moreover, there are plans to develop more NHS online tools, like the Healthy Living platform, to assist patients with diabetes in managing their condition [11].

The COVID-19 pandemic has urged the Chinese government to adjust top-level policies to develop telehealth in nursing practice and education. In February 2019, the National Health Commission published an initiative on “Implementing internet plus nursing services in six pilot provinces in China” to explore the management system, service model, and operational mechanism suitable for the care needs in China [12]. The outbreak of the COVID-19 pandemic made the Chinese government more aware of the potential benefits of telehealth in increasing nursing services, strengthening professional nursing training, preventing occupational exposure, and exploring cost-effective services and payment mechanisms. In December 2020, the National Health Commission reiterated the initiative and expanded the pilots to include at least one city in each province across China [13].

Evidence from existing practice and research has shown that telehealth is effective in many healthcare settings. For example, in Monash, Australia, antenatal care delivered by telehealth in a large publicly funded healthcare network has enabled a reduction of in-person consultation by 50% without adverse pregnancy outcomes [14]. Another example is the use of telehealth for patients with stable ophthalmological disorders, in which asynchronous and synchronous tele-ophthalmology services have been deployed to reduce unnecessary patient referrals by means of combining telehealth, artificial intelligence support system, and home monitoring [15].

The pandemic has also advanced the development of nursing informatics in the areas of research, nursing practice, and education. By searching the literature related to nursing informatics in PubMed, it was found that there were a total of 98 articles being published between January 2020 and August 2021 after the outbreak of the pandemic, compared to 77 and 47 articles published between January 2018 and December 2019, and January 2016 and December 2017 before the outbreak of the pandemic, with increase rates of 27.3% and 14.9%, respectively. Among the literature, 36.7% was related to the use of nursing informatics in clinical settings, while 28.6% was related to nursing education and training during the period of 2020–2021. On the contrary,

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only 27.3% (clinical settings) and 19.5% (nursing education and training) were identified as literature related to these two aspects during the 2018–2019 period, respectively.

These shreds of evidence have revealed that, although doctors, nurses, and patients are held against the use of telemedicine or telehealth for a long time before the pandemic, the COVID-19 pandemic, an extraordinary time during which the world has never faced before, has made telehealth a popular care model for providing necessary healthcare services. It seems that doctors, nurses, patients, and even healthcare insurances have accepted telehealth as an alternative care model for patients with many health conditions in place of in-person services. A survey conducted by the Royal College General Practitioners found that six in 10 appointments in mid-July 2020 were completed by telephone [16]. In the USA alone, it was estimated that the telemedicine industry is now worth \$250 billion among health insurers [17].

During the lockdown time, virtual teaching and learning gained popularity and became the only way for nursing schools to keep the courses running; both theoretical teaching and discussions can be fulfilled using virtual or online teaching. However, nursing students need reasonable time to master their skills and enhance their competencies, which can hardly be implemented purely via online teaching. In order to provide adequate training for nursing students, information technology such as Artificial Intelligence (AI) and Virtual Reality (VR) training tools have been developed, and they have shown great potential in providing training for nursing students. Two systemic reviews both reported that VR training could improve nursing students' knowledge more effectively than conventional methods [18,19]. One of the studies concluded that multiple, self-guided, and short sessions of 30-min VR training following a low to moderate level of immersion was the most effective approach [18].

In China, at the beginning of the 21st century, the Ministry of Education emphasized the importance of digitalization in education to foster a comprehensive and lifelong learning environment. In April 2018, the "Education digitalization 2.0 Action Plan" especially pointed out to accelerate the adaptation of "Smart Education Innovation" [20]. The COVID-19 has encouraged the development of virtual teaching and learning rapidly. For instance, the number of openly available MOOCs in China had increased to 34,000, with over 540 million active users [21]. Being an important carrier for delivering advanced education, VR application in education will facilitate nursing teaching and training, particularly during the pandemic.

Meanwhile, there is substantial evidence showing that the COVID-19 pandemic will not disappear soon. The number of confirmed cases and death are still growing, up till September 6th, 2021, the confirmed cases had reached over 214 million, with 190,832 new cases on September 5th alone. Among the confirmed cases, 4.5 million people had died from the virus [22]. Therefore, it can be projected that telehealth will continue to play an essential role in the near future, even after the pandemic. Therefore, more discussion will be needed on where telehealth can work to streamline the process of health care and where it cannot.

Telehealth has challenged the traditional patient-nurse relationship. Patients become increasingly empowered because of the availability of nurses that could fit patients' schedules, and nurses could provide assistance based on personalized demand via the internet. Nursing professionals must rethink the way on how to interact with patients and how to care for patients remotely. Therefore, adequate information competency among nurses becomes more important than ever before [23]. On April 6th, 2021, the American Association of Colleges of Nursing (AACN) released the core competencies for nursing education. In which, technology competency is defined as one of the most critical abilities for nursing

students. The competency includes: distinguishing and describing various Information Communication Technology (ICT) tools used in clinical care, using ICT tools to gather data, creating information and generating knowledge, using ICT tools to deliver safe care to diverse populations in a variety of settings, documenting care and communicating among providers, patients and all system levels, and using ICT in accordance with ethical, legal, professional and regular standards and workplace policies [24].

In 2008, the Medicine 2.0 Congress held in Toronto identified the broad concept of "Medicine 2.0", which means web-based applications, tools and services for health care consumers, caregivers, patients, health professionals, and biomedical researchers. There are five core themes associated with the adoption of "Medicine 2.0", including facilitation of social networking, participation, apo-mediation, collaboration and openness between and within different user groups, for example, caregivers, patients, health care professionals, etc [25]. The COVID-19 pandemic also challenged the current telehealth model, which required interdisciplinary teams to co-design various aspects of telehealth, considering the care approaches, definition of privacy, technological interoperability, etc. Such teams need a professional leader who is competent in utilizing digital health and also plays an essential role in healthcare delivery. Among healthcare providers, the nursing professionals are in the best place in utilizing telehealth to provide patients care, and they should make full use of telehealth to help them become more knowledgeable, to explore virtual models of care, to conduct data analytics, and to participate in co-designing digital solutions for existing health problems. Therefore, experienced nurses, who have received professional training in nursing informatics, will be the best person for such leaders. Thus, enhancing the role of nursing leadership in existing telehealth and improving nursing informatics competencies among nurse leaders will be vital to understand the intended and unintended consequences as well as opportunities of using such technologies [26].

To foster nursing leadership, the nursing curriculum should include contents associated with leadership development and related competencies in the use of telehealth in all aspects of practice, along with the incorporation of novel pedagogical approaches in teaching—for example, using immerse technology to deliver a simulation-based case study. We should also create educational tracks at the master or Ph.D. levels to prepare nurse specialists and scientists in nursing informatics.

During the COVID-19 pandemic, nursing professionals have made substantial achievements in delivering adequate patient care by utilizing telehealth. In realizing the importance of telehealth, it is also necessary to encourage original research to evaluate the performance of telehealth during and after the pandemic. In addition, designing and developing better nursing information systems and AI-assisted telehealth systems to remotely provide effective health management for patients with chronic diseases, mental disorders, etc., are also in great demand.

#### Declaration of competing interest

None.

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