Asia-Pacific Journal of Oncology Nursing 9 (2022) 100119

Contents lists available at ScienceDirect

Asia-Pacific Journal of Oncology Nursing

journal homepage: www.apjon.org

Editorial

Telenursing and artificial intelligence for oncology nursing

The development of information communication technologies (ICTs) has led to the spread of nursing care service delivery globally and has impacted patient care as an innovative method. World Health Organization (WHO) has suggested that the use of ICT is useful to support health and health-related fields, including telehealth, telemedicine, mobile health (mHealth), electronic medical or health records, big data, wearables, and even artificial intelligence (AI).[1] With various technologies, ICT has been pivotal in attaining overarching health priorities such as universal health coverage and sustainable development goals.[1] Therefore, health and nursing care should be delivered to people living anywhere in the world using these technologies.

Telenursing is defined as 'nursing activities provided through ICT and telecommunication'.[2–4] Telenursing assesses people from a distance and provides appropriate information, consultation, education, and health guidance through the empathic telecommunication. With the advent of the COVID-19 pandemic, telenursing is now widespread in many countries.

In some cases, telenursing is provided based on telemonitoring of the physical and mental state of people in home care settings to make a more accurate assessment. Telenursing/telehealth with telemonitoring is effective in decreasing the number of outpatient and emergency room visits, shortening hospital stays, improving health-related quality of life, and decreasing the cost of health care.[5–7] In addition, with the development of Internet of Things, robotics and AI have made rapid progress in the continuous monitoring of people living at home. These technologies have the potential to provide tools for advances in health care.[8] However, some challenges remain using these technologies for home care. If people are allowed to choose between face-to-face health/nursing care and telehealth/telenursing, it will be possible to provide healthcare that is satisfactory for both patients and the health care providers.

Especially in the field of oncology nursing, individually tailored support is required at each stage of cancer care: diagnosis, treatment, survivorship, or palliative care stage. Therefore, an interdisciplinary care team is necessary to support people with cancer for prolonged durations, and sharing of health information with healthcare team members as well as the people is also essential. People-centered care (PCC) is a partnership model between community members and healthcare providers to improve the health problems of individuals or the community.[9,10] People and the healthcare providers understand, trust, and respect each other, in addition to learning together, using each other's strength, assuming roles, overcoming problems together, and forming decisions together; these are the essential components of PCC. These partnerships initiate the creation of a society where people can improve their own health and can play a central role at each stage.[10] Telenursing is adopted to encourage people to understand their own state and improve their health. The means of sharing health information and utilizing it in daily life appropriately should be considered when adopting telenursing.

In the Telehealth in Oncology: American Society of Clinical Oncology (ASCO) Standards and Practice Recommendations 2021, it is stated that selection of targets to provide telehealth and establishment of relationship with the patients are essential for the long-term management. Moreover, the evolution of frequency of telehealth and in-person visits considering user's preference is required. Sufficient orientation and skilled staff for troubleshooting are necessary before implementing telehealth, in addition to the evaluation of people with user key performance indicators.[11] Examples of telenursing models for people with lung cancer include vital sign monitoring, symptom management, telemonitoring of chemotherapy side effects, supportive care, self-care education, rehabilitation, and reporting to physicians through websites, phone calls, and software.[12] This model makes it possible to manage symptoms, improve functional status, and quality of life and diminish the demand for care support. Side effect management is necessary in people on chemotherapy that have care needs. Telenursing has the potential to improve support needs, quality of life, satisfaction, and physical well-being, in addition to reducing cancer-related costs and the occurrence of symptoms such as fatigue, nausea, and vomiting.[13,14] Moreover, for people specifically living in rural and remote settings, telenursing increases support and access to care.[15] Telenursing provides significant supportive care and reduces the number of unnecessary hospital visits. The symptom management of cancer requires a variety of strategies, and by utilizing big data from the accumulation of daily monitoring and supporting decision-making based on AI predictions, it is possible to impart care to people and respond early to symptom changes. The development of non-invasive devices for monitoring is also necessary without burdening the users. Therefore, devices that improve the accuracy of tele-observations and the establishment of a secure data storage system based on a common platform are primarily required.

AI is "the theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages".[16] AI has the learning and reasoning ability and is being introduced with rapid advances in the high-performance of computers and development of networks.

Machine learning (ML) is a technique for statistical learning that involves optimization to minimize a loss function and optimize the predictive ability.[17] ML is used as a method for finding regularity and relationships in a large amount of data in a specific field by using an algorithm. ML has the advantage of being able to find rules in data and perform time consuming analysis in a very short time; however, manual intervention is necessary in judging and verifying notable data. Deep

https://doi.org/10.1016/j.apjon.2022.100119
Received 5 July 2022; Accepted 6 July 2022
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learning is the next step that combines advanced computers and special networks; deep learning discovers and develops itself while learning complex patterns hidden in big data. These AI technologies have made rapid advances in the fields of cancer genomic medicine and diagnostic support[18] and are used in performing gene analysis and image analysis by the automatic acquisition of multimodal learning, multitasking learning, expression learning, and hierarchical features, which are the characteristics of deep learning. Research and development aimed at optimizing cancer treatment and diagnostic systems have been promoted. The number of cases where AI robots ask questions such as in outpatient settings is increasing; however, nurses must coexist with these technologies to lend a human touch with the common goal of supporting the cancer treatment and decision-making in their life. Therefore, it is necessary to provide the humanistic support that is not provided through a "machine."

By utilizing technology, collecting and evaluating physical and mental data have become efficient without any additional burden on the person and healthcare provider, and it is also possible to respond to early signs, while people still can maintain their physical functional status. Therefore, it is necessary to expand the capacity of a "tele" nurse, which is different from conventional face-to-face nursing. However, currently, only a few Japanese nursing universities teach telenursing.[19] Hence, the promotion of telenursing education in undergraduate and graduate nursing education is also required. Telenurses need to learn about ICT and information risk management, telenursing and ethics, telecommunication/observations, clinical reasoning from monitoring data, guidelines, and PCC perspectives. In the Society 5.0 policy, the convergence of cyberspace and physical space improves human-centered life.[20] In the field of oncology nursing, it is the time to examine how the two should be integrated to enhance people's life.

Declaration of competing interest

None declared.

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Tomoko Kamei
Graduate School of Nursing Science, St. Luke's International University, Tokyo, Japan
E-mail address: kamei@slcn.ac.jp.