



Nurse Robots: A Necessity in the Nursing Care System during the Covid-19 Pandemic

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Dear Editor,

The emergence of diseases due to drug resistance, genetic mutations, and transmission has made the future of infectious diseases complicated and vague. Currently, the prevalence of coronavirus, with high infectivity and significant lethality, has made infection control among nurses and patient one of the main goals of the World Health Organization [1].

At present, the prevention and control of Covid-19 are in a critical period, so that the use of intelligent health care systems to control infection and maintain human resources, such as nurses, is an undeniable necessity, which should be considered by health policymakers and governments. This can be done by integrating intelligent health with traditional technologies in nursing and health care systems. Nursing robots are an example of such intelligent technologies able to upgrade the traditional systems to those novels, capable of

responding to increased demand during biological crises, such as the Covid-19 pandemic [2, 3].

Many hospitals across the world have turned to robots to remove the viruses and bacteria in patient rooms and wards, tirelessly and continuously providing services such as environmental sterilization using ultraviolet and disinfectant solutions according to health standards [4].

The use of nursing robots can be useful in the fight against the Covid-19 pandemic and affect the current and future life of the nursing system. These robots can be used to perform repetitive, tedious, and dangerous activities, such as delivering food to the patient, measuring vital signs, disinfecting the environments, collecting hazardous waste, tracking patients and carriers, and monitoring the quarantined environments, that expose nurses to the Covid-19 [5]. In Italy, the robots equipped with monitors with audio-visual communication with patients were used to

measure their important parameters, such as blood pressure and saturated oxygen [6].

Also, nasopharyngeal and oropharyngeal swab sampling and monitored changes in patients' blood parameters can be performed by nursing robots [5]. These robots can significantly reduce the transmission of infection and physical and mental fatigue among nurses and staff, improving and accelerating the treatment process and reducing the use of personal protective equipment and environmental disinfectants [4].

Nursing robots have been used in the health care system of some countries, including Japan, to solve the challenges in elderly health. Their use has solved the ergonomic problems of nurses, including moving people and bearing their weight. Further, application of these robots in patient education and enduring long shifts in dangerous and special health centers such as the ICU are another their advantages that lead to preserving the human capital and presenting significant economic benefit to the Japanese government [7].

Managing patients' respiratory, caring for patients under mechanical ventilation and full monitoring and recording vital systems are one of the most important tasks of nurses in the Covid-19 period. Robots can be used independently to read and record patients' vital signs, such as measuring blood pressure, body temperature, heart rate, and blood-soluble gases, leading to reduced infection risk of Covid-19 among health care workers. The skill of preparing, setting, and working with ICU equipment is another task that can be done by automated robots. Further, biometric health care tasks, such as heart rate (electrocardiography), electroencephalography, and muscle bio signals (electromyography), are performed by nursing robots in some countries [4].

The most common hospital wastes during the Covid-19 crisis are plastic masks, gloves, and protective clothing, use of which are inevitable. Consumption of this personal protective equipment, such as an estimated monthly 129 billion face masks and 65 billion gloves worldwide, leads to widespread environmental pollution. This hazard threatens public health because the waste carries the Covid-19 virus, which survives on plastic for up to 3 days and has far-reaching effects on ecosystems and organisms [8]. In addition to robots' direct benefits for health systems, it can help to maintain the environmental health for present and future generations.

Lack of spiritual and friendly communication with patients and the provision of services to patients not conscious is among the current limitations of robots, showing the high and key role of the nursing staff. Robots cannot replace nurses but

can be their assistants in the difficult days of dealing with crises, such as Covid-19; also, they can help policymakers and government planners respond to such crises by attending high-risk locations and engaging in risky activities [9].

Currently, the fatigue and shortage of specialized human resources, on the one hand, and the increasing number of infected patients, on the other hand, have disrupted the admission of other patients in many hospitals, resulting in irreparable damage to patients and their families. In such cases, by reducing the quality of services, other problems, including endangering patients' safety and increasing the length of hospital stay, also appear [10].

Although providing robots imposes costs on governments, their useful and diverse applications in crises, as well as their durability as a part of essential medical equipment, justify their presence in health care systems [7]. Since nurses are a major part of the workforce in the health care system and play a major role in providing direct services to patients, using robots can be useful for the health care system by compensating for nurses and reducing the leave rate [11].

Covid-19 pandemic is a challenge that provides an opportunity to identify new solutions to overcome such biological crises. The outbreak of this challenging and deadly epidemic has shown that focusing on hospital smartening is not a luxury and unnecessary thinking, but futurism and investment in maintaining the health of the community and associated professionals.

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