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Literature Review

THE ROLE OF "ROBOTIC ASSISTED INTENSIVIST" AS SOLUTION OF RESOURCES MANAGEMENT IN COVID-19 PANDEMIC ERA

Anna Surgean Veterini[1a], Bambang Pujo Semedi[1], Cita Rosita Sigit Prakoeswa[2], Damayanti Tinduh[3]

[1] Department of Anesthesiology and Therapy Intensive, Faculty of Medicine-Dr Soetomo General Academic Hospital, Universitas Airlangga, Surabaya
[2] Director of Education and Research, Dr Soetomo General Academic Hospital-Universitas Airlangga
[3] Head of Research and Development Dr Soetomo General Academic Hospital-Universitas Airlangga
[a] Corresponding author: anna.surgean.veterini-2017@fk.unair.ac.id

ABSTRACT

Providing expertise in the care of critically ill patients is one of the main needs of critical care medicine, especially in the COVID-19 pandemic era. This goal is particularly challenging, given the acknowledged shortage of intensive care specialists. We need the bedside nurse to have real-time access to get continuous reporting monitoring. The intensivist also has access to bed site examination at some time when they are not possible for coming to the intensive care unit (ICU). The big problems during COVID-19 are the limited personal protective equipment, the limited number of intensivist doctors, and the nature of the disease was very contagious and deadly. It is necessary to find a solution so as not to cause new problems, namely the death of medical staff and nurses due to frequent contact with Covid-19 patients. In this article, the author wants to open a view to getting solutions to problems in the field by presenting human replacement technology.

Keywords: Robotic-Assisted Intensivist; ICU Actuator; Medical High Technology; Robotic-Assisted for COVID-19

ABSTRAK

Memberikan keahlian dalam perawatan pasien yang sakit kritis merupakan salah satu kebutuhan utama pengobatan perawatan kritis, terutama di era pandemi COVID-19. Tujuan ini sangat menantang, mengingat kurangnya spesialis perawatan intensif. Kami membutuhkan perawat di samping tempat tidur sehingga memiliki akses waktu nyata untuk mendapatkan pemantauan pelaporan berkelanjutan. Intensivist juga harus mengakses pemeriksaan tempat tidur di beberapa waktu ketika mereka tidak memungkinkan untuk masuk ke unit perawatan intensif (ICU). Masalah besar selama COVID-19 adalah alat pelindung diri dan jumlah dokter intensif yang terbatas, serta sifat penyakit yang sangat menular dan mematikan. Untuk mengatasi hal tersebut perlu dicarikan solusi agar tidak menimbulkan masalah baru yaitu kematian tenaga medis dan perawat akibat terlalu sering kontak dengan pasien Covid-19. Pada artikel kali ini, penulis ingin membuka pandangan untuk mendapatkan solusi dari permasalahan di lapangan yaitu dengan menghadirkan teknologi pengganti manusia.

Kata kunci: Robotik Intensif Berbantuan; Aktuator ICU; Teknologi Tinggi Medis; Robot Yang Dibantu Untuk COVID-19

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INTRODUCTION

One of the strategies in modern critical care is using information technology (IT). IT applications offer promise to improve patient care, clinician efficiency, and patient outcomes. Technology applications and initiatives are multiplying to stop the spread of disease, treat patients, and reduce pressure from overworked health care workers, as well as develop new effective vaccines, as the coronavirus disease 19 (COVID-19) pandemic develops. Digital information and technology surveillance has been launched in an unprecedented way to gather reliable data and evidence to support public health decision-making at a time when everyone needs better information, such as epidemic disease modelers, state authorities, international organizations, and people who were quarantined or maintaining social distancing. Artificial intelligence, robots, and drones are being deployed to help track disease and enforce restrictive measures; while scientists apply gene editing, synthetic biology, and nanotechnology in preparing and testing future vaccines, treatments and, diagnostics (1).

One of the COVID-19 managements in China that we have to learn is robot using to provide services and care for those quarantined or practicing social distancing. Robotics developers are responding quickly to public health concerns and needs and the pandemic has fast-tracked the 'testing' of robots and drones in public, with all stakeholders seeking the most expedient and safest way to grapple with the outbreak and limit its further spread.

Thinking about the use of robots in developing countries becomes a separate homework. Developing countries, for example, Indonesia needs to make innovation to save existing resources, one of which is human resources. The number of health professionals is not balanced by the number of cases in a pandemic situation. Therefore, this article tries to review some of the introductory literature that has discussed the use of medical assistant robots.

LITERATURE REVIEW

COVID-19 and The Risk of Medical Staff

COVID-19 which started in China in December 2019 has spread rapidly to all parts of the world. This is because this disease is easily transmitted from human to human. Physical distancing is a major concern that must be done to prevent further transmission. This is of course very difficult for medical personnel to treat the patient because they must always be close together (2).

Some reports support that COVID-19 is also transmitted by humans to humans are reports that inform COVID-19 occurs in the family cluster (Wu et al., 2020). This disease can be transmitted through touch, droplets spread by coughing, sneezing, or talking face to face. In a small study conducted on women in their third trimester who were confirmed to be infected with the coronavirus disease, there was no evidence that there is the transmission from mother to child (3).

Highly sensitive laser beam scattering observations have revealed that loud noises can emit thousands of drops of oral liquid per second. In a closed and stagnant air environment, they disappear from the window of view with time constants in the range of 8 to 14 min, which corresponds to droplet nuclei of ca, with 4 μm diameter, or 12- to 21-μm droplets before dehydration. So that normal speaking causes airborne virus transmission in confined environments (4). The research result by Stadnytskyi (2020) gives the information that the risk of transmission between patients and health care workers is a problem that must be prevented and overcome. The use of robotic-assisted health workers is one alternative to prevent the risk of being infected. The other reason is to maintain existing human resources. The multidisciplinary collaboration was instrumental in the creation of robotic-assisted health workers. The role of education centers, companies, funders, and health workers is needed for the creation of appropriate robots. At the Institute of Technology Surabaya, 10 November has succeeded in creating several assisted health worker robots. This is stimulation for beginning to put technology in human activity.

Robotic Telepresence

The use of remote presence has previously been described in the medical literature by multiple authors. Zhang et al. (2019) had made the telepresence Robot with a virtual reality head-mounted display (VR HMD) (5). Zhang, Hansen, and Minakata (2019) made a Comparison between gaze- and hand-controlled telepresence robots with a head-mounted display. The gaze interactive interface can serve a range of telerobots, including a modified wheelchair, a build yourself model (Parallax Arlo), and a third-party model (Padbot) (6). Vespa et al. credited RP-7 rounding for a more rapid response to critical situations in a neuro ICU. They also reported a 0.63-day decrease in LOS and an estimated $1.1 mol/L reduction in ICU cost through enhanced efficiency, coordination of care, and throughput. Gandsas et al. (2007) reported that RP-7 decreased LOS and significantly decreased costs on a bariatric surgery service (7). Earlier discharge of patients enabled their institution to refill 60% of beds within 3 hours of discharge. The net financial benefit to their hospital was $370K per year per physician user. Petelin et al. (2007) reported that the earlier generation RP-6 robot was associated with decreased LOS and increased patient satisfaction in a community hospital setting. Hackensack University Medical Center has embarked on a protocol to use the RP-7 in decreasing LOS with initial success, whereas the Ryder Trauma Center in Miami has used the RP-7 to enhance both care and training in their trauma ICU (8).

If in a difficult situation attending presence is not available, the importance of time rounds is critical becomes even more essential. Communication between attending physicians and staff is enhanced when in this pandemic era. The previous article said that communication between attending physicians and staff is enhanced by RPT with the RP-7 robot was efficient (9). This data may be implicated in this pandemic that we stand in a difficult situation. The minimal amount of professional staff face to huge amount of critical and infectious patients.

The Chance in Developing Country

One example of the use of robot technology in infectious disease services is robot-controlled non-contact ultraviolet (UV) surface disinfection. This robot is very helpful for disinfecting the surface area of tools in the COVID-19 treatment room because droplets that stick to the surface of objects can be a medium of transmission. Corona-viruses can persist on inanimate surfaces—including metal, glass, or plastic—for days, and UV light devices (such as PX-UV) are effective in reducing contamination on high-touch surfaces in hospitals (10). But, the safest UV length must be considered to protect the environment.

Another example of the use of robotic technology in health care is telepresence robots. This robot is useful for monitoring the patient's vital signs, triage, evaluate, monitor, and treat patients from a safe distance between health workers and patients. Besides, it can assist the health care system, maintain public health, and provide health services that are more effective and safer. This of course will reduce the burden on hospitals to pay for human labor and the risk of contracting infectious diseases (11)(12) (13)(14). Some of the obstacles to using robot technology for emergency health services and ICUs are the expensive price of robots, the use of robots is useful and the infrastructure capability of using robots is not yet scientifically proven. This is because it involves the shape of the building floor, doors, and others (15).

CONCLUSION

We conclude that the use of technology to save resources is the key to handling a pandemic. One of a variety of technologies is the creation of robots or actuators to help health workers. At the beginning of manufacture may be expensive but in the long run the possibility of putting a lighter economic burden on the hospital. This needs to be examined further from various perspectives, for example, funding, health psychology of the workforce, and public trust about the use of technology in critical areas such as health. Infrastructure preparation in the future must be able to facilitate the application of technology like this.

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Conflict of Interest

There is no conflict of interest

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