COLLABORATION WITH COBOTS IN THE CONTEMPORARY WORKING ENVIRONMENT

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Abstract Slovenians like new technologies. However, they hold specific fears that robots will take their working places. Robots represent opportunities for providing service as the population grows old, and robots will be needed to help old people. Especially in fields where workers are scarce, such as healthcare, knowledge of the interaction human-cobot will be needed. Robots have been present in highly supervised and stable environments for decades. Due to extreme progress in robotics, they have moved among people, in less predictable environments, and have a more human-like appearance. The purpose of our paper is to present cases of cobots in Slovenian hospitals. We use qualitative methodology. Results of our desktop research are presented. Our paper researches contemporary management challenges in healthcare. Before, and after the COVID-19 pandemic, the demand for healthcare professionals was a critical challenge as the nursing staff was overburdened. It is hard to fill all the necessary nursing positions in hospitals. The problem seems to be getting even bigger due to the growing trend of the elderly population around the world. In the theoretical part, we present the interaction between human being-robot. In the empirical part, we present three examples of the incorporation of robots in hospitals in Slovenia and expose some of the current challenges, benefits, and difficulties of working with robots.

Keywords: social innovation, green cities, citizens, development

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1 Introduction

Organizational culture has a vast impact on the work environment and quality. Healthcare as an industry is growing rapidly, and healthcare is currently the largest industry in the world – at three times the cost of the banking sector. However, at the same time, risk, error, adverse events, and critical incidents are always present in the provision of medical care and undermine safety and quality. Organizational culture of collaboration is, therefore, key which means meeting the needs of staff and patients with the achievement of organizational goals. The culture in the healthcare organization should be primarily focused on creating a healthy working environment for staff (Šprajc & Lukhanina, 2022).

Today we need to start thinking about how to meet the challenges of gaining the most from the working population that is getting older, such as among others:

- age-sensitive job design of innovative work behavior: the role of cognitive job demands
- a multi-informant assessment of organizational agility maturity: an exploratory case analysis
- benefits and challenges of delegating work tasks in intergenerational teams in healthcare
- handling reverse delegation in healthcare (doctor-nurse; nurse-doctor)
- designing stretch assignments for older workers in healthcare
- designing developmental opportunities for older workers in healthcare
- Do older workers in healthcare prefer not to learn new things?
- Are older workers in healthcare less innovative?
- Do older workers in healthcare have the appropriate leadership assets – resilience, sociability, and the willingness to learn?

Slovenians like new technologies. However, they hold specific fears that robots will take their working places. Robots represent opportunities for providing service as the population grows old, and robots will be needed to help old people, especially in fields where workers are scarce, such as healthcare (Vukelič in Štakul, 2022). Robots have been present in highly supervised and stable environments for decades. Due to extreme progress in robotics, they have moved among people, in less

predictable environments, and have a more human-like appearance (Štakul, 2022, p. 19). However, there is a research gap on how to manage interactions between human collaborators with cobots. The purpose of your paper is to present case illustrations of cobots in Slovenian hospitals, nowadays.

2 Theoretical framework

Core competencies required by human resource managers today are 1) professionalism (how the organizational system as whole functions and what components it consists of; 2) communication (the manager can maintain a healthy work environment, increase staff motivation, resolve conflicts, and satisfy stakeholders); and 3) leadership skills.

How will the work of human resource managers change in the future is hard to imagine. In the past, robots were isolated from humans and seen as dangerous. Nowadays, they are more collaborative, dexterous, mobile, and autonomous. Over 3 million robots work globally in factories (Economist, 2022, p. 66). Millions more move goods around warehouses, clean homes, mow lawns, help surgeons conduct operations, and deliver goods, on land and by air (Economist, 2022, p. 66).

Robots are supposed to help recruit good healthcare staff by promoting the image of a modern, technologically advanced healthcare department (Barrett et al., 2012, p. 1452). The usage of robots in healthcare reduces (dispensing) errors and improves (pharmacy) efficiency, which are critical concerns in healthcare (Barrett et al., 2012).

Lifestyle choices about home working, creaking supply chains, and the e-commerce boom have left warehouses and other businesses struggling to recruit workers. The logistics industry implements automation to help keep workers safe and make their work more efficient. Stretch, a new robot from Boston Dynamics can handle that kind of variation that people take in stride and work as fast as an experienced warehouse worker. Stretch's design departs from the humanoid and quadrupedal robots (Ackerman, 2022). Stretch can work non stop 16 hours and move 800 boxes per hour as a human scan. However, this work punishes the human body, especially when lifting heavy boxes. Stretch will not replace workers entirely, the aim is for a human being to supervise robots. People become managers of robots and need to make sure that processes run smoothly and intervene if Stretch runs into unexpected

things. Stretch follows the standards for mobile industrial robots set by the American National Standards Institute and the Robotics Industry Association (Ackerman, 2022).

Robots are learning to do the picking and packaging for themselves. They are stepping out of their cages equipped with advanced sensors and machine learning, a form of artificial intelligence (AI), and will work alongside people (Economist, 2022). In the field of manufacturing, car plants lead automation. Robots take dull, repetitive, and strenuous jobs which are harder to fill by humans. Robots can create jobs by making businesses more efficient, allowing companies to expand (Economist, 2022, p. 66).

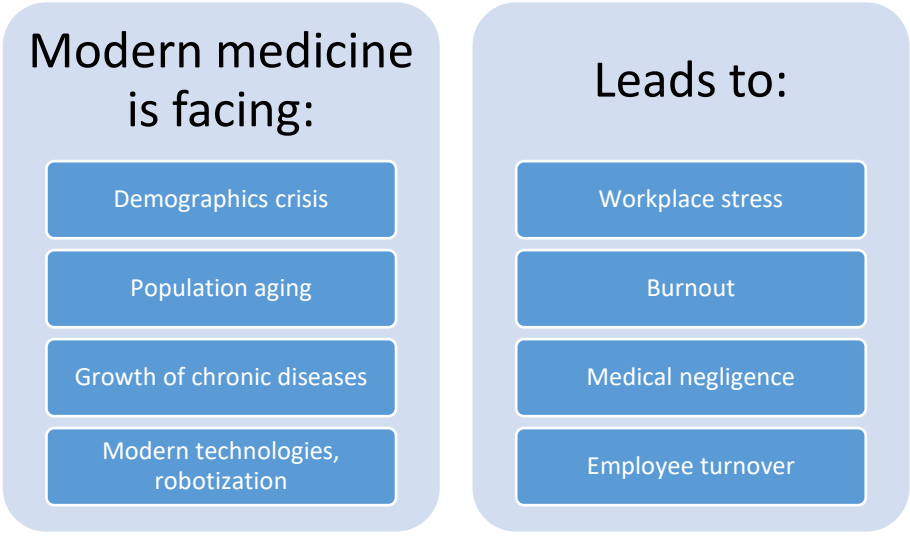

Figure 1: Trends and consequences in a contemporary medical setting (Šprajc & Lukhanina, 2022)

Robots are a long way from replacing the entire jobs of human healthcare workers. Replacing human-to-human interactions in this context is neither realistic nor desirable. Instead, robots can improve healthcare when they work alongside human workers and take over routine activities, so humans can better focus on (socially) more complex (patient) interactions. For instance, by taking over some of the routine patient monitoring activities, nurses and doctors have more time to focus on the kind of patient interactions that go beyond those routine activities, e.g., more in-

depth inquiries about symptoms, how patients feel, and what they can do to aid treatment success.

In scenarios like this, just as nurses and doctors or healthcare professionals from different disciplines have to work together and coordinate their work, so do robots and human healthcare workers. As artificial intelligence (AI) is becoming more advanced, robots in healthcare settings become more agentic: They gradually evolve from merely supporting various tasks to showing initiative, deciding, and acting autonomously. In a way, they move closer from being "a tool" to "a teammate" (Malone 2018). Consequently, human-robot interactions require the "coordination of complex activities such as communication, joint action, and human-aware execution" (Seeber et al. 2020). This leads to new challenges for human-robot teams, such as disrupting role structures. For instance, when night rounds in a post-surgical intensive care unit were conducted via robotic telepresence by one of the team's doctors, coordination structures had to be adapted to the new situation, and the roles that attending physicians, nurses, and residents enacted had to change decisively (Beane and Orlikowski 2015). In addition, in patient-oriented procedures, patients also need to adapt. Whenever patients are actively involved, it is unlikely to be enough to train healthcare workers "in the required collaboration competencies for collaborating with machines" (Seeber et al. 2020, p. 6), without educating patients.

3 Research method

We used secondary data and desktop research as our tools for gathering data. Good practice examples of different collaborations with robots in healthcare are presented from Slovenian hospitals to stimulate open debate regarding the usefulness and potential challenges of human-robot interaction in healthcare. We analyzed the data gathered by categorizing it into several key themes of our research interest for this conference. Our method was qualitative, as we provide case illustrations from the Slovenian healthcare setting.

In the empirical illustration, we will present integrations of robots in a Slovenian hospital environment. University clinical center Maribor (UCC MB) got a new member of the healthcare team, called robot Frida. Robot Frida (1,3m tall, 28 kg) has a certain amount of autonomy, it reacts to hearing its name if people are talking

about it, and it hears and comes to people. It speaks Slovene, perceives the emotions of a human, and can recognize signs of depression or anxiety (Izidor Mlakar in Zupanič, 12. 10. 2021). Frida's primary work is taking measurements. The First Slovenian humanoid robot is worth 25000 euros and is intended to help healthcare workers' workload management (Zupanič, 2021).

It can talk to patients, exercise with patients physiotherapy, do birocratical tasks of the staff, and enable doctors to access all medical information about the patient(s) in one place, right away (24ur.com; Robotka Frida v pomoč bolnikom in osebju UKC Maribor, 30.5.2022). She works at two departments of the surgery clinic of UCC Maribor (11. 5. 2022; Osebju UKC Maribor se bo pridružila robotka Frida). Scientist Izidor Mlakar said they designed the social robot Frida, which looks like a human. It collects data, which patients usually tell nurses when they visit the hospital. Robot Frida collects information on the temperature of the patient and the well-being of the patient by talking to patients. The questions were developed with the support of the department of psychology university Maribor. Robot Frida is active in conversation with the patient and gives feedback to the patient. It is never tired, very friendly, never gets angry, and works 24 hours daily. With its work, the hospital leadership intends to help the nurses manage their workload in collecting patient data (Lokalec.si, VIDEO: Robotka Frida pacientu v UKC Maribor izmerila temperaturo, ga izprašala, nato pa sta skupaj naredila še dihalne vaje, 30. 5. 2022). Robot Frida is part of an international project »HosmartAI-robot in healthcare«. Bojan Musil (Psychology department, University Maribor; Lokalec.si, VIDEO: Robotka Frida pacientu v UKC Maribor izmerila temperaturo, ga izprašala, nato pa sta skupaj naredila še dihalne vaje, 30. 5. 2022) is aware of the problems that arise because robots look similar to humans, that is why he observes, how patients react to Frida.

Vojko Flis, professor of surgery, and project leader of the HosmartAI project, is testing the first humanoid robot in the world in a healthcare environment (Robotka Frida bo pričela uvajanje v UKC Maribor na oddelkih za kirurgijo; 31. 5. 2022).: »Robots can collect different sources of information and combine them. In smart hospitals, artificial intelligence will give healthcare workers time for patients. In the first part of the pilot project, Frida has a human behind her who supervises what it does. We don't notice robots that don't have a human shape. As soon as we have a humanoid robot, things change psychologically «. In September 2022, the second

phase will entail the functioning of Frida in the hospital room with four patients. Project HosmartAI is 10 million euros worth; UCC Maribor and the university of Maribor received 900 000 euros. In the future Frida will receive also partner Smiljan if all goes well (Robotka Frida bo pričela uvajanje v UKC Maribor na oddelkih za kirurgijo; 31. 5. 2022).

One preliminary research study showed fear among nursing staff that robot Frida will overtake their work (Igor Robert Roj in FOTO: V UKC Maribor imajo novo pomočnico, robotko Frido: »Njeno primarno delo ostaja izvajanje meritev«; 30. 5. 2022).

Hospital Slovenj Gradec received a European donation in 2021 for a disinfection robot in the central surgery unit. Robot UVD model C is used for disinfecting and preventing the spread of infections. Before using the robot, the staff had a training session (Splošna bolnišnica Slovenj Gradec, 15. 9. 2021).

Hospital Slovenj Gradec also incorporated in March 2022 the autonomous transport system (ATS) robot Devžej (employees chose the name) with the aim of digitalization and robotization, improving working conditions and safety and better care for patients. Employees will be released from heavy physical work – transporting medical material, food, underwear, and waste. ATS was developed by companies Viptronik (Slovenia), Sumetzberger (Austria), and Yujin Robot (South Corea) in collaboration with the hospital. Basic platform for transport is based on an Autonomous mobile robot (AMR). It can be based in existing transport corridors, together with staff and patients, without unique adjustment of the rooms. ATS is currently transporting pharmaceutical material from the hospital pharmacy to specific departments. It can carry 250 kg. The hospital management aims to expand the system towards transporting food, clothes, and waste. Investment in the robot was 159 000 euros and financed by Slovenj Gradec hospital (Splošna bolnišnica Slovenj Gradec, 18. 3. 2022).

4 Concluding remarks

The design of robots has to consider the above-mentioned aspects and make suitable adaptations as easy as possible, especially for patients who cannot be expected to undergo formal, time-consuming training activities. Besides equipping healthcare

robots with functionality that makes it easier for healthcare workers and patients to adapt to them, robots should also be enabled to better adapt to individual patients or healthcare workers. Traditionally, technology design has considered mostly taskwork and neglected teamwork implications (Fiore and Wiltshire 2016). However, with recent advances in (AI) technology, it is becoming more important to consider how interactions with technology influence the division of labor among healthcare workers and patient involvement. More recently, there have been calls to consider design more holistically and focus not just on technology but also on these more social components. For instance, sensing and making sense of the robot's environment, sharing and learning with collaboration partners, and the division of labor between machines and humans need more attention (Seeber et al., 2020). Not only should implications for teamwork and the social aspects of interactions play a role in the design stage, but it should also be considered whether functions that support team-level processes by helping to mediate and support social interactions can be introduced (Fiore and Wiltshire 2016).

The theoretical implication of our conference paper is to introduce to the scientific and professional public the social impact of collaboration between humans and cobots that will be more present in the future, and we need to help workers in adjusting to new forms of work. The practical implication is in providing examples of actual preliminary results of the project carried out in the Slovenian hospital setting. We need to be aware that much fear is associated when we introduce new things to the workplace, so we need to incorporate proper training and change management tools to prepare people involved. The limitation of our study is time-bound, and there is still not a lot of empirical data as the research is still in its initial stage.

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