

Integrating Socially Assistive Robots into Japanese Nursing Care

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Abstract. This paper presents experiences of integrating assistive robots in Japanese nursing care through semi-structured interviews and site observations at three nursing homes in Japan during the year 2019. The study looked at experiences with the robots *Paro*, *Pepper*, and *Qoobo*. The goal was to investigate and evaluate the current state of using robots within the nursing care context, which involved: firsthand experiences with intended and real users; and response from the elderly, and nursing staff. The qualitative analysis results pointed out user satisfaction, adjusted purpose, therapeutic and entertaining effects. The potentials of using robots to assist in elderly care has been evident. Limitations currently relate to the lack of ways to fully utilize and integrate robots.

Keywords. Assistive robots, nursing-care, human-robot-interaction, impact on care

1. Introduction

According to the United Nations (UN) demographic statistics, Japan's population has decreased since 2009, holding about 128,500,000 residents at the time. As at 2019, Japan's population was about 126,800,000, but the forecast is that, the number will fall down to 108,800,000 by 2050 [1]. Moreover, Japan currently holds the world's largest population of elderly per capita with about 27% of Japan's population being 65 years or older. This means about 35 million people are over the age of retirement (65 years). Some countries argue that immigration might be the solution to this problem, while Japan has decided to invest in alternative futuristic ways of coping with its changing demographics. A proportionally large elderly population, in combination with a limited population growth, puts a higher demand on nursing care given the shortage of health care staff. Innovations have the potential to provide solutions that reduce the need for more human workers and promoting the elderly to be independent.

The Japanese government has presented six priority areas collectively, which consist of 13 areas in nursing care that require introduction of robot technology. These include namely: lifting aids, mobility aids, toilets, monitoring and communication systems, as

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well as bathing and nursing-care services [2]. Communication robots were introduced as the government's priority areas in 2014 and their development is supported since 2017.

The attitude towards robots is complex. The European Commission published a report in 2012, investigating its at-the-time 27 member states' "public attitudes towards robots" [8]. A total of 26,751 participants responded to the survey; 87% of them had no personal experience with robots, but 70% had a positive view towards them. When asked about areas of which robots should be banned from, "on average, 86% would feel 'uncomfortable' about having their children or elderly parents minded by a robot (in fact, 66% chose point 1 'totally uncomfortable' on the scale)" [3].

Two studies from 2008 [4] and 2014 [5] revealed that people would prefer robots to perform tasks like vacuum cleaning, lawn mowing, watching over the house and so on than babysit, play with children or take care of animals. However, the Japanese Cabinet Office survey [6] with 1842 respondents has found that that 65.1% of the participants wanted to use robots in nursing care. Important points in choosing nursing care robots considered by respondents include: "easy to use" (74.4%), followed by "reasonable price" (68.6%), and "safety license" (54.6%). Only 6.4% responded that the robot having a "nice design" was important.

2. Material and Methods

A qualitative study was conducted, which involved use of semi-structured interviews and observation. We visited three different Japanese nursing facilities chosen as the study sites from a public list of nursing facilities, which use the robot *Paro*. The two nursing homes were in Hyogo prefecture, and the daycare center for elderly was in Kyoto, all close to the Ritsumeikan University Biwako Campus. The interviews were primarily held with the three facilities' managers and nursing staff. Questions directed to the nursing staff comprised of; the type of robots used, areas of use, negative and positive experiences encountered, and future considerations of robot use. On the other hand, questions directed to the site managers comprised of; reasons for investing in robots, and experiences encountered. Patients were also observed using the robots. Two of the interviews were conducted in Japanese and one in English. All interviews were transcribed; two of them were translated into English.

Content analysis was conducted to elicit and categorize information about the usage of the robots and impact they made on nursing care.

3. Results

Results from the interviews and observations gave an insight into the role and impact robots have on Japanese nursing care.

The interviews suggested that these kinds of robots all work with the mind and the mental wellbeing of the patients. Patients suffering with dementia often believed *Paro* to be a dog or even a human baby, thus treating and interacting with it accordingly. Patients often cared and worried for *Paro*, asking if it was properly fed or whether it got enough sleep, thus indicating that there was a relationship established. Consequently, caregivers were advised to avoid letting the patients use *Paro* during their meal and snack times as they might be tempted to feed it, which had occasionally happened. It was reported that interacting with *Paro* evoked memories from the past for patients, which

often made them happy. Using *Paro* in therapy also depended on the nursing staff attitude. For example, not everyone liked *Paro*, or animals in general. In addition, the staff had already busy schedules, which left them little time to deal with *Paro*. One caretaker stated that “sometimes you have patients who take their wheelchairs and want to go somewhere, not knowing where to, which puts pressure on caretakers to keep eyes on the patients and keep them in their chairs”. The challenge they have is to keep patients engaged and motivated. One staff member said “I am constantly speaking to people who don’t speak back to me, but at some point if they have *Paro*, they make a sound or say ‘KAWAII’; so something is coming out, even if it is just a small sound, this is enough reaction for me because they don’t speak anymore”. This caretaker clearly valued *Paro*’s curative effect.

It was noticed that the staff’s enthusiasm in using robots might induce the enthusiasm in the patients. Moreover, patients that are cognitively more capable might find *Paro* less interesting. It was observed that *Paro* was effective on both male and female patients provided they liked animals. *Qoobo* was mostly used by one patient that did not like interacting with other people.

The qualitative analysis produced several categories relating to the assistive robots’ role in care and their impact on patients and staff as presented in Table 1.

Table 1. Key findings regarding the role and impact robots have on nursing care collected from three different Japanese nursing facilities.

Robot	Role in Care	Impact/Effect on	
		Patient	Staff
<i>Paro</i>	Therapy. Indicated for patients with dementia. Pet, Baby, Robot.	Slows down dementia. Brings back old memories, emotions and stories. Lessens feeling of emptiness. Changes the patient’s mood. Provokes speech in the patients. Improves communication between patients. Helps heal patient mentally. Improves facial expression. Substitutes animal therapy. Calming effect. Could exhaust/tire patients (negative).	Distracts patients in order to enable staff do other tasks. Cheaper, easier and safer than real animals. Way of connecting and taking care of patient. Makes job easier by: Calming patients down. Making patients happy instantly. Conversation starter/talking topic. Demands time and additional effort from staff – in some cases there is no time to spare (negative).
<i>Pepper</i>	Recreation. Taiso (Exercise/stretching) Substitute for professional. Staff, Robot, Alien, Child.	Entertainment. Smile. Helps heal patient mentally.	Reception greeter. Way of connecting and taking care of patient. Smile.
<i>Qoobo</i>	Therapy. Pet, Robot.	Calming effect. Happiness.	Easier to take care of patient.
Robots in General	Robots are more than tools.	Patients do not have to hesitate. Can maintain the patient’s self-esteem. Reduces the mental burden the patient feels towards the worker.	Thinking about how to use robots effectively increases the staff’s motivation and communication. More people have visited the nursing home which allows acquiring new information.

4. Discussion

The use of robots instead of toys, dolls or animals was based on the reason that therapeutic aids should be safe and have demonstrable therapeutic effects. Animals can get stressed and behave unpredictably. Robots like *Paro* are designed to have a therapeutic effect and can work as an alternative to pet/animal therapy without the risk of allergy, bites, scratches, infections or even stress for the animal itself. In addition, robots can be cheaper than keeping pets such as dogs and demand less maintenance. Even though *Paro* is designed to resemble a baby harp seal, patients often confuse *Paro* with their own pets. What differentiates *Paro* from a stuffed animal is the motions and reactions to its environment. Still, some people dislike certain animals which makes them skeptical to animal-type robots as well. Furthermore, the interaction time and enthusiasm depend on patients' mood; typical interaction time was 30 minutes daily.

Pepper is seen more as a staff member and is mostly used to entertain patients. It was also being used for Taizo, the daily Japanese stretching. It is placed in the center to lead the show, while the staff member encourages from the side, thus the need for human workers is not eliminated. Both *Pepper* and *Paro* can be used by the patients alone. Nonetheless, they are often used together with the nursing staff. The interest of both patients and staff members also determines the use of the robots. Ultimately, consensus was found that these robots were not thought to be better than humans but are used to assist and relieve the humans from work overload. As one of the interview subjects stated "When looking at the value of an industrial robot, the productivity is visible, but in the case of a nursing robots, we should see the number of staff halved, or more nursing care performed at the same time. However, the effect is more on patients' mentality which might not be as visible". Introverted patients, not interacting with others, were seen smiling and talking to the robots. Additional positive effects comprised of increased interest of groups and grandchildren to visit nursing homes and learn more about robots.

5. Conclusions

All nursing facilities were positive towards robots due to their beneficial effects such as patient satisfaction and increase in social activities. Robots like *Pepper* allow for easy updates which promote development of rehabilitation programs. Further studies are needed to generalize these initial insights into acceptance of robots into the nursing care.

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