

Assembling Sociality in Caring Spaces: Culturally Sensitive Robot Deployment During the Covid-19 Pandemic in Residential Care Homes in Ireland and Japan.

NAONORI KODATE
UNIVERSITY COLLEGE
DUBLIN & CENTER FOR
FRONTIER MEDICAL
ENGINEERING
IRELAND & JAPAN

PRANAV KOHLI
OTTAWA COMMUNITY
HOUSING FOUNDATION
CANADA

YURIE MAEDA
TECHNOLOGICAL
UNIVERSITY DUBLIN
IRELAND

KAZUKO ODAYASHI
UNIVERSAL
ACCESSIBILITY &
AGEING RESEARCH
CENTRE
JAPAN

DAVID PRENDERGAST
MAYNOOTH
UNIVERSITY
IRELAND

SHIGERU MASUYAMA
TOKYO MEDICAL
UNIVERSITY
JAPAN

Abstract

Can robots help care professionals deliver person-centered care? If so, how? The questions concerning the relationship between care and technology have long been a focus of debate and discussion. The Covid-19 pandemic has accelerated the development of various technologies and opened the door to trialing products and services that had previously been deemed unsuitable for care settings. Seizing the moment of change, we conducted fieldwork in two residential care homes (one in Ireland and the other in Japan) to observe caregiving processes through the deployment and use of an originally developed functional air-purification robot. Using the concepts of “carescape” and “assemblage,” the complex relationship between people, assistive technologies and care were explored. The focus of this paper is to outline key insights arising from these pilot deployments, particularly in relation to the intersection between the act of caring and the use of robots. Through ethnographic observations, interviews and focus groups with care professionals, we found the hybrid collective nature of using a robot by care professionals as well as a polysemic understanding of care. The insights gained from this study shed light on some of the potential common ingredients when a

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To email contact Naonori Kodate: naonori.kodate@ucd.ie.

chain of care is triggered by culturally sensitive deployment and use of technologies such as care robots.

Keywords

robot; care; culture; automation; digital technology; welfare; aging; implementation

Introduction

Can robots help care professionals deliver person-centered care? If so, how? The questions concerning the relationship between care and technology have long been a focus of debate and discussion, and have resulted in collaborative research in academia, government, industry and professional societies. In care settings, assistive technologies are increasingly expected to perform a broader set of functions and roles. A wide range of support technologies, from electric carts to signal buzzers and communication robots are already available on the market. The Covid-19 pandemic has accelerated the development of many of these technologies and opened the door to trialing products and services that many practitioners had previously deemed unsuitable for care settings.

Care itself has also attracted much attention in recent decades ([Puig de la Bellacasa 2011](#); [Martin, Myers, and Viseu 2015](#); [Lindén and Lydahl 2021](#)) with critical analyses regarding certain types of efficiency, rationality, solidarity, togetherness and the time-space dimensions of care ([Milligan and Wiles 2010](#); [Bowby 2012](#); [Ivanova, Wallenburg, and Bal 2016](#); [Liboiron 2016](#); [Søraa et al. 2021](#)). Again, the Covid-19 pandemic disrupted the ‘normal’ concept of time and space for care by putting up physical, psychological, and social barriers. For older people in particular, access to care facilities was restricted, and as a result, the ‘usual’ shared time and space with others including friends, family members and care professionals vanished for a long period of time. Despite the invisible nature of the ‘enemy’ (i.e., the virus) ([Shaw 2020](#)), or perhaps owing to its invisibility, the boundaries became more clearly delineated in our daily lives. Accordingly, human interactions with each other as well as time and space in care settings were accentuated.

Political theorist Giorgio Agamben ([1998](#)) observed that the ancient Greeks had two different words for “life”: bios (which describes the form or manner in which life is lived) and zoē (which describes the biological fact of being “alive”). The justification for Covid lockdowns constructed life as zoē (“bare life”). For policymakers across the globe, it did not matter how we lived (bios) but just that we were kept alive (zoē). As a result, for older people living in residential care homes, their living space became a symbol of “confinement” and the lack of access for their family and friends.

Even during the crisis mode created by the pandemic, caring remained a “necessary part of human life” ([Wilkinson and Kleinman 2016](#)). A team of sociologist and anthropologists Aryn Martin, Natasha Myers, and Ana Viseu ([2015](#)) describes “care” as a “slippery word.” They write that “any attempt to define it [care] will be exceeded by its multivocality in everyday and scholarly use” ([ibid.](#), [625](#)). In the English language, “care” denotes both affective concern (caring about) and practical action (caring for) ([Buch 2015](#)). Both the English and Japanese understandings of care consider social

and cultural interactions and relationality.¹ Political scientist Joan Tronto (1993) argues that this duality contributes to the belief that caring actions are naturally motivated by caring thoughts. Medical doctor and medical anthropologists Arthur Kleinman and Sjaak van der Geest describe caregiving as an “interpersonal experience” motivated by concern, compassion and love (2009, 61).

According to ethnographer and philosopher Annemarie Mol, ideas of care are engaged in constant and complex dialogues over competing notions of “good” in pursuit of “more bearable ways of living in—or with—reality” (2008, 46). Martin, Myers, and Viseu remind us that “What care looks and feels like is both context-specific and perspective-dependent” (2015, 625).

When technologies, particularly robots, are inserted into human relations in care settings, they often disrupt ‘natural’ relationships. Previous research in science and technology studies (STS) has unearthed the “darker sides” of care, the hidden aspects, such as unintended consequences of digital technologies for care (Lydahl 2023; Mol, Moser, and Pols 2010; Pols 2004; Puig de la Bellacasa 2011) and stakeholders’ staging efforts for care robots (Kerruish 2021; Lipp 2022; Chevallier 2022). STS scholars examined the use and impact of (tele)care at a distance, “cold” care through digitalization (Pols 2010) and “affiliative affordances” (Jones 2017; Chang and Šabanović 2015).

Relational and cultural aspects have also been studied by several scholars (Coopmans and McNamara 2020; De Togni et al. 2021). Jordan (2016) outlines how manga—the Japanese comic art form—depicts robots such as Tetsuwan Atomu (Mighty Atom, known as Astro Boy in the west), quite differently from those in western science fiction. Conversely, Robertson (2007, 2018) articulated how in Japan robots (humanoids, androids, and animaloids) were designed and developed according to their imaginaries, rooted in the conventional power structure. In the domain of social robotics, the significance of physical appearance (e.g., humanoid) has been emphasized (Alač 2009; Alač, Movellan, and Tanaka 2011; Alač 2016; Jones 2017; Robertson 2007; Kodate et al. 2023), while care robots and their sociability and sociomateriality has also been researched (Šabanović 2014; Jones 2017; Wright 2023; Bender 2025).

Many studies apply Human-Robot Interaction (HRI) (Mutlu and Forlizzi 2008; Chang and Šabanović 2014; Giorgi et al. 2022), and Actor Network Theory (ANT) (Callon and Ferrary 2006; Pols

¹The Japanese word used nowadays to refer to care is “*ka*” and it has been directly imported from the English language. It is commonly used in the context of care provision and care work. Meanwhile, the native Japanese word, “*kaigo*” refers to the care of older adults. Japanese expressions such as “*sewa wo suru*” and “*mendō wo miru*” refer to the act of taking care of or looking after someone. According to Chen (2014), the meaning of “*ka*” (a foreign word) was gradually recognized by native speakers of Japanese, forming the current meanings it possesses: “care, daily life, mental and medical support, care of the physical body.” In contrast, “*kaigo*” has been used in the same way from the beginning, meaning “from daily support to medical support for older people, patients, and people with disabilities” and has not changed significantly to the present day (ibid., 210). “*Kea*” has a more neutral tone, while “*kaigo*” delineates the relational aspect that one is dependent on the other. The Japanese word “*mimamori*” (looking after/watching over) is also frequently used in the context of care and caring (Kanzaki 2013).

2008). Some studies show that “weak” robots with flaws attract more positive reactions from users (Mirnig et al. 2017; Prendergast, Kodate and Balteanu 2021; Giorgi et al. 2022). Others address the question of suitability around the use of robots in care settings and practical quotidian contexts (Kenway 2023; Wright 2023). Ethical, legal and policy dimensions have also been explored (Coeckelbergh 2011; Sharkey 2014; Martin, Myers, and Viseu 2015; Lehoux and Grimard 2018; Elish 2019). What makes the care sector complex is that the public image of human centered services has been tainted in recent years, and it is not as simple as the dichotomy of human (warm care) versus digital technologies (cold care). In Ireland, for example, the scandal at the Áras Attracta nursing home in County Mayo was exposed by an investigatory documentary in 2014. Patients with disabilities were subject to abuse at the hands of care professionals, and the nursing home was managed by Health Service Executive (HSE). This led to the government’s decision to install CCTV cameras as surveillance mechanisms for the professionals. ‘Warm’ care is not guaranteed, just because care is provided by human hands, not robots or other digital technologies. Protection of privacy and dignity of both care recipients and care providers, and ultimately trust in society, are often raised as one of major factors affecting people’s willingness to use home care robots (Ide et al. 2024).

Another important aspect of digitalization and automation of care is concerned with the emerging division of labor between human beings and machines in the realm of creativity and innovation, and its implications for education and professional skills (Hammershøj 2019). It is globally accepted that the majority of people wish to stay and receive care at home or in their familiar community environment for as long as they can, and a policy that supports this concept of ‘aging in place’ is recommended (Kruk et al. 2018; Park and Ko 2020; McDonald, Scharf, and Walsh 2021). Technologies are certainly helpful tools for enabling this (Bentley et al. 2018). Yet the long-term impact of technology can be a double-edged sword, as it can upskill, re-skill but also down skill – if human capabilities are rendered obsolete or technology deprives human beings of the opportunity to develop their competence through hands-on experience. Therefore, while digitalization in care can expand possibilities of interactive and instantaneous exchanges with others, as the pandemic demonstrated, the nature of care by humans is remarkably different from care with less human involvement. In the post-pandemic era, as the model of care delivery continues to shift towards digitalization and automation at home, it is critical to understand the way technology-driven innovation recasts the spatiality and temporality of care and redistributes a sense of agency and control (Trnka 2016). The shared space and time in a communal environment could enhance a collective sense of belonging, empowerment, and self-control at the same time. It remains to be seen whether telemedicine and telecare with AI and robots can provide more than just a timely, transmissive, and transactional form of care (treatment and diagnosis), and even if they do, what the implications for care might be (Pols 2010, 2012). The STS scholar of interaction, Lucy Suchman’s book *Human-Machine Reconfigurations* (2006), underscores the importance of exploring and observing how humans and machines interact in situated practice.

In parallel the pandemic revealed the value of care work for vulnerable populations, drawing attention to the increasing burden for carers. Here Bowlby’s notion of “carescape” (the available

resources of care influenced by changes in the economy and policy) ([Bowlby 2012](#)) is useful, as well as a team of multidisciplinary STS scholars Dara Ivanova, Iris Wallenburg, and Roland Bal's application of the concept "assemblage" ([Ivanova, Wallenburg, and Bal 2016](#)). The complex relationship between people, places and care were put to test, due to the public health emergency and policy decisions. Care professionals had to be creative, imaginative, and responsible for shaping a "carescape." This is what this article is primarily focused on.

Care in Situated Practice: Robot and Care Professional Interactions in Japan and Ireland

Seizing the moment of change, posed by the global pandemic, the authors designed a study in the "wild." We investigated "care in practice," without defining "what is (good) care" ([Pols 2010, 375](#)), in a local institutional care context in two countries. Based on the concept of "empirical ethics of care," we investigated care in situated practice, and the "hybrid collective" nature of human-machine interactions ([Malone and Bernstein 2015](#)).

As described below, we carried out research in residential care homes against this background to observe and explore the processes by which a highly functional assistive robot was adopted and used by care professionals working in different cultures. This paper will therefore outline key insights arising from these pilot deployments, carried out during the Covid-19 pandemic, particularly in relation to the intersection between the act of caring and the use of robots. It argues for the value and expansion of research that situates and informs robotics design and iterative development within the practical and temporal complexities of real-world care environments. Using two case studies in Ireland and Japan, it explores how care (sociality in particular) was "assembled" including the practices, rhythms, and limitations of environments and work schedules of human and non-human actors in busy residential care homes.

Research Design and Processes

With the outbreak of the Covid-19 pandemic in February 2020, the research team approached a few robot companies based in Ireland, seeking an assistive robot that was going to help care facilities provide care under the challenging circumstances. One university spin-off venture company (Akara Robotics, AR) had developed a robot equipped with ultraviolet technology designed to eliminate bacteria and viruses including Covid-19 and agreed to develop a new and original robot for care facilities. It was decided that one original air-purification robot would be designed, produced, and tested in one care facility each in Ireland and Japan, under different timings. The study was to explore the needs and views of Health and Social Care Professionals (HSCPs) in two different cultures (Ireland and Japan) regarding the use of care robots in their facility and to understand its impact on their care work through observations, interviews, and focus groups. It was decided that the original air-disinfection robot (V-Air, VA hereafter) would be trialed for eight weeks (March-May 2022) in selected areas of the facility in Ireland, and then the robot was transported to Tokyo and trialed there for eight weeks (June-August 2022).



The study originated in research into human-robot interactions and how care professionals in different cultures perceive robotics-aided care systems. We conducted fieldwork in two residential care homes to observe caregiving processes through the deployment and use of an originally developed functional air-purification robot. While the Covid-19 pandemic prohibited us from regularly observing interactions between the robot and older people (due to the ever-present risk of infection), this meant that we were instead given the opportunity to listen more carefully to the voices of care professionals.

The study design was primarily qualitative, with semi-structured interviews, ethnographic observations and focus groups before, during and after the pilot period. The interviews and focus groups covered the following themes: personal experience with technology, the meaning of care, expectations, actual use of VA, the impact of Covid-19, desired functions, and future vision of care. For all the interviews, while the same topic guide was used and all questions were asked, participants were free to spend more time on certain topics which are dear to them.

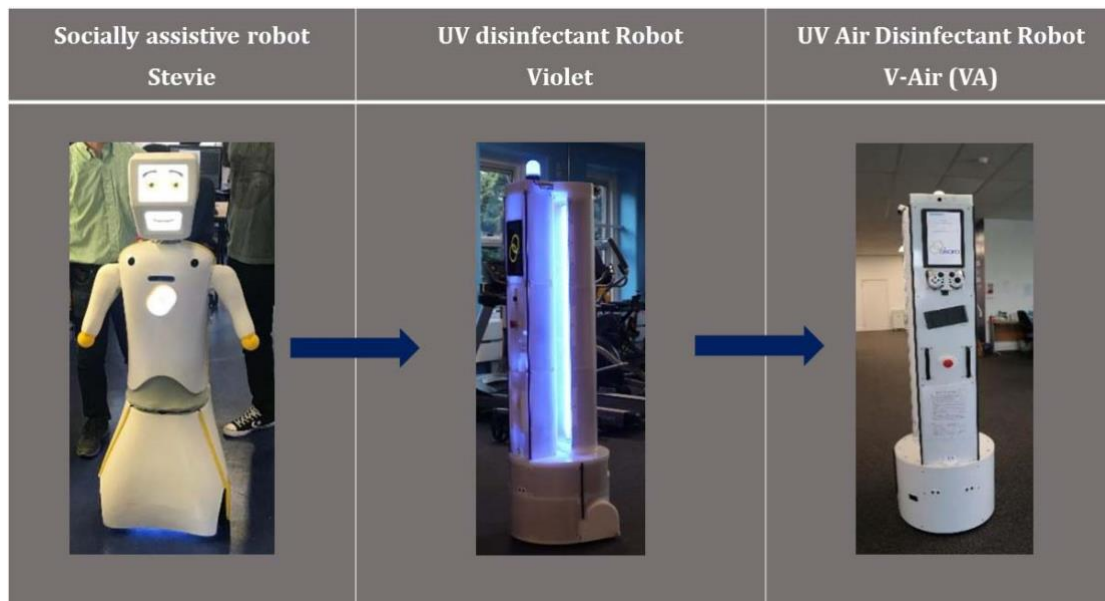
Prior to the data collection, the research ethics approval was granted by the [Redacted for Peer-Review]. A team of researchers (two social scientists who are bilingual (English and Japanese) and one anthropologist who speaks English) went to the “field,” and collected the data from interviews, focus groups and observation field notes, which are used here.

VA – The Robot

When we approached AR, the company had already been known worldwide for Stevie² ([figure 1](#)), which is a social care robot designed to interact with older people and operate in nursing homes and retirement communities. At the start of the pandemic, AR had built a disinfection robot called Violet, which could autonomously navigate a room and disinfect it using ultraviolet light. After our discussions, the team designed and developed the robot (VA) specifically for this project, keeping users in residential care homes (older people and care professionals) in mind. [Figure 1](#) shows the evolution of AR robots.

² The name Stevie was selected by AR developers, as it is a gender-neutral name.





[Figure 1](#). Evolution of the Akara robots (Source: Photography by the author)

By prioritizing the safety of older people in residential care facilities, UV light was covered up, when Violet was transformed into VA. As [figure 1](#) shows, AR moved away from a fully-automated humanoid type of robot (Stevie). As a result, VA was not autonomous. Rather, users had a choice of three operational modes: manual using the touch-sensitive handlebars, hands-free with an operator within close range, and remote control from a distance. As AR staff designed Violet and VA, they decided to keep a very simple and inorganic appearance. However, even among the engineers at AR, opinions were divided as to whether such a functional (air-purification) robot should have a smiley face, the face of an animal (cat) and the capability to speak.

Settings and Participants

The research was conducted in naturalistic settings. We adopted the same two-stage approach to residential care homes (RCH) in Dublin [RCH-IE] and Tokyo [RCH-JP]. First, VA was introduced to the senior management in both RCH-IE and RCH-JP in order to receive their approval; and second, training sessions were provided to care professionals (both individually and in groups). It was agreed that the VA robot would be primarily used in two sections of each RCH. One was a day care center (or day hospital), and the other was the physiotherapy and rehabilitation unit ([figure 2](#)). In both facilities, the day care center and the rehabilitation unit are connected by a short corridor and located on the same floor. The flooring types were the same wooden one in Japan, while they were different between the two units in Ireland. The flooring in the rehabilitation ‘gym’ unit (top right in [figure 2](#)) had a slip resistant rubber floor. This caused certain challenges for physiotherapists to move VA around, particularly using remote control. The charging points for VA were in the day care center in Japan, and in the rehabilitation unit in Ireland. This also meant extra (care) work for physiotherapists in RCH-

JP and nurses in RCH-IE to pick up VA from ‘the other’ side of the carespace. As the staff took turns using VA according to the timetable and the availability of the equipment, they coordinated their work and activities between the two units.

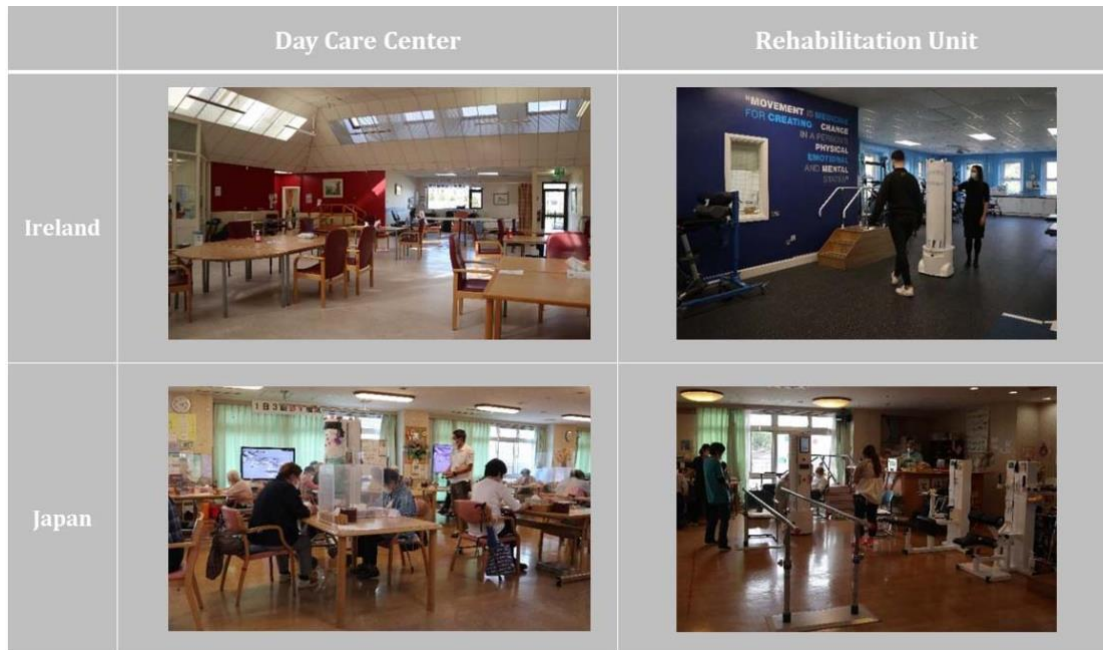


Figure 2. Four study sites in two countries (Source: Photography by the author)

As [figure 2](#) indicates, all four units have windows for ventilation and space to keep some distance from each other. However, in each place, their social and physical activities were the main purpose of gathering, and therefore necessitated the functionalities of VA (mobile air-purification equipment). This set-up in both facilities created an intimate carespace between humans but also between humans and the robot. Wherever older persons were active (e.g., singing, physical exercises), there was the presence of VA between them and care professionals.

[Table 1](#) shows 14 professionals who participated in the study. All fourteen HSCPs used the robot on a daily basis and were working full-time in each residential care home. They all consented to take part in the study.

In both facilities, the chief AR engineer for this project explained the science behind the robot (the mechanism of HEPA H13 filter and ultraviolet germicidal irradiation) and its effectiveness at filtering microbes (including Covid-19) from the air. He then explained how to operate the robot, how to turn it on/off, the functionality of the big red emergency stop button, charging, tablet user-interface and how to move the robot through the controller and also manually via the pressure-sensitive handles.

In the following section, we use IDs as shorthand to anonymize our respondents.

Table 1. Participants' Characteristics in Ireland (IE) and Japan (JP)

IDs	Occupation	Gender	Years of Professional Experience	Focus Group (FG)
IE-1	Nurse	F	> 10 years	IE-FG1
IE-2	Healthcare Assistant	F	> 10 years	IE-FG3
IE-3	Nurse	F	> 10 years	IE-FG1
IE-4	Nurse	F	> 10 years	IE-FG1
IE-5	Physiotherapist	F	< 5 years	IE-FG2
IE-6	Physiotherapist	M	< 5 years	IE-FG2
IE-7	Physiotherapist	F	> 10 years	IE-FG3
JP-1	Care Professional	F	> 10 years	JP-FG3
JP-2	Care Professional	M	> 10 years	JP-FG2
JP-3	Care Support Specialist	F	< 5 years	JP-FG3
JP-4	Care Support Specialist	F	> 10 years	JP-FG1
JP-5	Care Professional	M	> 10 years	JP-FG2
JP-6	Physiotherapist	F	> 10 years	JP-FG1
JP-7	Occupational Therapist	M	> 10 years	JP-FG1

Findings from the Field

Staff Training

In both RCHs, an engineer provided a written manual (which was translated into Japanese for the staff in RCH-JP) and training session for the care professional participants as a group, followed by one-to-one sessions. An overview of safety training was also given with emphasis on making sure that the robot was operated carefully around ramps, moving equipment, older people, and care professionals. Cleaning, care and maintenance instructions were given. Storage of the robot was discussed, and staff themselves identified a room where the robot could be safely stored and charged overnight. Finding a charging point became one major point of discussion in both facilities, as that has space implications, as well as extra workload for (certain) staff members. In RCH-IE, one staff member asked whether VA needed to be used with UV switched on constantly or not, because if UV is not used, that would give VA a longer battery life. The answer from the engineer was that UV is not constantly needed, as the HEPA filter and fan still serves as a filter for cleaner air, although when people are engaged in social activities and/or physical exercises, the use of UV is highly recommended. Therefore, carefully observing and minding the power of VA became “a matter of concern and care” for care professionals ([Latour 2005](#); [Puig de la Bellacasa 2011](#)).

Another aspect that was raised in both facilities was the color scheme of the lamp VA carries. As [figure 1](#) shows, there is a lamp on the top of both Violet and VA, and this indicates whether it is moving or charging: yellow (ready to go), green (station, or charging), blue (air-cleaning operating), and red (emergency). This was intuitive for some staff members, while others suggested otherwise. There was no country-specific consensus. In RCH-JP, once VA started its operation, this color scheme was generally ignored as the robot itself was too tall for most staff members to see the lamp (apart from when it was green/being charged). This also prompted them to think that there needed to be another layer of safety measures for older people, as they would not see the lamp or understand what each color indicated.

Initial Impressions and Cultural References

When VA was first introduced to care professionals in both facilities, it evoked some reactions unique to each country. In Ireland, moving VA around in the corridor of RCH-IE stirred up some excitement and curiosity. A porter at the entrance saw the robot and commented: “It is a bit Dr Who,³ isn’t it?” Another responded: “Dalek!” laughing. Even before the session began, one of the staff asked, “But the robot’s going to live here from now on?” and this was followed by a joking comment that “it’s going to be listening to everything we say.” This illustrates how science fiction shapes people’s imagination and understanding of care robots ([Jordan 2016](#)). Furthermore, unlike in Japan, humanoids are portrayed particularly negatively in the west. Someone else remarked that the joystick reminded her of an Xbox controller. Evident in these remarks is a consistent effort to make sense of this unfamiliar non-humanoid interactive robot through comparisons to more familiar non-humanoid interactive technologies such as Amazon®’s Alexa and gaming consoles which they find in their daily context.

In Japan, on the other hand, the HSCPs had a different reason for feeling a sense of excitement and curiosity for VA, as it ‘traveled’ by air all the way from Dublin to Tokyo. VA’s overseas transfer also caused anxiety among some staff members. The main body of the robot arrived safely, while a new battery and a joystick had to be purchased locally. With great anticipation for its arrival, care professionals and managers in RCH-JP gave VA a very warm welcome. Even before its arrival, VA had been talked about as a ‘great helper’ to keep their facility open and accessible for care recipients. The level of excitement was turned into a spontaneous, ad hoc collective team-training session. Almost all staff members formed a queue to see VA, and the person who learned to use VA began teaching the next person in the queue. Remarkably, many of the staff members were over 60 years

³ Doctor Who is a science fiction television series produced by the British Broadcasting Corporation (BBC). The main character called the Doctor is an extraterrestrial being, and part of a humanoid species (Time Lords). The comment by a nurse refers to this. Dalek is a fictional extraterrestrial race of extremely xenophobic cyborg mutants.

old and commented that they do not know how to play computer games, but they would like to give it a try, operating VA, as an experience. As soon as it arrived in RCH-JP, VA became a 'spectacle' and brought people together, just as a local festival ('matsuri' in Japanese), which was the very thing that was prohibited by the pandemic. To a certain degree, the accompanying robot engineer from AR also became part of the carespace at RCH-JP. The AR chief engineer (RC) for this project flew to Japan and spent one week in RCH-JP, providing the first introductory and training sessions, in conjunction with the PI (as an interpreter). Other engineering students from a university in Japan were also on standby in case VA failed to perform its function, during the trial period in Japan. On the day of VA's arrival at RCH-JP, there were several non-Japanese engineers from Ireland, France and China. Their presence alongside the robot became a focal point of conversation among care professionals and older people in RCH-JP for the initial period of the trial, and it cemented the initial image of VA, being a foreign-made gadget. It is reflected in the change of the name (from Fu-chan to Catherine, and its nickname Kato-chan⁴).

When VA was shown around in different parts of the facility, older people were equally positive towards VA. They asked: "what is the robot for?" and as VA was shown around, many staff members pointed out that this robot is for air-purification, and for their safety. They mentioned that this robot is from "Airurando" (Ireland). One older person was waving at the robot and clapping for it. One staff member said, "it has a big presence," while others stated that "it is clear from its size that this was not made in Japan."

The issue of VA's size was considered by some to be a sign of 'reliability' and 'reassurance' but for others, it meant that VA lacked "cuteness" (kawaii-ness/kawaisa). User experience specialists Portugal and Shad (2003) explain the importance of being kawaii (cute, loveable, and innocent) in Japanese everyday life. They discovered that the concept embodies friendliness, politeness, and pleasure in micro-relationships with objects that transcend age and gender in the country.

The above-mentioned issues that were raised on the first day in RCH-JP foreshadowed how the seven HSCPs would later take ownership of the project. First, they felt the emergency red button should be covered up and hidden from older people to avoid being pressed by mistake. Second, they felt that VA needed a "face" (just like Stevie in [figure 1](#)), some "sound" when it is in use, and a "name." Almost instantly, the name "Fu-chan" was given to VA (based on the pronunciation of the word "wind"). These discussions in the professional team echo the works of anthropologist Jennifer Robertson (2018) and folklorist/anthropologist Kunio Yanagita (1969). Yanagita details in his book "Festivals in Japan" how participation in local festivals were an integral part of Japanese people's daily/religious life. Collectively faced with the appearance of a 'foreign made' gadget, the process of

⁴ It is worth noting that 'chan' is often used in Japan to express a sense of affection, endearment or close relationship when addressing someone. Fu-chan and Kato-chan in this form are both gender-neutral, although the latter's original name Catherine is a girl's name.

decorating and making VA their own continued once it was brought into contact with care recipients. The way VA was used in two settings reveals the importance of cultural adaptations in local ‘carespaces.’

Assembling Sociality for Older People, Care Professionals and the Robot

As previously mentioned, VA was welcomed wholeheartedly by both facilities and all participants, with some humor and great expectations, and this was mainly because VA offered the ability to lift restrictions-to-access to human interactions in care facilities. In its initial phase, care professionals’ response to VA focused primarily on the pandemic context in which it was introduced. HSCPs in Ireland and Japan immediately recognized the way in which it enabled patients to return to facilities and pre-Covid rhythms of sociality. HSCPs also drew our attention to the peace of mind that VA’s presence brought. This was expressed eloquently by a nurse in RCH-IE who said,

So this machine gives additional peace of mind that what we are doing in the department is further [under] control . . . Other than the regular Covid instructions and Covid plans that we are using, this machine is [an] extra layer of safety and support. (Nurse in RCH-IE).

Similarly, a physiotherapist in RCH-IE said,

. . .because you know we’ve had a few mini outbreaks of Covid and everything over the past few months . . . psychologically it makes you feel okay when the air is being cleaned. And I think you can definitely feel, you can feel the airflow and everything around it. And I think it’s good to be able to move it around when you’re doing exercise. It gives people a lot of reassurance. (Physiotherapist in RCH-IE).

In RCH-JP a care professional recalled how happy they were when they first heard of VA’s entry into the facility. For them it represented the possibility of a return to normalcy. JP-1 said,

Because of Covid-19, there had been a lot of restrictions. In particular, we could not do karaoke in the day care, because of the risk of infection. We decided that while the VA was being installed and running, we could resume karaoke. I heard that older people were very happy. (Care Professional in RCH -JP)

This echoes care professionals’ reflections on quality of life and “warm” care.

Once VA was installed and operational, we began to notice that HSCPs in Ireland and Japan used it in different ways. This was due in large part to the flexibility that is inherent in VA’s design. The foremost of these divergences was in the way that HSCPs preferred to move the robot.

In Japan, the use of the joystick by a person standing close to VA was the most popular choice, while in Ireland HSCPs preferred to move the robot manually. JP-2, a care professional in RCH-JP, explained their preference for the joystick in terms of their familiarity with gaming. They said,



From the operator's point of view, I am also from the game generation, so it was a lot of fun, and I think it was great that what you operated with your hands moved it forward and back, just like a radio controller.

In Ireland, the manual mode was chosen mainly for safety reasons, but also due to certain abrasive floor surfaces within the facility (i.e., rehabilitation unit). As IE-6 explained,

... it's [VA] not particularly big or bulky, but it can be a bit awkward to move. Especially where we are, in a gym. It's a bit different than a hospital surface. Our floor is kind of infamous for being very awkward to move things. But sometimes you would kind of move it and you would go to push it. And it felt like there was a bit of resistance. (Physiotherapist in RCH-IE).

In FG1 in Ireland, another care professional also noted that,

I could say that VA might topple over and then that would be another safety hazard. So that's the reason when you hold it manually you feel more in control. (Physiotherapist in RCH-IE).

Users were also quick to customize VA's appearance. VA's appearance – whether it was static or dynamic – was important to many HSCPs in Japan. It is important to clarify here that “appearance” refers not just to VA's physical appearance but also its general impression as a functional robot. It mattered more in Japan whether VA had the appearance of its own agency or not. JP-1 explained that

... the older people were more receptive to the robot moving around on its own than when the operator was nearby, and they would say, 'Wow,' or 'the robot is coming!' I was able to see their excitement on their faces ... It's great that VA was moving on its own. (care professional, RCH-IE).

Consequently, VA's physical appearance too became a factor. In Japan VA was dressed up only a few days after its introduction. This decision was made by staff members in consultation with older people. The name Kato-chan (Japanized name for Catherine, Katoriinu, with the honorific “chan” which expresses a sense of endearment) was given to the device, based on the idea that the robot came from Europe. Staff members added a face, apron, hair and hands.

To ensure safety for older adults or staff members, music was also played when it was in use. This was seen very positively as music evoked different images and was associated with a fun place, just as a local festival. In FG2, JP-2 explained the rationale for dressing up the robot and adding music. They said,

Older people did not react well to the inorganic state of the robot when it was first presented, and it was large and had a very strong presence. It certainly was one of the staff's innovations. (Care professional in RCH-JP).

Overall, care professionals at RCH-JP spoke positively about the addition of music. JP-6 said,

I was impressed with the music and thought it was a nice feature. It was like a 'matsuri' float.

JP-4 added that,



I thought that the use of music helped older people feel nostalgia and reminded them of how they used to be, etc. The additional function was part of the act of caring. (Care support professional in RCH-JP).

A similar attempt was made in Ireland, although it was not successful. Our final focus group revealed that some staff members tried to decorate the robot.

Actually we put a hat on it . . . and a scarf . . . we only did it for a few seconds because it kept falling off (Laughs). (Focus group participant).

Although minor in comparison to the scale of modifications made at RCH-JP, this is nevertheless important to acknowledge. VA's introduction to RCH-IE evoked curiosity among its patients. Consequently, HSCPs began to acknowledge VA's presence in everyday conversations with patients. IE-1 said,

Positive curiosity that we found. So, we slowly addressed it to the patients, introducing it every time when a new patient comes in. (Focus group participant).

In Focus Group 3 (FG3) a care professional remarked,

. . . the patients used to come up and to touch it and see what it was doing. (Care professional in focus group).

What makes these attempts at changing VA's appearance and socially including it in the everyday life of the care facility particularly interesting is that they went against the original design of the developers. AR deliberately gave VA a mechanical appearance to highlight its primary functionality (i.e., air-purification rather than social interaction). Yet, care professionals in Japan and Ireland – albeit at different scales – attempted to change this.

[Figure 3](#) shows a typical scene from RCH-IE on the left-hand side, and that from RCH-JP on the right-hand side. The Irish scene describes a conversation between a physiotherapist (male) (who was a technology enthusiast) and an older guest who was visiting the rehabilitation unit. The physiotherapist expressed the view that VA became a piece of equipment that served people and the community, but he would not like a humanoid.

It's not quite the uncanny valley effect, but I prefer not having a humanizing element of pieces of equipment like that. (Physiotherapist in RCH-IE).

The Japanese scene, in contrast, shows a typical 'interaction' between a care professional and an older person visiting a day care unit. They even spoke to VA, using the name, Kato-chan.

It is worth noting however that despite these differences (e.g., level of anthropomorphism, modes of operation) between the two countries, human-to-human interactions were reinvigorated



by VA in both facilities. The robot became the focal point of their conversations among older people and HSCPs, contributing to the local carescapes.

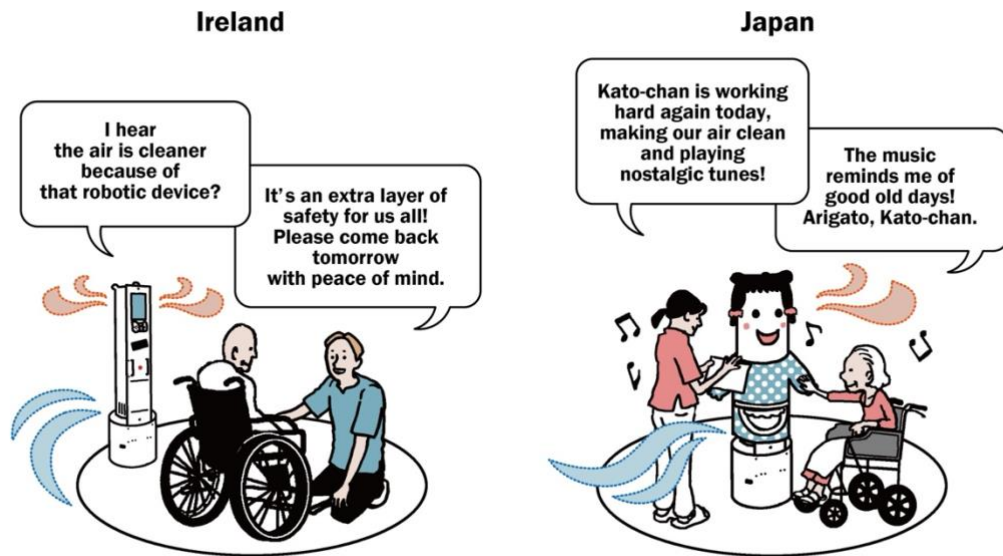


Figure 3. Appearances of VA and contrasting interactions in Ireland and Japan (Source: Authors. The illustration by Kamito Sumi, Hayanon, and Science Manga Studio).

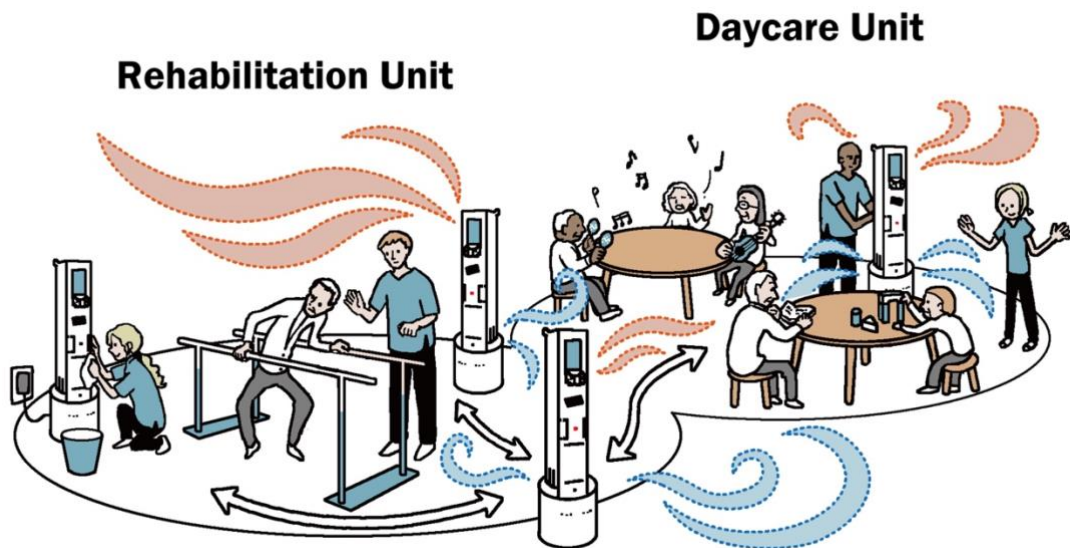


Figure 4. How the use of VA was embedded in circuits of care in RCH-IE (Source: Authors. The illustration by Kamito Sumi, Hayanon, and Science Manga Studio).

[Figure 4](#) shows how VA was used in RCH-IE. In FG2 at RCH-IE, a manager made a tongue-in-cheek comment along these lines. When asked about their experience of working with VA, they said “I felt he [VA] was a very easy staff member to work with (All laugh). There were no complaints (Laughs) he just did his job.” On the one hand it anthropomorphizes VA as a subservient (perhaps even the “ideal”) employee – conjuring apocalyptic images of “difficult” humans being replaced by “obedient” robots. On the other hand, however, the larger context of this conversation reveals something entirely different at work. Our observations revealed that care professionals provided “care” using VA by devising a “flat” environment where older people and care professionals would both feel comfortable, without the sense of a hierarchy. The larger experience of having VA installed in-situ was one of learning. Not only were HSCPs learning to operate VA, but they were also learning from each other’s experiences. Meanwhile, managers were learning to manage VA by paying attention to its capabilities and limits – in effect learning about VA. Care professionals were reconnected through the need of smooth coordination of their work across different units within the organization ([Mutlu and Forlizzi 2008](#); [Obayashi et al. 2021](#)). After the trials, care professionals in both countries were asked to reflect on care work in the present moment, and their perceptions of caregiving with digital technologies and robots in the future.

Future of Carespaces with Robots and Digital Technologies

Despite generally positive experiences with VA, HSCPs expressed resistance to a technology-saturated future that leads to non-personal “standardization.” That is, a future where technology is seen as a substitute for person-centered “warm” care. Numerous respondents reiterated the essential human aspect of their work even as they expressed their openness towards seeing more innovative technologies in place in care settings. In FG2, one interlocutor noted,

We’re in a very people person job. We deal with patients, we deal with staff, we deal with the public. We are used to dealing with people the whole time. And the vulnerability of people. . . . And I suppose I don’t know I’d have to see what the more personalized version would be like. And I suppose we’re kind of going that way with all technology and you know robots and everything. But I don’t know if we’re really there yet (Laughs). But I’m open to technology. (Physiotherapist in RCH-IE).

This was followed, in the same focus group, by a participant who reminded us that much of her job concerns her patients’ emotional well-being:

You can be with people who are quite ill or have gone through quite a tough time. So, I think what we do really well here is face to face with the patient. We listen to them or we’re quite empathetic. And I just don’t think that’ll ever be replaced by AI really. (Physiotherapist in RCH-IE).

The key role and competence of care professionals is to create a caring space and assemble sociality (even under severe environments such as the pandemic), and the participants do not believe that AI can perform this complex task effectively.



In contrast, in RCH-JP, one focus group discussed the changing characteristics of “older people” in the future. One care professional spoke about the need to increase recruitment of younger people to ensure that Japan’s ageing population is not left without care professionals. They said,

If we do not manage to communicate the positive aspects of welfare (care professionals) to the generation of the Shōwa era,⁵ there is less and less motivation among them to join us, or the desire to work in [the] care sector will diminish. The baby-boom generation will be using the facility more and more, and the characteristics of the facility will be completely different from those of the guests using it now.

This professional also spoke about using more technology in care as a way of attracting more younger people into taking up care as a professional career. Meanwhile, for another participant in Japan, the future of care involves the digitization of several of the residential care facility’s social activities. They said,

I think our social activities will be something like video games or something like that. Online mah-jongg, for example. There will be a shift to individual activities, rather than all of us doing it together. So, in terms of caregiving, I think it will become something that doesn’t involve over-interference.

A shift towards video games would also be consonant with a generational shift in those needing care. As millennials grow older, care professionals in the future will be caring for digital natives.

It was also pointed out that more technology (research, development and use) should be aimed at aging in place (growing older in one’s own home and community). For example, one professional in Japan said,

I think that as technology evolves in the area of people living at home, it will become even more feasible for people to live at home. There are many monitoring sensors on the market today that can be used to watch over children or beds. . .

In a similar vein, two other interviewees spoke about the potential rise of “telecare.” They said:

Telecare. . . If there is a connected system which lessens the need to go there, and one can watch over people remotely. If such a device becomes more commonly used, we can avoid solitary deaths because of delayed response. Then it would be good if such a system could be made simpler and accessible in general. If so, perhaps even at-home care. We are gradually moving in this direction now.

⁵ A Japanese era corresponding to the reign of Emperor Hirohito between December 1926 and January 1989.



Their comments demonstrate that care professionals are conscious of changing carescapes in the medium- and long-term.

Carescapes and Reflections Triggered by the Use of a Disinfectant Robot

Through the deployment and use of an originally developed functional robot in two culturally different locations, we both observed “care in situated practice” and listened to the voice of care professionals, asking “what is (good) care.” They reflected on their own caregiving and caring spaces.

As a result, we gathered a set of very rich materials indicating the “hybrid collective” nature ([Malone and Bernstein 2015](#)) of using VA by care professionals as well as “polysemic understanding of care” ([Buch 2015](#)) in the two residential care homes. Based on the data presented above and researchers’ reflections, the insights below shed light on the key factors that triggered the assemblage of care, because of deployment and use of the air-purification robot.

External environment – The Right Equipment, the Right Place, the Right Time

The global pandemic played a significant role in setting the scene for this study and aligning everyone’s interests, from the funding body, participating organizations, engineers and researchers. Within the highly-restricted physical and structural environment, care professionals in both countries found the way to carve out carescape in order to protect safety of older people and HSCPs themselves, while assembling sociality and togetherness. It was vital for engineers and researchers to be cognizant of the priorities of care facilities and caregivers, which were safety, access to care and sociality.

Affordances – Customization / “asobi gokoro” (Playfulness) / Gamification

Without any preplanned design, the cycles of actualization happened in this study. The AR engineers intentionally decided to design VA in an inorganic fashion, and that was kept in the residential care home in Ireland. Subsequently, in the residential care home in Japan, VA was transformed into a humanoid cleaning assistant with hair, face, dress, and a foreign name. The gamification of the device, using the joystick, is also worth mentioning, as it provides HSCPs with more than just the choice of operation modes. The curiosity among not only care professionals (direct users) but also older people (indirect users) was enhanced using a joystick. It struck the chord of “asobi gogoko” (literal translation: playful heart) of the stakeholders and added extra fun to the otherwise more predictable environment. As previously mentioned, anthropomorphic VA brought a local festival (‘matsuri’) feel to the site. The combination of these intended and unintended affordances given to VA had a great appeal to HSCPs, particularly of those in Japan, and increased the hybrid collective nature of human-robot interactions. Although the relationship between robot performance and attributes and users’ trust is a different topic ([Giorgi et al. 2022](#); [Kodate and Nallur 2025](#)), the relationship between user attachment and affordances (e.g., ludic design) ([Ngankam et al. 2023](#)) is worth exploring further.

Agency-Enhancing Culture – Trust in Care Professionals in Local Units

In both residential care homes in Ireland and Japan, there were some remarkable resemblances in their organizational cultures. One key aspect was that day-to-day decision-making was decentralized and entrusted to local managers. How care professionals in local units are trusted and given the discretion for shaping the study (e.g., the hours of use, decorations of the robot) appears to have served as an agency-enhancing element of the “successful” adoption of VA ([Mutlu and Forlizzi 2008](#); [Kodate et al. 2022](#)). The fact that the HSCPs collectively had experience with the use of technologies, and a realistic expectation towards VA was abundantly clear in the data we presented above. This finding resonates with the argument that interventionist research needs care and solidarity ([Liboiron 2016](#)).

Shape of Care in the Future

Much STS literature to date has focused on the active impact that technologies may have on care and the nature of care work. However, as the participants of this study indicated, societal changes outside of immediate care settings can also shape the ecosystem where future technologies are used. Future care recipients’ desires and needs are changing over time, and what people want from HSCPs will change accordingly. For example, interpretations of ideal ‘sociality’ and ‘togetherness’ in care settings, and how they can be supported, will be dependent on the zeitgeist. Culture is not static either, and it evolves with changing demography, global migration, and generational shifts. When considering a balance between human touch and the use of technologies, the perspective of “carescapes” – the time-space and cultural dimension of care will therefore become even more important in the future.

Conclusion

In conclusion, this study carried out in two countries during the global pandemic, provided an exceptionally unique and fertile ground for a closer look at the “hybrid collective” intelligence at play in care settings. This was enabled by the deployment of a highly functional (and momentarily desired) robot. The results shown were precious reflections by care professionals on the meaning of care and care work in residential care homes, which emphasizes the significance of sociality, and how they interact with older people and various artefacts including the robot. Cultural sensitivities to and familiarity with (humanoid/animal-like) robots were manifested in the way the same air-purification robot was dressed, operated and given a name while the universality of work ethics, empathy and relationality was highlighted in both cultures. If the relay of considerations for others, as opposed to pure rationality (workload, efficiency saving, cost-cutting), can be supported and augmented by the deployment of technologies, the circuits of care ([Prendergast, Kodate and Balteanu 2021](#)) could be created in a carefully managed environment where older people and caregivers are both responsible and respected.



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Author Biographies

Naonori Kodate (PhD) is Associate Professor in Social Policy and Welfare Technology at University College Dublin, Ireland and Adjunct Research Professor at Center for Frontier Medical Engineering, Chiba University, Japan. Pranav Kohli (PhD) is an anthropologist working at Ottawa Community Housing Foundation, Canada. Yurie Maeda lectures at Technological University Dublin (Ireland) in the areas of Business and IT. Kazuko Obayashi (MSW) is Director of Social Welfare Corporation Tokyo Seishin-kai and Universal Accessibility & Ageing Research Centre, Japan. David Prendergast (PhD) is Professor of Anthropology at Maynooth University, Ireland. Shigeru Masuyama (MD) is a Visiting Professor at Travelers Medical Center, Tokyo Medical University, Japan.

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