

# Evaluating Mobile Remote Presence Bots for Medical Consultation in Nursing Homes<sup>1</sup>

Valérie Jungo  
Junexus Consulting, Switzerland  
valerie.jungo@junexus.ch

Christopher Lueg  
Medical Informatics, Bern University of Applied Sciences, Switzerland  
christopher.lueg@bfh.ch

Franziska Hofer  
brainability, Switzerland  
franziska.hofer@brainability.ch

Matthias Bender  
Medical Informatics, Bern University of Applied Sciences, Switzerland  
matthias.bender@bfh.ch

## Abstract

*Interviews with nursing home residents and medical practitioners who used a telepresence robot aka mobile remote presence bot (MRP) for medical consultation suggest that consulting via MRP is viable option for certain types of consultations. Participants perceived communication via the MRP as generally positive and the interaction felt natural even though it clearly wasn't the same as face-to-face conversation. The interpersonal quality of communication was slightly reduced; consultations may become more effective however this may impact on the emotional relationship between patients and doctors. Medical practitioners would be able to spend more time in conversation with their patients since time spent travelling to residential homes is greatly reduced. Consulting via MRP also offers a safe option during isolation regimes like the ones that have been implemented in long term care facilities around the world during the SARS-CoVID-2 pandemic.*

## Introduction

Physical distance as a challenge to care delivery is a prominent issue in vast countries like Canada or the USA but also in small but mountainous countries like Switzerland. We are interested in how telepresence robots or mobile remote presence bots (MRP) aka 'ipads on a stick' (Kniberg 2013) can be used to address some specific challenges, such as medical practitioners having to drive long distances in cases where phone-only consultation isn't quite sufficient but attending in person may not be required either.

---

<sup>1</sup> Proceedings of the 83rd Annual Meeting of the Association for Information Science and Technology (ASIS&T), Pittsburgh, USA, October 23-27, 2020 (held virtually), to appear.

The designated purpose of MRP is to improve communication between individuals (Beer and Takayama 2011). Unlike video teleconferencing systems that require all interaction to take place in a pre-defined set of rooms and/or from a single viewpoint, MRP participation lets participants command an actual physical representation of themselves at a remote location (Lewis et al 2014).

Among early reports on using MRP in everyday settings are Lee and Takayama (2011). Based on interviews, observations, and survey results from people who had used MRP for several months, they concluded that MRP enabled remote workers to live and work with local coworkers almost as if they were physically there. An important aspect of that was the mobile embodiment of the remote worker evoking perceptions of the MRP both as a person and as a machine which also lead to the formation of new usage norms among remote and local coworkers.

### **MRP Mediated Medical Consultation in a Swiss Nursing Home**

*Lakeview*<sup>2</sup> is a residential home for the elderly in Biel/Bienne, Switzerland that is known for its innovative approach to providing residential care. The use case that we developed in collaboration with medical professionals was residents consulting with a medical practitioner who in that case would not need to be physically present. The focus of the research was on understanding possible differences in communication between face-to-face and MRP as well as understanding the sense of presence and the quality of interpersonal interaction (Jungo 2019). Ethics approval was sought and granted. The MRP we used was a 'Beam' by SuitableTech ([suitabletech.com/products/beam](https://suitabletech.com/products/beam)).

To prepare for the actual experiments we conducted a preliminary trial. We recruited as participants a retired elderly person and a registered nurse familiar with *Lakeview*. The trial took place at Bern University of Applied Sciences in Biel. We utilized the Medical Informatics *Living Lab* that includes a fully furnished 1-bedroom apartment for research purposes such as these. The nurse received prior training in using the MRP control app. The feedback that we received from the trial participants was encouraging. Both of our participants experienced the interaction via Beam MRP as positive.

The *in situ* experiments at *Lakeview* involved two actual *Lakeview* residents and their attending medical doctors. Like the nurse in our trial, the medical doctors received training in using the MRP app prior to the experiments. In two distinct sessions the doctors used the *Lakeview-based* MRP from their actual surgeries away from *Lakeview*. The residents on the other hand were seated in a dedicated room at *Lakeview*. Each one of the doctors activated the MRP at *Lakeview* using the control app on their respective devices and steered the MRP from its away parked location to the room where 'their' *Lakeview* resident was waiting for the consultation.

---

<sup>2</sup> Not the actual name

Half-standardized interviews were conducted following the experiments. The interviews were recorded and subsequently transcribed and analyzed. The findings affirm the positive impression gained from the trial at the *Living Lab*.

A key finding is that both *Lakeview* residents reported they would be willing to engage in difficult or emotional topics even though they also stressed that there would also be situations where they would prefer face-to-face conversations. All four participants agreed that while the conversations did not resemble face-to-face conversations they were not perceived as unnatural either. The quality of the conversation in terms of turn-taking and flow of speech was perceived as positive. Participants felt the conversations were the same just different. When trying to explain the phenomenon participants referred to some notion of distance without coming up with a more precise description.

Participants did not perceive the *Beam* MRP as a robot but more like a machine or device which seems to align with the purpose of MRP as about improving communication between individuals (Beer and Takayama 2011). Both medical professionals reported having used less body language which was partly due to the technical setup of doctors who used iPads but also because the MRP were showing only participants' heads. This was not perceived as a barrier though since they considered body language less important in mediated medical conversations anyway. Three of the four participants noted they engaged in less small talk than they would probably do in face-to-face conversations. This and less body language can have an impact on the relationship between patients and doctors, as it is known that nonverbal behavior can be an important trust building factor and also has a large impact on patient satisfaction and health outcomes.

Medical professionals pointed out that they were not able to see the residents eye-to-eye since the MRP does not allow to adjust the height of the screen and the camera that 'looks' at the remote person. This caused the undesired effect that the medical professionals literally looked down on their patients.

## **Conclusions**

We demonstrated that Mobile Remote Presence bots (MRP) can successfully be used in certain types of medical consultation over distance like consultation with residents of nursing homes. Furthermore, consulting via MRP presents a safe alternative during isolation regimes like the ones that have been implemented in long term care facilities around the world during the SARS-CoVID-2 pandemic. For broader acceptance of MRP the devices need to be fine-tuned to human preferences e.g., by making sure that MRP support different camera modalities that account for human standing and sitting postures.

## **Acknowledgments**

We wish to thank our volunteers who participated in the experiments as well as the most supportive management and staff at *Lakeview*. We also wish to thank BFH Medical Informatics for the opportunity to utilize the *Living Lab* and its robotic inhabitant, *BrönniBot*.

## References

- Beer, J.M. and Takayama, L. (2011). Mobile Remote Presence Systems for Older Adults: Acceptance, Benefits, and Concerns. *Proc. HRI'11*, Lausanne, Switzerland.
- CMS (2020). Guidance for Infection Control and Prevention of Coronavirus Disease 2019 (COVID-19) in Nursing Homes. *DHHS*.  
<https://www.cms.gov/files/document/3-13-2020-nursing-home-guidance-covid-19.pdf>
- Jungo, V. (2019). Einsatz von Telepräsenzrobotern für ärztliche Konsultationen. Bachelor Thesis. School of Applied Psychology, University of Applied Sciences and Arts Northwestern Switzerland (FHNW).
- Kniberg, H. (2013). What it feels like being an ipad on a stick on wheels. *Spotify R&D*. December 12, 2013. <https://engineering.atspotify.com/2013/12/12/what-it-feels-like-being-an-ipad-on-a-stick-on-wheels/>
- Lee, M.K. and Takayama, L. (2011). "Now, I have a body": Uses and social norms for mobile remote presence in the workplace. *Proc CHI 2011*, Vancouver, Canada. ACM.
- Lewis, T., Drury, J.L., Beltz, B. (2014). Evaluating Mobile Remote Presence (MRP) Robots. Technical paper. MITRE Corporation. <https://www.mitre.org/publications/technical-papers/evaluating-mobile-remote-presence-mrp-robots>