Evaluation of social and assistive robotics in geriatric institutions: Dimensions of usability, acceptability and ethics

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Purpose Older adults suffering from neurocognitive disorders require multimodal support. Social assistant robots, mechanical entities capable of interacting socially with their users in a variety of contexts (informational, recreational, educational), could be used to improve their physical and psychological well-being and maintain their quality of life. Today, however, these robot assistants are not sufficiently advanced to engage in satisfactory social interactions that would lead to their adoption. This project is part of the European SPRING project, which aims to develop a social assistance robot, ARI, capable of interacting with several speakers in hospital environments. ARI is designed to inform, guide and entertain users and support healthcare professionals in their work. **Methods** The evaluation of the ARI robotic system was carried out with two stakeholders in a Paris hospital department (France): patients and their accompanying persons, who used the ARI robot. The study was conducted in two experimental waves to measure the system's progress and effectiveness. The first wave included 20 participants, comprising both patients and accompanying persons, while the second wave expanded the evaluation to 49 participants. This structure allowed us to iteratively improve the robot's usability based on feedback received after the first wave. The study focused on the usability of the system and the analysis of human-robot interactions in order to identify areas for ergonomic improvement. To assess usability, we used the System Usability Scale. The robot's acceptability in hospital settings was assessed using the French version of the Acceptability E-Scale questionnaire and a semi-directive interview, asking users about the ethical issues involved in implementing social robots in hospital settings. **Results** Two waves of experiments have been carried out since March 2023, involving 20 and 49 participants respectively, with an average age of 76.7 and 73.89. The second wave introduced a major innovation: the integration of a Large Language Model (LLM) into interaction with the ARI robot. The results showed an improvement in the acceptability and usability of the social robot during this second phase. Mean scores on the Acceptability Evaluation Scale (AES) rose from 15.4 to 20.8/30, while those on the System Usability Scale (SUS) increased from 47.5 to 57/100. **Conclusion** In conclusion, our study within the European SPRING project aimed to evaluate the ARI social assistance robot in hospital settings, focusing on usability and human-robot interaction. The integration of a Large Language Model (LLM) in the second phase marked a significant advancement, leading to improved acceptability and usability scores. These findings highlight the potential of advanced technologies in enhancing social robots' effectiveness in healthcare contexts. As we continue to refine ARI based on user feedback, our research contributes to the ongoing development of assistive technologies tailored to the needs of older individuals and their caregivers.