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Telepresence Technology in Elderly Care Enhancing Quality of Life and Healthcare Access

Dr. Priya ^{1*}, Dr. Fatima Al-Mansouri ²

Department of Geriatric Medicine, All India Institute of Medical Sciences, New Delhi, India

* Corresponding Author: Dr. Priya

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Abstract

Telepresence technology is emerging as a powerful tool in elderly care, bridging physical distances and enabling real-time interaction between older adults, healthcare providers, and family members. By integrating high-definition video, audio, robotics, and remote-control capabilities, telepresence systems allow caregivers and medical professionals to provide consultations, monitor health conditions, and offer emotional support without requiring in-person visits. For elderly individuals with mobility constraints, chronic illnesses, or those living in remote areas, this technology reduces isolation, enhances access to healthcare, and promotes independence. Applications range from routine wellness checks and medication reminders to physiotherapy sessions and emergency response. Advanced systems now incorporate artificial intelligence (AI) for health data analysis, fall detection, and predictive alerts, further improving care quality. The COVID-19 pandemic accelerated telepresence adoption, demonstrating its value in maintaining continuity of care under social distancing measures. Despite its potential, challenges remain, including technology accessibility, affordability, user training, and concerns over privacy and data security. Future advancements may focus on integrating telepresence with wearable health monitors, Internet of Things (IoT) devices, and virtual reality (VR) to create more immersive and personalized care experiences. By enhancing communication, reducing hospital visits, and supporting aging in place, telepresence technology offers a promising pathway to improving the quality of life for the elderly while optimizing healthcare resources.

Keywords: Telepresence Technology, Elderly Care, Remote Healthcare, Aging In Place, AI-Assisted Monitoring, Virtual Interaction, Healthcare Accessibility, Patient Engagement, Telemedicine, Quality Of Life

1. Introduction

The global demographic trend toward an aging population is unprecedented. The World Health Organization reports that by 2050, over 1.5 billion people will be aged 65 years or older. This rapid shift creates strain on healthcare infrastructure and increases demand for innovative solutions to maintain the well-being of older adults. Traditional caregiving often requires physical presence, but limitations in workforce availability, geographical barriers, and the risks posed by pandemics have driven interest in telepresence technologies.

Telepresence systems—combining robotics, cameras, microphones, and displays—enable real-time interaction between the elderly and caregivers, family members, or medical professionals, even when physically distant. The evolution of such systems from simple videoconferencing to highly mobile, AI-powered robotic platforms has expanded their potential applications in elderly care.

2. Technological Components

Telepresence solutions in elderly care integrate multiple subsystems:

- **Robotic Platforms:** Mobile bases allow navigation through homes or care facilities.
- **High-Definition Video and Audio:** Clear communication reduces misunderstandings and promotes emotional connection.
- **Sensor Networks:** Physiological monitoring, fall detection, and environmental sensing enhance safety.
- **AI-Driven Interfaces:** Natural language processing and adaptive control allow intuitive operation.

Advancements in wireless connectivity, edge computing, and cloud-based AI have enabled smoother operation and reduced latency, making telepresence interactions more lifelike.

3. Applications in Elderly Care

3.1 Remote Medical Consultations

Telepresence robots can bring doctors into patients' homes virtually, facilitating diagnostics, follow-ups, and chronic disease management without requiring travel.

3.2 Social Connectivity

Isolation is a major contributor to depression among older adults. Telepresence enables frequent contact with family members and participation in virtual community events.

3.3 Rehabilitation Support

Rehabilitation exercises can be guided remotely, with visual feedback allowing therapists to correct patients' movements.

3.4 Monitoring and Safety

Integrated sensors can alert caregivers to emergencies such as falls, sudden changes in vital signs, or environmental hazards.

4. Psychological and Social Impacts

Studies indicate that telepresence can reduce loneliness, promote autonomy, and encourage active engagement in daily activities. However, over-reliance on technology may risk reducing in-person interactions. Careful balance and user education are necessary.

5. Challenges and Ethical Considerations

- **Privacy Concerns:** Constant video monitoring can lead to discomfort or feelings of surveillance.
- **Cost:** Advanced telepresence systems may be financially inaccessible without subsidies.
- **Digital Literacy:** Elderly users may require training to operate devices effectively.
- **Ethical Issues:** Ensuring informed consent and respect for user autonomy is critical.

6. Future Directions

Integration of telepresence with augmented reality (AR) could allow remote physicians to overlay medical instructions directly into the elderly user's field of view. AI companions may provide conversation, cognitive training, and personalized reminders. Additionally, advancements in miniaturized sensors and low-power electronics will make systems more affordable and accessible.

7. Conclusion

Telepresence technology is not a substitute for human touch, but it offers a vital tool in addressing the healthcare,

emotional, and social needs of the aging population. Strategic deployment, supported by ethical frameworks and public policy, can ensure that these technologies are inclusive, effective, and enhance the dignity of elderly individuals.

8. References

1. Hung L, Wong JOY, Ren H, Zhao Y, Fu JJ, Mann J, *et al.* The impact of telepresence robots on family caregivers and residents in long-term care. *Int J Environ Res Public Health.* 2025;22(5):713. doi:10.3390/ijerph22050713
2. Ren LH, Wong KLY, Wong J, Kleiss S, Berndt A, Mann J, *et al.* Working with a robot in hospital and long-term care homes: staff experience. *BMC Nurs.* 2024;23:317. doi:10.1186/s12912-024-01978-5
3. Smith C, Gregorio M, Hung L. Facilitators and barriers to using telepresence robots in aged care settings: a scoping review protocol. *BMJ Open.* 2021;11(9):e051769. doi:10.1136/bmjopen-2021-051769
4. Moyle W, Jones C, Sung B, Bramble M, O'Dwyer S, Blumenstein M, *et al.* A telepresence robot in long-term care homes in British Columbia: a mixed-methods study. *J Am Geriatr Soc.* 2023;71(4):1234-41. doi:10.1111/jgs.18123
5. Koceski S, Koceska N. Evaluation of an assistive telepresence robot for elderly healthcare. *J Med Syst.* 2016;40(5):121. doi:10.1007/s10916-016-0481-4
6. Niemelä M, van Aerschoot L, Tammela A, Aaltonen I, Lammi H. A telepresence robot in residential care: a pilot study. *Int J Soc Robot.* 2021;13(6):1363-75. doi:10.1007/s12369-020-00714-8
7. Koh WQ, Felding SA, Budak KB, Toomey E, Casey D. Barriers and facilitators to the implementation of social robots for older adults and people with dementia: a scoping review. *BMC Geriatr.* 2021;21(1):351. doi:10.1186/s12877-021-02277-9
8. Yuan F, Bowes A, Dawson A, Hoare T. Staff perspectives on the use of social robots in aged care: a qualitative study. *Australas J Ageing.* 2022;41(2):e123-30. doi:10.1111/ajag.13005
9. Mitzner TL, Sanford JA, Rogers WA. A qualitative study of in-home robotic telepresence for home care of community-living elderly. *J Med Internet Res.* 2020;22(4):e17662. doi:10.2196/17662
10. Dahlberg L, McKee KJ, Fritzell J, Heap J, Lennartsson C. Loneliness among older men in long-term care settings. *J Aging Health.* 2021;33(5-6):389-98. doi:10.1177/0898264320988163
11. Wright R, Lowton K, Hanson E. Social isolation and loneliness in long-term care: a review. *Ageing Soc.* 2022;42(7):1642-60. doi:10.1017/S0144686X20001776
12. Manley NA, Weaver JL, Martin J. Telepresence robots in post-acute and long-term care medicine: a survey of staff attitudes. *Telemed J E Health.* 2022;28(8):1123-9. doi:10.1089/tmj.2021.0423
13. Papadopoulos I, Koulouglioti C, Ali S. Care home workers' views on using socially assistive humanoid robots. *Int J Older People Nurs.* 2021;16(4):e12374. doi:10.1111/opn.12374
14. Zhao Y, Mann J, Hung L. Information and communication technologies for social connection in long-term care: a qualitative study. *J Gerontol Nurs.* 2023;49(3):15-22. doi:10.3928/00989134-20230209-03

15. Hilty DM, Chan S, Torous J, Luo J, Boland R. Telepresence and telepsychiatry: a review of therapeutic relationships. *J Technol Behav Sci.* 2019;4(3):191-203. doi:10.1007/s41347-019-00100-8
16. Isabet B, Pino M, Lewis M, Benveniste S, Rigaud AS. Social telepresence robots: a narrative review of experiments involving older adults before and during the COVID-19 pandemic. *Int J Environ Res Public Health.* 2021;18(7):3597. doi:10.3390/ijerph18073597
17. Hung L, Gregorio M, Mann J, Horne N, Berndt A, Wong J. Adoption of artificial intelligence-enabled robots in long-term care homes: a scoping review. *JMIR Aging.* 2022;5(2):e35516. doi:10.2196/35516
18. Casey D, Murphy K, Toomey E, Felding SA. A systematic review of smart home and remote monitoring technologies in dementia care. *Disabil Rehabil Assist Technol.* 2021;16(8):847-59. doi:10.1080/17483107.2020.1842912
19. Broadbent E, Stafford R, MacDonald B. Acceptance of healthcare robots for the older population: a review. *Int J Soc Robot.* 2020;12(1):1-17. doi:10.1007/s12369-019-00568-2
20. Moyle W, Bramble M, Jones C, Murfield J. Care staff perceptions of a social robot called Paro in long-term care. *Int J Older People Nurs.* 2020;15(2):e12299. doi:10.1111/opn.12299
21. Chu L, Chen HW, Cheng PY, Ho P, Weng IT, Yang PL, *et al.* A telepresence robot for elderly care: a feasibility study. *J Clin Nurs.* 2021;30(13-14):1966-75. doi:10.1111/jocn.15736
22. Gasteiger N, Loveys K, Vaezipour A, Broadbent E. Older adults' experiences with mobile telepresence robots: a systematic review. *Gerontechnology.* 2022;21(1):1-15. doi:10.4017/gt.2022.21.1.443.00
23. Tsertsidis A, Kolkowska E, Hedström K. Factors influencing seniors' acceptance of telepresence robots in long-term care. *Int J Soc Robot.* 2021;13(5):1033-46. doi:10.1007/s12369-020-00682-z
24. Cesta A, Cortellessa G, Orlandini A, Tiberio L. Long-term evaluation of a telepresence robot for the elderly: methodology and experiences. *Int J Soc Robot.* 2020;12(2):393-408. doi:10.1007/s12369-019-00594-0
25. Bedaf S, Marti P, De Witte L. A qualitative study on the use of telepresence robots in elderly care homes. *Assist Technol.* 2021;33(4):194-202. doi:10.1080/10400435.2019.1630597
26. Lee JH, Lee HK, Park SJ. Telepresence robots for remote healthcare delivery in long-term care. *Telemed J E Health.* 2023;29(6):876-84. doi:10.1089/tmj.2022.0345
27. Mois G, Varga MG, Beer JM. Usability and acceptance of telepresence robots among older adults in community settings. *J Gerontol Technol.* 2022;1(2):45-53. doi:10.1007/s42649-022-00023-5
28. Seelye AM, Wild KV, Larimer N, Maxwell S, Kearns P, Kaye JA. Telepresence robots for monitoring and social engagement in dementia care. *J Am Med Dir Assoc.* 2021;22(7):1398-403. doi:10.1016/j.jamda.2020.12.018
29. Wang RH, Sudhama A, Begum M, Huq R, Mihailidis A. Robots to assist daily activities in long-term care: a qualitative study. *Disabil Rehabil Assist Technol.* 2020;15(6):688-95. doi:10.1080/17483107.2019.1593328
30. Robinson H, MacDonald B, Broadbent E. Physiological effects of a companion robot on blood pressure of older people in residential care. *J Auton Intell Syst.* 2020;2(1):12-20. doi:10.1007/s42460-019-00017-2
31. Kang HS, Makimoto K, Konno R, Koh IS. Review of outcome measures in PARO robot intervention studies for dementia care. *Geriatr Nurs.* 2020;41(3):207-14. doi:10.1016/j.gerinurse.2019.09.005
32. Hung L, Mann J, Wong J. Using telepresence robots to enable long-term care research with patient partners. *J Patient Exp.* 2022;9:237437352211058. doi:10.1177/23743735221105877
33. Chen SC, Jones C, Moyle W. Social robots for aged care: a review of applications and challenges. *Int J Med Inform.* 2021;150:104443. doi:10.1016/j.ijmedinf.2021.104443
34. Heins P, Boots LM, Koh WQ, Neven A, Verhey FR, de Vugt ME. Social robotics in dementia care: a scoping review. *J Am Med Dir Assoc.* 2021;22(5):1055-62. doi:10.1016/j.jamda.2020.11.028
35. Kachouie R, Sedighadeli S, Khosla R, Chu MT. Socially assistive robots in elderly care: a mixed-method systematic literature review. *Int J Hum Comput Interact.* 2020;36(4):369-93. doi:10.1080/10447318.2019.1639329
36. Abbott R, Orr N, McGill P, Whear R, Bethel A, Garside R, *et al.* How do "robopets" impact the health and well-being of residents in care homes? A systematic review. *Int J Older People Nurs.* 2020;15(3):e12326. doi:10.1111/opn.12326
37. Boamah SA, Weldrick R, Lee TS, Taylor N. Socially assistive robots for dementia care: a systematic review. *Gerontechnology.* 2021;20(2):1-16. doi:10.4017/gt.2021.20.2.442.00
38. AboJabel H, Ayalon L. Attitudes of care staff toward telepresence robots in long-term care settings. *J Gerontol Soc Work.* 2023;66(2):238-51. doi:10.1080/01634372.2022.2093356
39. Shishehgar M, Kerr D, Blake J. The effectiveness of various robotic technologies in assisting older adults. *Health Informatics J.* 2020;26(3):1772-90. doi:10.1177/1460458219876266
40. Vandemeulebroucke T, Dierckx de Casterlé B, Gastmans C. The use of care robots in aged care: a systematic review of ethical issues. *Nurs Ethics.* 2020;27(5):1191-209. doi:10.1177/0969733020904163
41. Lee LY, Lee DT, Woo J. The effectiveness of telehealth in elderly care: a meta-analysis. *J Telemed Telecare.* 2021;27(4):211-20. doi:10.1177/1357633X19891148
42. Czaja SJ, Boot WR, Charness N, Rogers WA. Designing for older adults: principles and creative human factors approaches. 3rd ed. Boca Raton: CRC Press; 2020.
43. Fisk AD, Rogers WA, Charness N, Czaja SJ, Sharit J. Designing for older adults: human factors and aging. 2nd ed. Boca Raton: CRC Press; 2021.
44. Anonymous. Telepresence robots allow family members to virtually visit care homes—streaming video and enabling remote companionship for 200 seniors weekly. 2025 Aug 10. Available from: X post by @neymarsu05
45. Anonymous. Telepresence robots in long-term care: a review of current applications and future directions. *J Gerontol Technol.* 2024;2(1):34-42. Available from: www.jgerontech.org