

Navigating aging with technology: New frontiers in geriatric healthcare



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Abstract

With the advent of new technologies, caregivers of geriatric patients can now tap into a more extensive range of digital tools and resources, addressing key areas such as health, social connection, daily support, and mental well-being. Recently, a new era of technology-enabled interventions has emerged, empowering and supporting family caregivers, thanks to the advent of new technologies like smartphones, robots, sensors, virtual reality, and voice assistants are now smarter and more connected, thanks to advanced data analysis. The benefits of using smart home technology to provide care for elderly patients, including enhanced physical and emotional well-being. As the world's population ages, the demand for care and support services is escalating rapidly. This study would help in investigating novel approaches to providing care.

Keywords: digital tools, geriatric patients, mental health, Senior-friendly technology

1. Introduction

There could be difficulties for older persons using innovative technologies in day today life. Senior-friendly technology are therefore more important than ever and can greatly enhance the quality of life for the elderly. Technology for senior individuals consists of tablets, smartphones, wearable devices, sensors, and home surveillance systems. These items have simple interfaces, large text sizes, and improved accessibility, making them suitable for older persons who might have trouble with advanced technology (1).

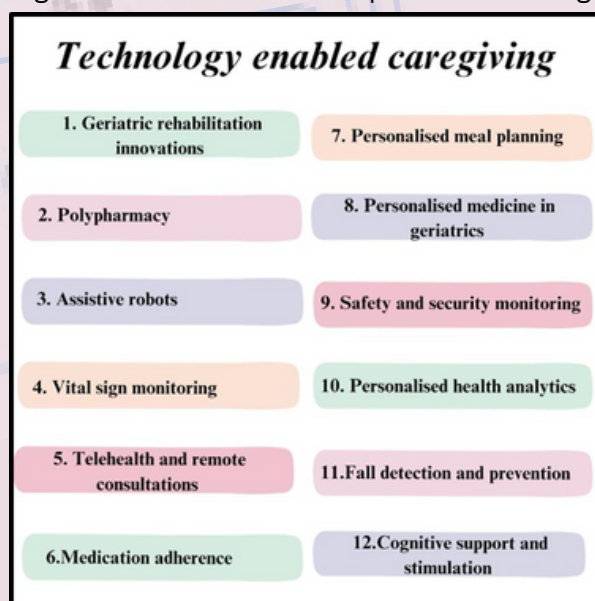


Figure 1. Technology enabled caregiving

1.1. Geriatric rehabilitation innovations

A comprehensive approach to enhance independent functioning for elderly patients, many of whom are fragile and suffer from several multiple disorders, such as cognitive dysfunction and communication issues is known as geriatric rehabilitation (2). Research indicates that geriatric rehabilitation can lower mortality and nursing care admission rates while also improving functional results which including robotic therapy devices, telemedicine applications, patient monitoring systems, and environmental control systems present in smart homes (3).

1.2. Polypharmacy

The medication cascade effect, food-drug, drug-drug, disease-drug, and nutraceutical-drug interactions are some of the effects of polypharmacy that can affect people 65 years of age and older with several chronic health issues.(4).The cascade effect can be decreased via regulatory intervention, medical education, and patient education. It's crucial to continuously evaluate medications and illnesses (5).

1.3. Assistive robots

Robotic technology have been applied to telemedicine, drug delivery, surgery, physical and neurological rehabilitation, and patient management. Functional and technical requirements should consist of motion, interaction, manipulation, decision support, and perception (6).Robots help with daily tasks, monitoring their way of behaving and health, and offering companionship in the form of hobbies, entertainment, memories, and social interaction.

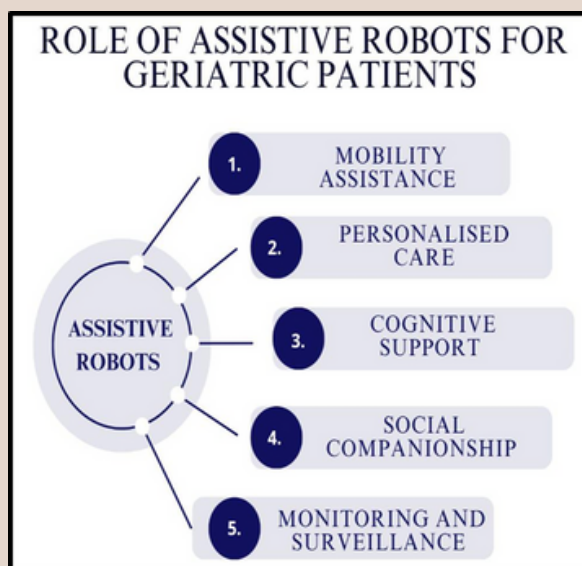


Figure 2. Role of assistive robots for geriatric patients

1.4. Vital sign monitoring

Neglecting patient monitoring is linked to unfavourable consequences and a delay in finding signs of decline in body temperature, blood pressure, heart rate, respiration rate, and oxygen saturation are examples of vital sign measurements and Early Warning Scoring (EWS) systems are part of normal hospital monitoring procedures. As long as there are no false alarms, it should be simpler to spot an individual's condition worsening because their vital indicators are being monitored continuously. Professionals identify constant surveillance as a helpful tool for aiding in the early detection of deterioration. Although the cost-effectiveness of continuous monitoring in general wards has not been thoroughly proved, prior research indicates that it would be possible to adopt it outside of intensive care units (ICUs) with the potential to increase patient safety (7).

1.5. Telecare and remote consultation

Telemedicine [Healing from a distance] is a new and innovative way to provide healthcare through direct consultations, preventive care, video conferencing technology. Based on preliminary findings from the Longitudinal Ageing Study [LASI] conducted in India, 20% of people have mental health issues, 40% are disabled, and 55% of people have a chronic illness (8). It eliminates the chance of catching an illness at the hospital where the doctor works (9).

1.6. Medication adherence

Precisely assessing and tracking patient adherence to medicine is essential in both research and clinical settings, yet it's still an uphill battle internationally.

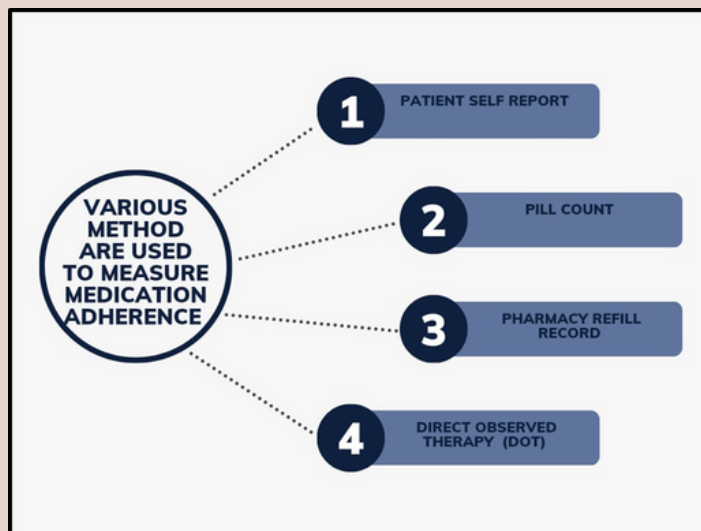


Figure 3. Various methods are used to measure medication adherence

Adherence to medication is a complex behaviour that is affected by patients, medical staff, the healthcare system, and customized therapy.

Adherence tools, such as medicine boxes and alarms, or technology-based solutions, can help patients remember to take their medication and keep their prescriptions in order (10).

1.7. Personalised meal plan

Pathophysiological circumstances, physiological changes, and social contexts all influence the eating patterns of older people. As a result, comprehensive dietary interventions that take into account nutritional needs, individual preferences, medication use, and chewing and tasting capabilities are required (11).

Major health issues that affect millions of people globally are chronic illness including diabetes and heart disease. By supplying the right nutrients in a balanced or healthy diet, meal planning assists in reaching healthy eating objectives. It lowers the risk of hypertension and cholesterol, maintains blood glucose levels, and assists with obesity management and treatment compliance. Thus, organizing meals is crucial to achieving better overall health results (12).

1.8. Personalized medicine in geriatrics

There's a growing evidence that personalized medicine, a developing science that bases patient management decisions on unique genetic, molecular, or cellular traits, might help patients with a variety of diseases, most notably cancer. The management of frail elderly individuals with concomitant illness conditions, polypharmacy, and individual diversity in homeostatic competence and responsiveness to medication presents obstacles for personalized therapy (13).

1.9. Safety monitoring

Older adult care facilities, which provide personal care and accommodations around the clock, including residential and nursing homes manned by care professionals, safety is given high emphasis. Since social care uses a variety of methodologies and safety concepts are less advanced than those seen in hospital environments, assessing older adults' safety components facilities is essential for quality improvement (14).

1.10. Analytics for personalised health care

Population ageing significantly impedes efforts to improve the independence, longevity, quality of life, and health. They evaluate data, keep an eye on the patient's health, and make suggestions for changes to medicine and therapy. Precision health is a popular method for creating and implementing interventions that take into account a population's heterogeneity (15).

1.11. Fall detection and prevention

Falls are an enormous health concern for the elderly who live in vulnerable communities. However, the issue of older individuals falling concerns not only health professionals, but also the scientific community. This leads to the implementation of fall prevention programs in a range of health disciplines, including social care, geriatrics, occupational therapy, physiotherapy, general practice, and nursing. The technique of analyzing risk variables is called fall risk evaluation. Efforts to mitigate risk factors focus on physiological aspects such as muscular power and coordination, harmony, posture, and gait reaction time.

Based on two wearable smart sensors—the WIMU fall detector and the Wearable Inertial Measurement Unit (WIMU data-logger)—an integrated fall detection and prevention information and communication technologies (ICT) service for senior citizens was built and developed. The WIMU data-logger's (Wearable Inertial Measurement Unit) goal was to either detect falls and react quickly in the event of a fall event or to strategically quantify fall risk. The purpose of the WIMU logger is to evaluate test subjects quantitatively when doing clinical exams. When used in conjunction with an Android mobile device, both devices offer services. (Figure 4) (16).

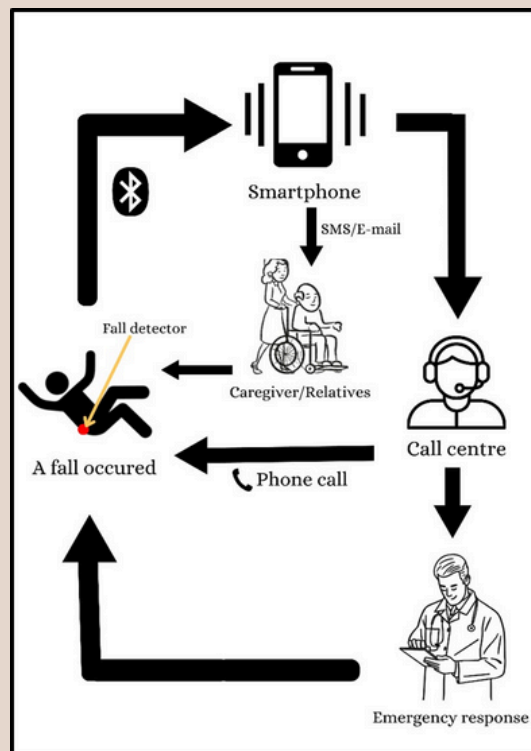


Figure 4. The design of the fall detection software

1.12. Cognitive support

Cognitive stimulation is an alternative technique to medication that tries to promote worldwide cognitive and social functioning by participation in multiple events and discussions (17).

2. Conclusion

Integrating technology and digital tools into geriatric healthcare enhances patient care, promotes independence, and improves health outcomes, ensuring older adults receive personalized, efficient, and accessible healthcare services.

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