

Technological advancements: A boon to geriatric healthcare



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Abstract

With the demographic changes and global trend of improving health-related quality and expectancy of life for elder people has resulted in significant interest in technological and personalized care. It is pivotal to understand the improvements, recognize the challenges in current scenario for superior health management to meet the apparent social needs. The present article aims to provide an overview on the recent technological advancements in health care, independence and safety for older people focusing on tools aimed at assistive, information and communication technology with promising guarantee on physical or cognitive performance of aging persons.

Keywords: Geriatrics, Comprehensive geriatric assessment, Assistive technologies

1. Introduction

The aim of this science towards management of health status and treatment of disease in the older population is referred to as Geriatrics. The aim of science is to aid towards well-being of older people by focusing on comprehensive doctrines, hence also termed as medical gerontology (1). Health is defined as a state where an individual is devoid of any disease with overall physical, psychological and social well-being. For individuals over 60 years and above the definition of health broadens with emphasis on independence, increased self-reliance in daily activities with elevated well-being. The present article, gives the essence of various technological advancements in geriatric health care considering different age-related warning signals. In the present scenario, prominence on preventive care is focused broadly on detection of probable diseases by regular screening along with life style modifications adapting healthy habits.

2. Technology in geriatrics

As per World Health Organization (WHO) projection the percentage of adults over 60 and older will double from 12% to 22% between the years 2015 and 2050. The need to create efficient therapies to preserve and enhance older individual's health, mobility and quality of life is highlighted by this demographic transition (2). The demographic transition in recent days with surge in the numeral of ageing adults with impairments, the increased health care cost and the swift technological development especially in fields of electronics, communication along with home automation robotic solutions add to concern of government, industry agencies and professionals from health care sector towards ageing people. Advancements in medical field play a crucial role in overcoming challenges in quality of life related to health by offering innovational treatment methods stressing on preventive management importance (3).

3. Recent advancements

At present, technologies namely Assistive Technologies (AT), Human-Computer Interaction technologies (HCI), and Information and Communication Technologies (ICT) are areas where researchers are curiously involved compared to existing tools on behaviour monitoring, such as (i) warning systems and sensors alert caregivers whenever there is change in behaviour or location of care recipient, (ii) smart homes tools, which predict potentially and abnormally dangerous behaviour and (iii) telemedicine or telehealth tools, namely passive monitoring systems, works by exchanging data remotely between health care professionals or caregivers and patients, with the aid of video systems which allow patients to communicate with other people staying within the home (4).

As per recent findings, in urban areas elder people have access to information and communication technologies such as smart phone, which allow the elder people to continue independence by lowering isolation, enhancing medication management along with transportation thereby remarkably contributing to increased well-being and social inclusion (5).



Figure 1. Challenges faced in daily activities by elders

Use of technology in effective manner helps in delivering self-care interventions in cost-efficient manner. Such awareness is in greater need towards interventions in public health in rural areas also (6). Few challenges faced in daily activities by elders are shown in Figure 1.

These thorough approaches are crucial for enhancing health-related quality of life in older adults, as they play a key role in lowering disease rates, boosting general health and potentially increasing life expectancy (7) which are presented in Figure 2.



Figure 2. Various approaches to refine quality life of elders

The comprehensive geriatric assessment (CGA) is a multifaceted diagnostic approach for older persons to improve their overall health. It assesses various dimensions of fragility, involving physical, cognitive, and social functions within daily living. With the growth of the digital age, remote CGA has evolved, which entails performing this thorough assessment approach via remote technology methods, reducing the necessity for older persons to physically visit healthcare facilities. Instead, essential health data is gathered using remote monitoring equipment, online questionnaires, video chats, and other techniques. Wearable monitoring technology, such as wrist band sensors and smart watches, which may be linked to computer applications on other devices such as computers, tablets, and smartphones, have made activity tracking more viable and accessible through digital means (8).

Post pandemic, the innovative advancement in the information age lead to superior prospects in evaluation of telemedicine. Telemedicine devices facilitate the assessment of Activities of Daily Living (ADL) by noticing the actual movements of patients at home, such as walking upstairs, using washroom and dressing oneself. For example wearable fitness trackers will monitor physical activity level of individual and also provide valuable information on exercise and mobility routines. Strategies and recommendations for geriatrics healing and care are represented in Figure 3.

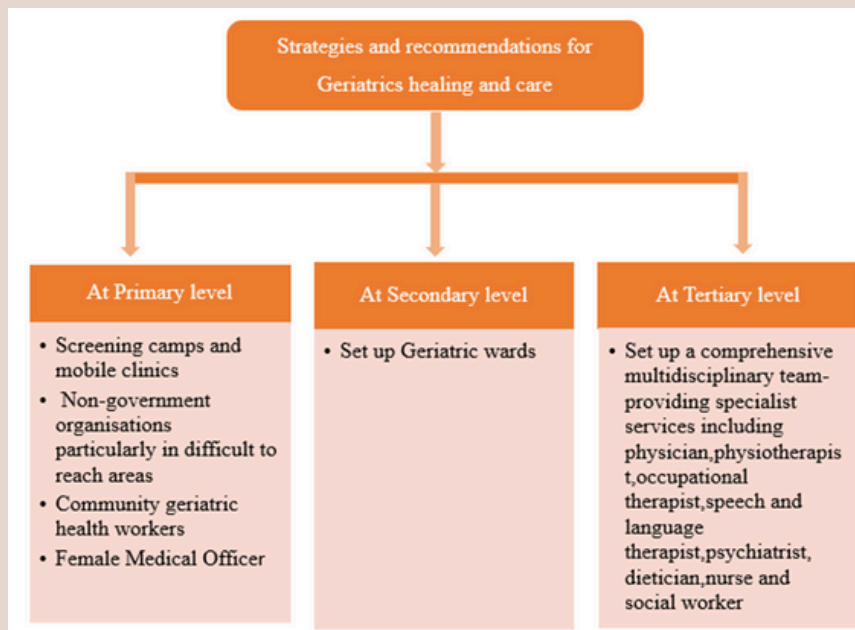


Figure 3. Strategies and recommendations for geriatrics healing and care

Accelerometers are more accurate in measuring sleep duration than self-reported which is scientifically proven, provides an insight towards habit and sleep pattern which in turn play important role in screening for risk of cardiovascular diseases in future (9).

Personal Robot Assistants (PRAs) and Cognitive Assistants (CAs) are the new generation assistants. Difference between PRAs and CAs is in the usage of hardware such as PARs use robots whereas CAs use appliances to connect with smart-television or smartphones of the user. Hence, bottom-line idea in such developments is to strengthen the elder’s autonomy, reduce vulnerability and also enhance their cognitive and physical condition respecting their privacy at the same time.

Person AAL (10), a cognitive assistant works with the help of wearable sensors measures the vital signs considerably health status in the elders. With the goal to encourage elder population, Person AAL is adapted dynamically from a questionnaire exercise motivations inventory (EMI) along with older’s bio-signal information. So, various suggestions in the form of articles and health-related messages, motivate elder population to maintain healthy and active lifestyle (11).

In this scenario, wristband data is used to determine the level of stress and emotion experienced by the elderly while exercising. This type of sensor is simple to install, eliminating the possibility of false alarms and incorrect data in the prior project. However, activity monitoring is significantly limited because a wrist sensor cannot give information on all the body components participating in the completed exercise. With that goal, this CA's shows seniors how to complete each activity and alerts them if they are performing poorly or experiencing stress at peak levels (12). Technological advancements in the form of innovations and evolving models are given in Table 1.

Table 1. Technological advancements in the form of innovations and evolving models

| S.No. | Technological advancements | Innovations and evolving models |
|-------|--|--|
| 1. | Chronic disease management (Diabetes, hypertension, heart failure) | Telemedicine and remote monitoring Artificial intelligence (AI) in predictive care |
| 2. | Cognitive health (Alzheimer's, dementia) | Early detection of cognitive decline Novel interventions for cognitive stimulation-virtual reality (VR) and augmented reality (AR) |
| 3. | Medical management | Poly pharmacy reduction strategies Smart medication dispensing systems-IoT enabled smart pill dispensers |
| 4. | Holistic care approaches | Integrative geriatric care models Age-friendly health systems |
| 5. | Palliative and end off-life care | Advanced care planning tools Palliative care integration |

4. Conclusion

The development in enhancing health related standard of life for elder persons project a successful route for enhancing quality of life of adults over 60 and above. Increased awareness, innovations technical aspects, breakthrough in medical field marks positive impact towards satisfying specific needs of such population. The outcomes of such scientific work embrace towards better diagnostics and treatment options improving enhanced accessibility to health care. However, it is vitally important to identify and work persistently towards overcoming challenges that affect quality of life for elder persons.

Interdisciplinary collaboration with uninterrupted efforts towards bridging the gap between advancements and challenges, society can strengthen an atmosphere that supports and values the happiness and health of all members with a special focus on ageing population well-being.

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