



## **Futuristic Health Care Trends in Senior Care**

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### **ABSTRACT**

*Health is multifaceted necessitating inter-sectoral coordination to tackle it in a comprehensive manner to decrease the escalating disease burden. Population explosion of the elderly segment has created major concern since the old age dependency ratio is also drastically increasing. Advancements in the field of technologies incorporated in medicine has resulted not only in just reduction of mortality rate but improvisation in the quality of life for which artificial intelligence creates a trend of ease in today's modern world of innovations. A healthy person would take a balanced nutrition for which the oral cavity is the gateway but is most often neglected for appropriate care and accumulated dental problems results in tooth loss which affects not only the functional ability in terms of speech and chewing but also one's self esteem. Digitalized technological adoptions have made the delivery of oral health services with ease for both the patient as well as dentist as it saves precious time and is simple to handle offering comfort. Early diagnosis and prompt health care delivery by evidence-based practise for not only decline in mortality and morbidity but also improvisation in the overall quality of life especially health sector through provision of holistic care is the requisite to achieve sustainable developmental goal for the community. Thus, this paper was review conducted in order to understand the need of technological adoptions for the most deserving population segment of the nation who are under-served.*

*Keywords:* Gerontechnological Adoption, Oral Health Disease, Senior Citizens

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### **INTRODUCTION**

Health is a fundamental human right of every citizen and universal health coverage refers to provision of premium quality services irrespective of age, health, race, social status or ability to pay. There is a great need to incorporate digitalization in the delivery of both general as well as oral health care delivery especially elders as they suffer geriatric giants as stated by Professor Bernard and numerous other problems such as socio-economic constraints, complications as a consequence of polypharmacy due to comorbidities etc. Senior citizens are guiding sources for stabilization of the economy and hence they deserve appropriate special care. Literatures have documented that their utilization of health services has been low due to neglect which is a major barrier for health promotion in this population.

#### **Geriatric Populations Needs Technological Special Care**

More focus to geriatric population is of utmost significance owing to multidimensional health care challenges. Gerontic care refers to provision of necessary care and comfort to the maximum possible extent. Numerous industries are adopting newer technologies as it is accelerated by digital transformation and medical care is not an exception to it. Advent of modern technological advancements has amplified the trend of translational medicine. An interdisciplinary field connecting existing and developing technologies to the aspirations and needs of the elderly is gerontechnology which ultimately supports successful aging [1].

#### **Advantages of Gerontechnological Adoption**

Information and communication technologies (ICT) have improved cost efficiency of health centres apart from increasing the effectiveness of services provided and contribution to health promotion through collaboration with public participation. ICT coupled with knowledge management software enables comprehensive analysis of shared message, efficient problem-solving and collective decision making with

much prioritization to provision of tailored care with more concern for patient's autonomy. Furthermore, smart wearable non invasive technologies especially remote patient monitoring tools offer recordings of valuable and virtual real time physiological data which aids in appropriate observations and regular planning of apt follow-up care sessions with adequate compliance of the patients. These eminent tools have also contributed to detection of diseases progression and presumption of conditions which have features of relapse in addition to provision of support for crises management of treatment outcome consequences through development of predictive tools particularly biopsychosocial indices. The advantage also includes provision of home care services such as intense rehabilitation with satisfactory psychosocial support at times of requiring ambulatory care which is feasible to be delivered through E-health care systems in the recent times. The tools also aid in the prediction of genetic disorders at early stages through algorithms incorporating mathematical as well as statistical models thus preventive therapies could be the adopted to overcome anomalies. Health is affected by a multitude of factors and hence both inter as well as multi-disciplinary approaches are the need of the hour to overcome challenges such as inverse care law and Matthew effect and the current digitalized health care delivery system makes sure that proactive health care management exists to effective integration. The added efficacy of these revolutionary tools is also that it creates ease in the structures and processes at intra and inter organizational levels by simplification through decentralizing services and thereby increasing participatory health value chains. The innovations have also motivated the community for a shift towards self-management model from dependency on traditional health systems so that self-control over personal health which is the most efficacious of all modalities is encouraged to curb the menace of ever-growing disease burden of especially chronic diseases due to changing life style in the present era apart from comforting the patients through palliative care which is undergoing an exponential growth. Moreover, health educational reinforcement with the help of user-friendly applications development has enormously increased the compliance of patients for hygiene maintenance and periodic health visits. The advanced tools have ensured that e- health governance plays a crucial role in the reach of preventive services including tackle in a systematic manner of all contributory factors for the etiology of diseases by predicting the dynamics of health with the external environment so that collaborative approach involving all stakeholders could overcome the root cause of disorders. Telemedicine protects the elderly from the risk of acquiring iatrogenic and idiopathic diseases through elimination of cross-contamination and increases accessibility to health services without transformational constraints. The storage of multidimensional health related data most commonly using cloud computing also plays a significant role in the planning and execution of community health programmes. It also provides information for systematic evaluations to ensure delivery of culturally acceptable health policies and programmes apart from serving as basic tools to formulate strategies of data protection and confidentiality through cyber security service. Smart devices aid the aging population and have evolved from personal emergency response service to provision of reminders for performing routine daily day to day activities exclusively through voice assistants. Digital pill dispensers, sensors to track activities, motion activated lights, smart door bells displaying the video of the individual at the door front, automatic smart security systems and detection devices to identify dangers in the household are the reasons to regard technology as a boon to a good quality of life. The tools based on the Internet of things (IoT) developed with intersectional concern on clinical and ethical factors results in enhancement of productive relational care, facilitation of independent living, promotion of older adults' health outcomes at minimized wastage of resources only when designed to meet the expectations of the elderly in order to provide them tangible benefits focussing on their better self-management and safety. The fact that most of the modernized tools designed are automated for ease in handling and as the databases consist of integrated records collected at different intervals, the information provides clarity regarding between and within subject comparative data analysis for enhancements of prospects in the field of research and development. The evolution of newer techniques has propelled automated drug delivery system which is compatible with electronic gadgets in addition to maintenance of standardized protocols in the health care delivery system [3].

#### **An overview of the Oral Health Disease Burden in the Elderly**

A study by R D Manderson et al in 1975 reveals that 91% of the total sample has missing dentition and 58 % had oral tissues that were so deformed or resorbed [4]. Half of the sample had some form of denture-induced pathology which required either conservative or surgical treatment. A study by M Grabowski et al in 1975 concluded that prosthetic treatment was the main requirement to 80% of the elderly subjects [5]. The treatment needs were extensive and was due to neglected care as per a research by Rise J et al 1978[6]. A study performed by Smith JM et al 1979 found that the elderly participants were embarrassed by the appearance of their teeth and by their dentures dropping during social contact[7]. Dental status and dental needs of a geriatric population were evaluated among 304 elderly people by Mann J et al 1985 in which it was found that the dental status of this population was poor and dental needs were high[8]. According to a study by Miyazaki H et al 1992, a higher level of both untreated teeth and denture treatment needs, and

poorer oral hygiene, was found in 1908 elderly people having poor general health than was observed in those with better health [9]. The New England Elders Dental Study (NEEDS) reported by Chester W. Douglass et al 1993 showed much greater tooth retention among elders compared to 30 years ago [10]. Extremely high demand for the dental health services and programmes for the elderly was suggested by Sengul Unluer et al 2003 as the elders illustrated poor dental health [11]. A study conducted by Edward C M Lo et al 2004 found that about two-thirds of the elderly reported having difficulties chewing and over half had not visited a dentist for over 5 years [12]. The Adelaide Dental Study of Nursing Homes conducted by JM Chalmers et al 2004 found that the residents' oral diseases, especially coronal and root caries, rapidly progressed during their stay in residential care [13]. The dental health of the institutionalized elderly was poor in a survey by S. Kraljevic simunkovic et al 2005 as well [14]. Poor OHRQoL was found to be associated to self-reporting problems with teeth or gums and functional edentulism in a study by Marco Cornejo et al 2009 [15]. A study carried out by Mohammad Sayeed Ahmad et al 2015 stated that oral health is one of the important components of aging and presence of oral disease could affect general health and quality of life of elderly people [16]. A similar study by J. Karki et al 2015 also found that the oral health of the institutionalized elderly residents was poorer and higher reported levels of attending a dentist when only in trouble was also documented on comparing to non-dependent older adults living in the community [17].

### **Understanding the exploding Elderly Segment**

Demographic transition has led to rapid exponential growth of the greying population at a global level and the futuristic trend requires experts in geriatrics to cater age-specific holistic health care. The escalation is expected at an unprecedented rate and it is expected that this segment will outnumber the younger population. It is anticipated by the UN that the global population would ascend to 9.2 billion in 2050 from 6.1 billion in 21st century in which a four-fold increase in the geriatric category is expected from 595 million to 2 billion. It is exploding in proportion from 10% in 2000 which is likely to reach 15% in 2025 and 21.6% by 2050. Senior citizens are subjected to a lot of age related biological, physiological, social, mental and emotional changes and as their health condition is multifaceted with more vulnerable complexities such as multiple pathologies and polypharmacy, integrated health care management system (IHMS) framed with nil biases comprising a team of geriatricians, geriatric dentists and geriatric nurses in the forefront is the need of the hour to provide comprehensive services to meet the unmet health care needs of this ever growing elderly population segment whose dependency impacts the young individuals. The care giver demographic would never increase as that of the older adults. However, artificial intelligence through its machine learning mechanisms replaces care provided by human resources which primarily safeguards high-risk patients. Technologies are now becoming the new care givers for the elderly with the development of robotic assistants which acts as gaming partners encouraging sharing of personal emotions and aiding physical activity which is immensely gaining momentum attracting numerous investors owing to its splendid potential in the technological marketplace.

### **Digital Dentistry for Our Senior Citizens**

Oral cavity usually regarded as the mirror of our body as a link exists with systemic health is to be maintained in the elderly for optimal functional efficiency. Favourable treatment outcomes through digital dentistry make it simpler for elderly patients to understand better the process as it involves tri dimensional scanning in addition to the benefit of obtaining accurate and rapid records which are virtually documentable and retrievable at times of requirement. Technological dental tools have also helped in the identification of minuscule changes in the size, colour, texture, location, and depth of oral soft tissues lesions. Furthermore, computer aided designing and manufacturing (CAD-CAM) contributes to fabrication of oral prosthesis for geriatric individuals at faster pace and minimal dental visits in their comfort zone ensuring avoidance of gag, allergic reactions etc in contrast to conventional techniques. The use of CAD/CAM however dates back to invention in 1973 and implementation for practice in a regularized fashion in 1980s is undergoing rapid developmental transitions for advanced features such as merging with a software that enables modification for analysis for an instance etc. As inverse care law which means that the enormous workforce and infrastructures are concentrated at urban zones when majority of the community resides in rural regions exists, tele-dentistry could be beneficial to those living in areas where there is lack of dental offices. Virtual dental delivery system also ensures that the appointments are aligned so that the older adults do not go through long waiting periods. Augmented reality is another benefit for dental students across the globe to improvise their technical skills which provides them a unique opportunity to react with the environment in addition to imparting virtual information. Another emerging trend is the use of interactive virtual reality to distract the patients to ease anxious patients during treatment procedures. Smart tooth brushes consisting of pressure, time and technique guided alarms in addition to 3D map view of the oral cavity with changing motions enabled through sensors and attachments of intra-oral camera incorporating user friendly apps are emerging as personal oral hygiene aids for effective plaque control [18].

## Uberization of Dental Care

Health care consumers are in the lookout of dental offices which offer instant services. The unintentional benefit of dental care uberization is its impact on reaching the unreached segment of the community. The future would require dental hygienists to provide domiciliary care under virtual supervision of expert service providers in order to overcome the challenge of workforce deficit and fulfil raising oral health care demands.

## CONCLUSION

Increased accuracy and efficiency, faster treatment, better patient experience, improved communication, reduced radiation exposure, production of high-qualitative, precise and customized dental appliances, immense convenience, effective records maintenance and maintenance of cost efficiency are some of the reasons why digitalization is a bliss for all especially the most deserved geriatric group. Awareness inculcation on the data driven gerontechnology-based services among the geriatric population is essential to overcome the challenge of inadequate wisdom reflecting on their resistance to technology adoption which forms the solid ground for the future development of the healthcare industry. Technological rewards must be extended to increasing the utilization of oral health care services by addressing their related barriers and provision of appropriate strategies to resolve concerns with main focus on oral health promotion through educational intervention coupling emphasis on reinforcements post delivery of all dental services under one roof ensuring activation of dental health insurance.

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