Chapter 9

The Use of Artificial Intelligence in Gerodontology in the Age of Digital Technology

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ABSTRACT

The age of digital technology and transformation has brought numerous innovative benefits to the medical field. One of these innovations is the rise in the use of artificial intelligence in treating patients who suffer from both simple and chronic illnesses. Geriatric dentistry is one of those medical domains that is starting to use this new technology to diagnose and treat the oral cavities of its elderly patients. The purpose of this research is to investigate the usage and implementation of artificial intelligence and other technologies in geriatric dentistry by using the biopsychosocial model of ageing as a framework to help dentists with elderly patients. Since this breakthrough is a new and obscure type of tool, little is known about the many leaps it has made, the quality of the results, the availability of the data it generates, its integration into clinical care, and its ethical considerations concerning safety and privacy.

INTRODUCTION

With advancements in digital healthcare technologies like artificial intelligence (AI), 3D printing, robotics, nanotechnology, etc., healthcare is taking shape right before our eyes. Healthcare digitization offers a variety of opportunities for lowering human error rates, enhancing clinical results, monitoring data over time, etc. A number of health-related domains, including developing new clinical systems, maintaining patient information and records, and treating various illnesses, depend heavily on AI techniques ranging from machine learning to deep learning (Ullah et al., 2020).

Combining telecommunications and dentistry, teledentistry entails the transmission of clinical data and images over vast distances for dental consultation and treatment planning. Teledentistry has the potential to increase accessibility, enhance oral healthcare delivery, and cut costs. Additionally, it could end the disparities in oral healthcare between rural and urban areas (Jampani et al., 2011).

Academic medical centres, community hospitals, managed-care organisations, rural hospitals, and other settings all use telemedicine today. It is also used internationally to connect healthcare providers in developing nations with hospitals in developed nations. Remote access to medical care now has previously unheard-of opportunities thanks to developments in digital communication, telecommunication, and the Internet (Dils et al., 2004).

In recent years, there have been numerous technological advancements in the dental industry. Digital diagnostic imaging services, computers, telecommunications technology, devices, and software for analysis and follow-up and even artificial intelligence and machine learning (Clark, 2023). The term "artificial intelligence" (AI) is a general one that refers to the use of a computer to simulate intelligent behaviour with the least amount of human involvement (Hamet & Tremblay, 2017). It is a subfield of computer science that can analyse intricate medical data. Their ability to find significant relationships in a data set can be used in many clinical situations for diagnosis, treatment, and outcome prediction (Ramesh et al., 2004).

On the other hand, the subset of artificial intelligence known as machine learning (ML) uses data to enable computers to "learn" and thus enhance performance (Mitchell, 1997). Without being explicitly programmed to do so, machine learning algorithms create a model from sample data, also referred to as training data, in order to make predictions or decisions (Sudweeks & Gero, 2012).

A surge in interest in AI occurred in the 1980s and 1990s. Different clinical settings in the field of medicine have made use of artificial intelligence techniques like fuzzy expert systems, Bayesian networks, artificial neural networks, and hybrid intelligent systems (Amisha et al., 2019). In 2016, compared to other industries, healthcare applications received the largest share of investments in AI research (CB Insights Research, 2017).

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