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RESEARCH ARTICLE

ARTIFICIAL INTELLIGENCE IN PUBLIC HEALTH DENTISTRY

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Abstract

Artificial intelligence (AI) is now playing a greater role in the healthcare sector. It can be helpful in many situations when new technologies can benefit people. Artificial intelligence (AI) is the term used to describe the capacity of machines to perform human-like tasks. Intelligent data processing software is now necessary due to the substantial increase in documented information and patient data. From data processing and information retrieval to the use of neural networks for diagnosis and the incorporation of augmented reality and virtual reality into dental education, artificial intelligence has a wide range of applications in medicine and dentistry. Artificial intelligence (AI) is being studied in dentistry for a variety of purposes, including the identification of normal and anomalous structures, disease diagnosis, and treatment outcome prediction. This review looks at some current and future applications of AI in Public Health Dentistry.

Introduction:-

In a summer workshop titled the Dartmouth Summer Research Project on Artificial Intelligence, John McCarthy first used the phrase artificial intelligence (AI) in 1956.[1]

"The theory and development of computer systems able to do activities ordinarily requiring human intellect, such as visual perception, speech recognition, decision-making, and translation between languages," according to the English Oxford Living Dictionary.

AI is generally classified into two ways:

1. Based on AI or AI-based systems:
   - Reactive machines,
   - Limited memory machines,
   - Theory of mind, and
   - Self-aware AI.
2. Tech parlance classification:
   - Artificial Narrow Intelligence (ANI),
   - Artificial General Intelligence (AGI), and
   - Artificial Super intelligence (ASI).[2]

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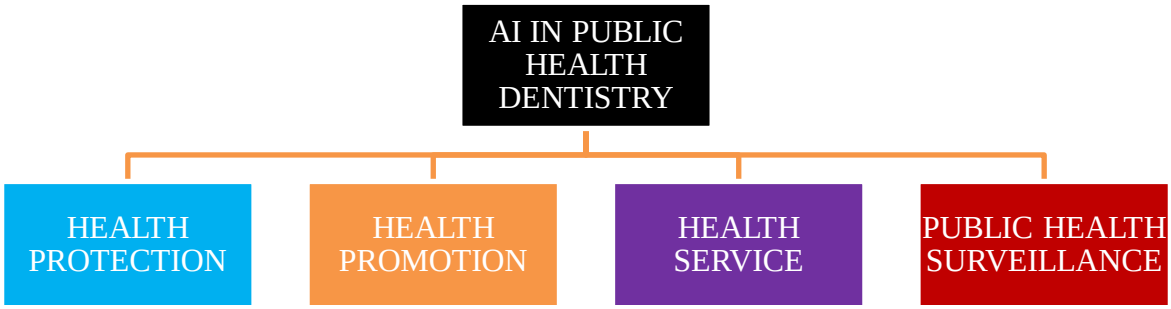
Artificial Intelligence in Public Health Dentistry:
Artificial intelligence has the potential to significantly improve public health, "Dr. Matthew Diamond of the FDA believes, "However, it's crucial to keep in mind that, like any tool, AI-enabled devices must be created and used properly.

Virtual dental assistants driven by artificial intelligence are capable of doing a number of tasks better, more efficiently, and with fewer errors than their human counterparts.[3]

For instance,
1. Helping with clinical diagnosis and treatment planning, managing routine appointments,
2. Reminding patients and dentists to schedule check-ups and
3. Identifying any genetic or lifestyle variables that may raise susceptibility to illnesses and diseases.

Workers are in limited supply in many parts of the world, and this situation is expected to continue. The World Health Organization's (WHO) Sustainable Development Goals can be achieved in part by using AI to aid with these difficulties.[4]

The technological potential of artificial intelligence has received substantially more attention than the potential impact of social factors on results that could be obtained with its assistance in vision statements for the future of public health. Artificial intelligence could be used to increase the efficiency of a public health system that is expanding.[4]



Health Protection:
By analysing data patterns for near-real-time surveillance and illness identification, artificial intelligence has the potential to be applied in the field of health protection.[5]
For example,
1. AI is used to diagnose oral lesions such premalignant and malignant lesions, as well as oral epithelial dysplasia.
2. When a dental emergency strikes and a dental professional cannot be reached, AI offers emergency tele-assistance.
3. AI improves the sensitivity and diagnostic accuracy of dentists in identifying dental cavities.[6]

Health Promotion:
AI provides individualised and targeted health advice based on risk profile and behavioural habits. Depending on their education and previous experience, experts have a variety of skills. The increased interest in employing computer-aided decision making is a result of this, among other things.[4]
For example,
1. The idea of mobile dentistry (mDentistry), which could ultimately alter the way dental care is delivered and show off its potential in the future.
2. Text messages sent automatically and via smartphone apps to encourage people to practise better mouth hygiene.
3. Through the use of Metaverse software, the public or private health sectors can virtually deliver oral health education and dialogues to target populations and communities for the good of all.

4. Kolibree Artificial Intelligence (AI) embedded smart electric toothbrush which is aimed to change people's daily behaviour and improve oral care.[7]

Dentistry In The Metaverse[8]

Ai Toothbrush To Improve Oral Health[9]

Health Service:

AI Increases efficacy of health services through

1. Using machine learning to detect abnormalities
2. Machine learning-facilitated automated evidence synthesis
3. Administrative application

Clinicians, patients, or populations can benefit from the information provided by clinical decision support systems, which can more quickly and effectively improve health outcomes. A deep learning-based approach has been tested in a few studies and has produced encouraging results for the diagnosis of oral disease (such as caries, periodontal disease, and oral cancer) utilising intraoral pictures.

The most common applications of artificial intelligence's natural language processing (NLP) in the healthcare industry include documentation, scientific coding, organising scientific complexity, storing and maintaining patient databases, tracking patient orders, monitoring health conditions, and taking preventive actions like setting up recurring reminders for patients who are participating in tobacco or smoking cessation programmes. It aids in directing scientists when creating cohorts for pricey clinical trials.[10]

Public Health Survellance:

Data analysis at the public level will necessitate a consistent change in approaches employed in functional diagnostic systems, including data mining, artificial intelligence, and machine learning methods to identify huge

amounts of data, useful patterns, and support public health decision-making. Experts will heavily rely on instruments and systems that make use of cutting-edge statistical techniques to distinguish associated ineffective patterns with accuracy, scalable algorithms to process large amounts of complex, highly-dimensional data, and machine learning techniques to further enhance system performance from user feedback.[11]

AI techniques, particularly those based on machine learning, have long been used to analyse trends and dangers from public health monitoring data streams and find patterns, identify anomalies, and recognise patterns.[4]These data streams frequently have strong temporal and spatial components, necessitating analysis in conjunction with outside social, economic, and environmental data. In particular, those not initially or purposefully intended to address epidemiological concerns, AI opens the door to the use of a number of novel or underutilised data sources for public health surveillance.

Prism and Sentinel AI applications offer healthcare analytics designed to speed clinical trial development, identify target patient and physician populations, improve clinical launch strategy, and sharpen Health Economics and Outcome Research studies with real-world evidence. Sentinel innovative service uses artificial intelligence to scrutinize data for detecting threats.[12]

Conclusion:-

A new era in dentistry has emerged as a result of the height of artificial intelligence and digitization, and the field's future prospects are incredibly bright. Although many research have demonstrated potential uses for AI in dentistry, these technologies are still very far from being able to fully replace dental experts. Instead, the usage of AI should be seen as a supplementary tool to support specialists and dentists. To guarantee that humans maintain the ability to oversee treatment and make knowledgeable judgements in dentistry, it is imperative to ensure that AI is integrated in a safe and controlled manner. Even though AI can be useful in a number of ways, a dentist must ultimately make the decision because dentistry is a multidisciplinary field.

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