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Information Technology in Oral Health

Abstract

Information Technology (IT), a relatively new field, can change the dynamics of the dental care delivery system. Most of the dentists are unaware about its goals and advantages and how to get involved into it. This article illustrates as to how IT can be an effective solution for dentists and their patients. Its maturation will depend as much, on the efforts of the health authorities as on the collective efforts of the dental professionals. IT can meet the dental care needs of the underserved in the rural areas and it can ensure the good oral health of the children in schools and child care centres. It provides new opportunities for dental education by providing an easy access to primary care professionals for efficient consultation, thus helping in conducting effective postgraduate education and continuing dental education programmes.

Key Words

Information technology; teledentistry; telecommunication; oral health; dentistry

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INTRODUCTION

Information technology (IT) has advanced precipitously in the last fifty years. Many of these advances have enabled new and beneficial applications of IT in dental education. According to 1997 survey by American Dental Association, almost 80 % of dentists have computers in their offices, 30 % have access to the Internet, and an increasing number use a variety of other technologies, including digital intraoral cameras and paperless patient records. Communication involves the use of electronic mail, Internet search, promotion practices with the help of web technologies, database searching for drugs, dosages and interactions, then learning, practicing and practicing procedures in virtual reality, etc. Clinical practice and research involve the use of new technologies such as devices producing digital images based on x-ray or intraoral cameras, as well as retrieval of medical literature or publishing content on electronic media. When it comes to the health information systems (HIS), it should be noted that the World Health Organization (WHO), has determined it as part of the overall information system and includes a mechanism for collecting, processing, analysis and reception of information necessary for the organization and implementation of health care, but also research and organization of health care. Dental Informatics is the branch of medical informatics oriented to dentistry. It deals with the management of information, communication and application of new technologies in clinical practice and research. Information management involves the storage and use of information generated in direct work with patients in a dental office; it includes the organization of work and arranging visits and operation of dental practice. It is therefore an information system in the dental office.[1-7] IT has given a great relief in work.

Information Technology in Oral Health

The vast strides made in the field of Information Technology have helped popularize the use of computers in Dentistry. Several dental software programs have been indigenously developed for clinical care, patient education, for practice management last but not the least for data analysis.[8]

Research and Biostatistics

Public health Dentistry invariably involves collection of data from an extensive population. This data needs to be collected on a periodic basis to assess the prevalence and incidence of various diseases in a population as well as to keep a track on the trends. The various software programs like

SPSS (Statistical Package for the Social Sciences),[9] SAS (Statistical Analysis System),[10] Microsoft EXCEL[11] and EPI-INFO,[12] have made the analysis of such an extensive data simple and easy to compute. Dental informatics has developed significantly since the 1960s, when the first uses of informatics approaches to address dental issues were documented. In the 1960s, the National Library of Medicine (NLM) in the USA began to accumulate in a computer the bibliographic citations of the more than 3000 biomedical journals stored and indexed by the NLM. A search programme called ELH ILL was developed to retrieve these references. By 1971, these references were available in MEDLINE, the first interactive online medical bibliographic database. Since 1979, MEDLINE has included all references contained in the index to Dental Literature and is the most comprehensive bibliographic database of the published dental literature.[13,14]

Oral health education

Almost all dentists use computers in their daily life but very few use them to improve dental health of the patient by educating them through patient educating software and creating awareness towards improving the oral hygiene. Many patients educating software can be used to help and enhance patient‘s knowledge towards dental health under clinical settings. Software programs such as GURU,[15] PATIENT ORIENTED PROBLEM SOLVING,[16] CASEY PATIENT EDUCATION SOFTWARE,[17] ORASPHERE,[18] have been proven to be effective in a clinical setting. The feasibility of utilizing these software programs for community health education as well as developing alternate programs applicable in a community setting needs to be evolved. The health education software programs, which are simple, may be installed at the primary health center level and the primary health workers may use these for creating awareness on health as well as oral health.

Teledentistry

Telemedicine began in 1924, with the concept of a physician seeing his patient over the radio using a television screen. Telemedicine programs first started in 1950.The initial concept of Teledentistry developed as part of the blueprint for dental informatics, a new domain combining computer and information science, engineering and technology in all areas of oral health, which was drafted at a 1989 conference funded by the Westinghouse electronics system group in Baltimore. Teledentistry was put into practice in US army in 1994 by doing dental consultations on person located more than 100 miles apart. Since then, various institute and organization have practiced Teledentistry with varying degree of success. Teledentistry is a synergistic combination of telecommunications technology, Internet and dental practice. It is a relatively new field and due to the extensive growth of technological capabilities, Teledentistry possesses the potential to fundamentally change the current practice and the face of the dental care. Teledentistry can be defined as the use of electronic information and telecommunications technologies to support long-distance clinical oral health care, patient and professional health-related education, public health, and health administration. It increases patient access to dental care, improves quality of care and the cost effectiveness. For a typical Teledentistry visit, special video- conference equipment and a video/internet connection is set up at both the hub site and remote site. Patient checks in at the remote clinic and before consultation fill out a questionnaire. Dentist or assistant at the remote clinic records a hand-on-examination. Questionnaire, examination and any imaging or documents that are included in the dental record are transmitted to the hub via the online electronic patient record system. With the review of the information in hand, the specialist starts an online consultation with the patient through video conferencing. Telemedicine have been successfully implemented in many developed countries.[19]

Ethical and Legal Issues

Confidentiality: Concern about the confidentiality arises from the transfer of medical histories and records as well as from general security issues of electronic information stored in computers. Practitioner of Teledentistry should take utmost care to ensure that patient privacy is not compromised by unauthorized entities. However patient should be informed that their information is to be transmitted electronically and possibility exist that information will be intercepted, despite maximum efforts to maintain security. Patient should also be informed about inherent risk of improper diagnosis and/or treatment due to failure of technology involved.[20]

Medico legal and copyright issues: In Teledentistry practice, medico legal and copyright issues also have to be considered. These problems are primarily due to lack of well-defined standards. Many of legal issues such as licensure, jurisdiction, and malpractice have not yet been definitively

decided by legislative or juridical branches of various governments.[21] In 2002, 20 states in US enforced restrictive licensure laws requiring Teledentistry practitioner to obtain full licence to practice across state lines.[7]

Use of Information Technology Among Dental Students

IT among dental students remains low. The quality of oral health education can be improved by utilizing the advantages of this technology. Efforts should be made to invest in problem-solving and evidence-based dentistry and to incorporate methods of information retrieval and management into the curriculum.[22]

Applications (APPS) used in Dentistry

Nowadays there is an App for almost everything to increase efficiency and productivity. Rather than an exhaustive list of every available app, these apps we find the most useful for dentists and oral health professionals useful for patient forms, data management, patient communication, clinical reference, practice management, imaging. They are Brush DJ, Dental Expert, Dental Phobia, Braces Help, Teeth Whitener, KidsDental, Dictionary of Dental Terminology, My Smile, Monster Mouth DDS, Colgate Tooth Fairy, dCStory, DDS GP (Dental Demo Suite General Practice), Canvas, Note Taker HD, GoodNotes, Penultimate, Box, LogMeIn, MyDentist, Dental Spanish Guide, Medscape Mobile, Epocrates, GC Restorative Dentistry Guides, iRomexis, Dental RX, Dental Product Shopper, Lexi-Dental Complete.[23,24]

DISCUSSION

During the last quarter of 20th century, emergence and rapid evolution of microprocessor technology enabled developments in IT that heralded an information age, which widened and transformed economic and social activities all over the world.[25] Governments of many developed countries, have already channeled these technologies in the field of healthcare, including dental sectors. Most, if not all, dental schools in the United States have information technology support departments, or at least some IT support staff, but very few employ formally trained informaticians. That is a problem for a number of reasons. Information technology staff is experts in IT, while dental faculty and staff are experts in dentistry. However, putting the two groups together in the context of a dental school does not guarantee success in using IT. Dental clinicians, educators, and researchers do not speak the same language as IT professionals, and many schools fail to bridge that gap.[23] Many voices, ranging from the Gies[26] and IOM[27] reports on dental education to the Macy Foundation study[28] and the meetings of the Santa Fe Group, and even most articles in this issue, have advocated for positive and constructive changes in the dental education environment. Information technology and informatics are key to facilitating many of these changes. A major challenge for dental schools is that they must maintain and balance a complex mix of activities, including clinical care, education, research, and administration. This operational complexity, in turn, begets computational complexity. In India the need for a proper oral health information management system arises because of the glaring disparities in equality and access to oral healthcare between urban and rural regions; increasing burden of oral diseases.

CONCLUSION

Computer technology has reshaped our lives already. The question is to what degree it will reshape dentistry. Challenges and opportunities abound for improving how we support clinical care, education, and research with IT. In clinical care, we need to move electronic dental records beyond replicating paper, connect information on oral health to that on systemic health, facilitate collaborative care through Teledentistry, and help clinicians apply evidence-based dentistry and preventive management strategies. With respect to education, we should adopt an evidence-based approach to IT use for teaching and learning, share effective educational content and methods, leverage technology-mediated changes in the balance of power between faculty and students, improve technology support for clinical teaching, and build an information infrastructure centered on learners and organizations. In research, opportunities include reusing clinical care data for research studies, helping advance computational methods for research, applying generalizable research tools in dentistry, and reusing research data and scientific workflows. In the process, we transition from a focus on IT-the mere technical aspects of applying computer technology-to one on informatics: the what, how, and why of managing information.

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