Original Research Article

Practices and usage of computers in dental settings by dentists - A cross sectional study

Aasim Farooq Shah[*]

Registrar, Department of Public Health Dentistry, Government Dental College and Hospital, Shireen Bagh, Srinagar, Jammu and Kashmir, India
[*]Corresponding author email: **dr_aasimshah@yahoo.com**

Abstract

Medical informatics is the rapidly developing scientific field that deals with resources, devices and formalized methods for optimizing the storage, retrieval and management of biomedical information for problem solving and decision making. It is the branch of science concerned with the use of computers and communication technology to acquire, store, analyze, communicate and display medical information and knowledge to facilitate understanding and improve the accuracy, timeliness and reliability of decision-making. This study was aimed to asses if the dentists in Kashmir use computers at their practices and hospitals. A self-designed questionnaire was used to conduct the survey. The questionnaire was randomly distributed to 446 dental professionals working as interns and teaching staff and dental practitioners. It was noted that 88.5% of the dentists did not use any practice management. Those who are using computers at their practices most frequently use it to store patient information (18.7%). While 22.6 % use it for scheduling appointments, 9.8% for treatment planning, 28.9% use it for diagnosis as radiographs. Many barriers for the use of technology have been put forth. Five categories of barriers to technology integration are time, expertise, access, resources and support.

Key words

Computers, Dentist, Practice, Use.

Introduction

Medical informatics is the application of computers, communications and information technology and systems to all fields of medicine - medical care, medical education and medical research. Medical informatics is the rapidly developing scientific field that deals with resources, devices and formalized methods for optimizing the storage, retrieval and management

of biomedical information for problem solving and decision making. It is the branch of science concerned with the use of computers and communication technology to acquire, store, analyze, communicate and display medical information and knowledge to facilitate understanding and improve the accuracy, timeliness and reliability of decision-making. Medical Informatics (MI) provides a comprehensive survey of current work performed to develop information technology for the clinical workplace. It deals with the acquisition of data from patients, processing and storage of data in computers and the transformation from data into information data.

Dentists have been using technology to supplement their practice for years. Radiography is the most common tool used by dentists to supplement areas of human inadequacy. Lately the computers are being used to enhance the dental practice and provide patient care more efficiently [1].

Initially the computers were introduced into dental practices to make paperwork and billing procedures more efficient. However, this limited use of computers overlooked less obvious educational applications that can have an added benefit of helping dentists to widen their horizon and become more effective providers of high quality healthcare delivery [2].

Dental concepts need to be redefined in order to become organized and appropriate for computer applications. Therefore it is essential that educators give urgent attention to redefining dental concepts in a way that will benefit all. Computer systems today provide chair side check-out, charting capabilities, treatment planning options, educational modules, photographic and radiographic image storage, and total office organization modules to streamline every aspect of dental health care. Today's systems can soon become the backbone of an office and everyone, including the dentist, who must become intimately involved with the computer to gain the maximum benefits [3].

The term information technology refers to an entire industry. In real, information technology is the use of computers and software to manage information. In some areas, this is referred to as Management Information Services (MIS) or simply as Information Services (IS). The information technology department of any institute or company executes tasks like storing, utilizing, retrieving and implementing data. Today information management is a very important aspect of the health care system. The earliest use of computation for medicine was for dental projects in the 1950s at the United States National Bureau of Standards by Robert Ledley. The next step in the mid-1950s were the development of expert systems such as MYCIN and INTERNIST-I. In 1965, the National Library of Medicine started to use MEDLINE and MEDLARS. MUMPS (Massachusetts General Hospital Utility Multi-Programming System) was developed at Massachusetts General Hospital in Boston. Cognitively medical informatics concerns itself with information processing, and communication tasks of medical practice, education, and research, including the information science and the technology to support these tasks. It is basically interdisciplinary field, with a highly applied aim, and it also addresses a number of fundamental research problems as well as planning and policy issues. After years of research on information systems to support the infrastructure of medicine, finally a new generation of systems and tools emerged that aimed at doctors and other health care managers and professionals - to support education, decision making, communication, and may other aspects of professional activity. Large scale investments are being made by health care institutions on information systems that will affect every aspect of their organization's function and medical informatics will emerge as a distinct academic entity [4].

This study was aimed to asses if the dentists in Kashmir use computers at their practices and hospitals and how informed they are in the field of dental informatics.

Materials and methods

The study involved a survey of randomly selected dental professionals working in Government Dental College and Hospital Srinagar and different hospitals of Kashmir, India. Some participants were from tertiary care hospitals where health management information system is used on computers, while others were from hospitals where paper based records are still being used and many private practioners were also included in the study. A self-designed questionnaire was used to conduct the survey. The questionnaire was randomly distributed to 446 dental professionals working as interns and teaching staff and dental practitioners in various dental setups. A survey containing 10 main questions was created with subsections in some questions. The questionnaire was divided into two main categories as demographic details and computer experience. Questions used were short and easy to understand. The survey was kept anonymous in order to make it more transparent so that users can share their real opinion of their skills and their training needs. The survey data was entered into a database for further analysis. SPSS 12.0 was used for this purpose. The data was used to generate frequencies, percentages, and graphs.

Results

The total number of respondents was 446, out of which 256 (57.3%) were females and 191 (42.7%) males (**Figure - 1**). The mean age of the respondents was 28.7 years with a range of 22 years to 46 years. Dentists who responded included 380 (85.2%) general dentists / practitioners and 66 (14.79%) specialists. The survey showed that 38.6% of the respondents had their own private practice and 13.4% worked for a private clinic/hospital, 32.7% worked for an institute and only 15.3% worked for some government hospital or establishment.

The result of the survey showed that 44.3% of the respondents had no network connecting all the computers or had a single computer at their practice while 55.7% had a network connecting

computers at their practice. It was noted that 88.5% of the dentists did not use any practice management system, only 11.5% were using a practice management system at work. Those who are using computers at their practices most frequently use it to store patient information (18.7%). While 22.6 % use it for scheduling appointments, 9.8% for treatment planning, 28.9% use it for diagnosis as radiographs and 20 % use it for other purposes which were not specified (**Figure - 2**). The frequency of internet usage at home was the highest. 75.9% used their office premises to access patient related information and only 24.1% could access this information at home. It was also seen that 74% used the computer for patient education. The most significant barrier of computer usage was the lack of computer education, untrained staff and low financial support. Majority of the dentists had internet connection at their workplace (88.2%). Most (84.9%) of them thought that a computer at the chair side is an additional advantage. 66.3% were insecure about security of information in the computer and only 8% were uploading the information of patients online for patients viewing.

Figure - 1: Frequency distribution of subjects in relation to gender.
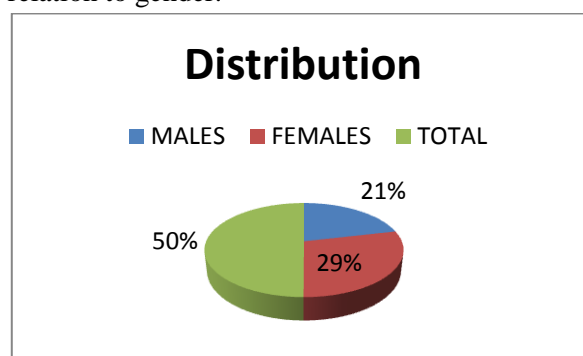

Discussion

In the 1970's a growing number of commercial vendors began to market practice management and electronic medical records systems. Although many products exist only a small number of health practitioners use fully featured electronic health care records systems. The hospital management and information system

consists of not only information of the hospital and clinical information of a patient but also includes telemedicine, computer-assisted instructions to patient as well as doctors and may even cover computer-assisted imaging and surgery. Surgical simulations and virtual environment are educational tools not only for doctors but also for patients. It is the era of convergence with the computer screen.

Figure - 2: Frequency distribution of subjects in relation to use of computers in dental practice.
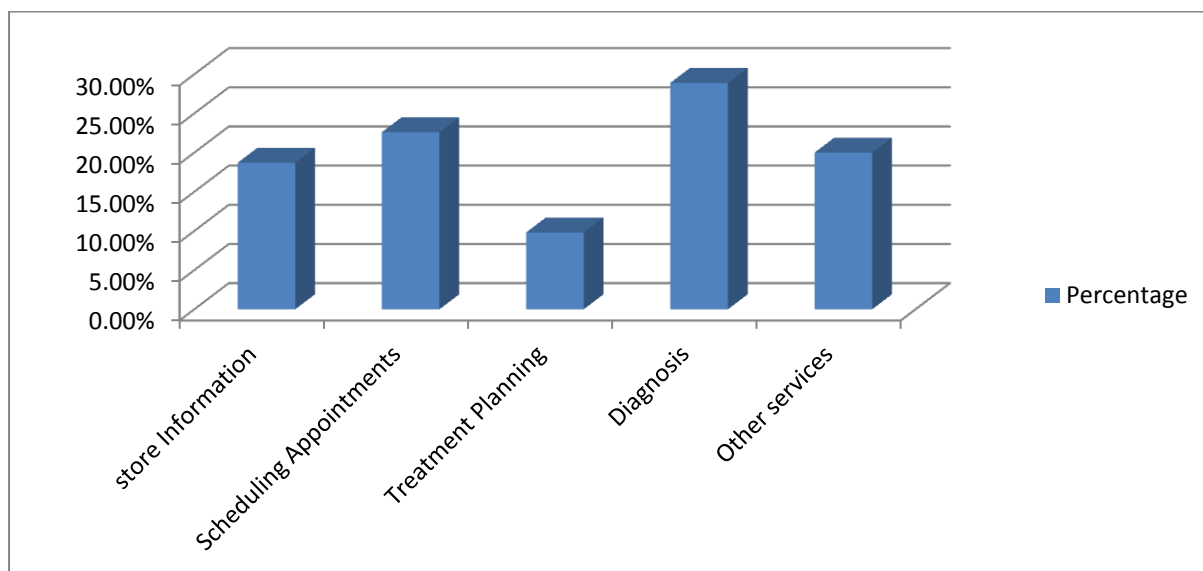
The term 'Biomedical Computing' has also been used for a number of years. 'Medical informatics' originated in Europe with a broader scope than 'medical computing'. Medical Informatics was defined as the 'rapidly developing scientific field that deals with the storage, retrieval and optimal use of biomedical information, data, and knowledge for problem solving and decision making'. Dental informatics is a comparatively new field that has significant potential for supporting clinical care. Most dentists are unaware of what dental informatics is, what its goals are, what it has achieved and how they one can get involved in it.

The results showed that the average age of the dentists that we surveyed was almost 27 years ranging between 22-42 years. The primary reason for this was that we targeted hospitals and institutes where we could access large number of dentists in one visit. Thus the questionnaire was distributed amongst interns, house surgeons, fresh graduates and general dentists. The only keen respondents were the younger generation, probably ones who are more literate about computers. In India as well as the rest of the world computer technology has significantly taken over all fields of life.

As we can see the relative proportion of women in dentistry has increased from less than 3 percent of practicing dentists in 1970 to more than 14 percent in 2002. By 2020, women are projected to make up about 30 percent of active dental practitioners [5]. The American Dental Association's Future of Dentistry report concluded that the major demographic shift in the number of female dentists will affect dental work force trends in the United States throughout the first decades of this century [6]. The results showed only 66(14.79%) dentists were specialists. Specialists in Kashmir were much lower in number than general practitioners. The reasons could be the limited number of postgraduate seats offered locally. Apart from these dentists who do specialize from abroad have no incentive to come back due to job saturations and low income offering, leaving

behind a large pool of general dentists as compared to specialist.

Computers are an increasingly common feature of healthcare systems throughout the world [8]. In addition to clinical care, computerization in clinical practice can also improve both front- and back-room administrative efficiency [7].

In regards to dentistry, computer applications offer benefits in patient registration, admission, computer based Patient Records (CPR), recalls and regular follow-ups, and knowledge-based clinical decision support systems [8].

Currently, computers in dentist' offices are used primarily by secretaries and receptionists for business management purposes. Dental applications for the dentist to use during patient examinations are being developed. Such computer use should improve primary dental patient care [9]. We found that a majority of respondents had computers in their offices, while a minority used chair-side computers. Data are similar to Schleyer's report for the United States [10].

Though our study showed that almost all dentists had an internet connection at their practices but only a few had a network connecting the computers. Apart from this hardly anyone used or knew about a practice management system. They accessed patient's related information from home or office and the main purpose for internet use was email. The other purpose of using a computer was storing patient related information. This survey reveals that computerization is more likely to be adopted by private clinics, probably because of financial support than Government Hospitals where it is hardly used. In Jammu and Kashmir, government hospitals receive a much higher number of patient visits than private clinics. However they use it to assist and streamline administrative affairs. While the competitive advantage of a private practitioner lies in service delivery, investment in technology to assist in clinical service delivery offers a great return to private practitioners. Many barriers for the use of technology have been put forth. Five categories of barriers to technology integration are time, expertise, access, resources and support.

Indian Space Research Organisation (ISRO) has initiated a number of telemedicine pilot projects which are very specific to the needs of development of our society. The projects consist of linking hospitals in remote and inaccessible areas with super speciality hospital located in the city through Indian National Satellite (INSAT). Remote areas covered are J&K and Ladakh in North, offshore islands of Andaman and Lakshadweep, interior parts of Orissa, northeastern states of country and some tribal districts in the mainland states. Telemedicine is most effective for India which is vast and has different regions like the mountain region of J&K and Ladakh. With a majority of our population living in rural area and majority of doctors living in urban areas, telemedicine can be a solution for providing improved health care for benefits like improved access, reduced cost, reduced isolation of doctors and finally improved quality of health care.

Conclusions

Presently the dental practices are in a transition between paper based storage of information and implementation of electronically storing data. On the other hand, one can observe the fast movement towards implementing computers at chair side and the surfacing of systems that serve clinical needs more comprehensively than previously. The negative impacts of computer use may be amplified by some nonusers, but proper instruction in computer use will reduce resistance to this inevitable and essential change.

References

1. Abbey LM. Mastering change. In: Abbey LM, Zimmermann JL, editors. Dental informatics: integrating technology into the dental environment. New York: Springer-Verlag; 1992, p. 13.

2. Monteith BD. The electronic patient record and second generation clinical databases: problems of standards and nomenclature. J Dent Educ., 1991; 55: 246-52.

3. Freydberg BK, Seltzer SM, Walker B. Choosing the Right Computer System. Compend Contin Educ Dent., 1999; 20(8): 738-40.

4. Greenes RA, Shortliffe EH. Medical Informatics: An Emerging Discipline with Academic and Institutional Perspectives. Journal of the American Medical Association, 1990; 263(8): 1114-20.

5. American Dental Association, Survey Center. The American Dental Association dental workforce model: 1999–2020. Chicago: American Dental Association, 2001.

6. American Dental Association. Future of dentistry. Chicago: American Dental Association, Health Policy Resources Center; 2001, 35–8.

7. Coiera E. The Guide to Health Informatics, 2nd edition, Arnold, London, October, 2003.

8. Johnson L, Thomas G, Dow S, Stanford C. An initial evaluation of The Iowa Dental Surgical Simulator. J Dent Educ., 2000; 64: 847-53.

9. Iplikcioglu H, Akca K, Cehreli M. The use of computerized tomography for diagnosis and treatment planning in implant dentistry. J Oral Implantol., 2002; 28: 29-36.

10. Schleyer TK. Dental Informatics: An Emerging Biomedical Informatics Discipline. Adv Dent Res., 2003; 17: 4-8.