Original Article

Knowledge and Utilization of Computer among Health-care Professionals in Mumbai

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Abstract

Background: Incorporation of information technology (IT) advancements in health care has gained wide acceptance in the last two decades. Developed countries have successfully incorporated this in their health-care system, thus improving health care. However, only a limited application of IT is seen in developing countries. **Aim:** The aim of the study was to assess the knowledge and utilization of computers among health-care professionals in Mumbai, India. **Methodology:** A cross-sectional questionnaire study was conducted among dental, medical, Ayurveda, and homeopathy practitioners. A total of 1000 respondents (250/group) were included in the study. The first section of the questionnaire sought sociodemographic information of respondents, and the second section sought information on the level to which health-care practitioners apply computers to tasks at their places of work, accessibility of the Internet, views regarding the cost of a computer, and the problems associated with the medical recording system at their places of work. Data were entered into Microsoft Excel and analyzed using SPSS version 17. $P \leq 0.05$ was considered statistically significant. **Results:** Two hundred and fifty participants in each profession were included in the study. The age ranged between 23 and 65 years. Majority (>80%) of the participants had knowledge about word processing program and slide preparation for presentation. On comparison, knowledge was more in medical and dental professionals ($P = 0.04$). Almost 80% were in the opinion that electronic system for records is better than paper-based recording system, but majority of them reported lack of such facility at their workplace. Knowledge and utilization was higher among the doctors having postgraduate qualification compared to undergraduates ($P = 0.002$). **Conclusion:** The study showed average knowledge but lack of utilization of computers by health-care professionals in routine practice. More research should be done into the factors that play an important role in computer use among health-care professionals in developing societies.

Keywords: Computer literacy, health-care professionals, knowledge, utilization

INTRODUCTION

Since the advent of computers, there have been significant interests in the collection, storage, retrieval, and analysis of a wide range of information in all spheres of socioeconomic development endeavor.[1] In the health sector, advances in information and computer technology in the last quarter of the 20th century has led to the ability to more accurately profile individual health risk and to understand better basic physiologic and pathologic processes and diagnosis through new imaging and scanning technologies. Such technological development, however, demands an increased responsibility of practitioners, managers, and policymakers to assess the appropriateness of new technologies.[2]

Studies show that serious implementations of these technologies occur mainly in the developed countries. In most of the developing countries, computer literacy is still low may be because of high cost of hardware or software and connectivity issues. More so, little is known about the level of computer use in health facilities within these communities.[3] In a study conducted among a selected population of doctors in Nigeria by Ozumba,[4] only about 0.5% of doctors searched the Internet for information relating to their clinical practice/research, though 72% of respondents believed that the Internet had a role to

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play in medical practice. In a survey of health professionals and medical students in Lagos, Nigeria, Bello *et al*.[5] reported that only 26% of respondents had a computer and only 27% of doctors demonstrated computer literacy. This is in sharp contrast to what obtained in Europe, America, and Australia.[6]

A study in 2002 among a selected population of student doctors in Malaysia showed that 94.3% of respondents could use a computer.[7] Similarly, higher values have been obtained for medical/dental students in Europe[8] and Saudi Arabia.[9] A study carried out in New Zealand in 2002[10] showed that 99% of practices use specifically designed patient management system software to assist with recording of patient and clinical consultation details and to help with the daily running of their businesses.

The success of any health informatics program is hinged on the skill set of the personnel involved. Data from the health sector are enormous, and many times, there is the risk of the load of data becoming a useless bundle of records. Not much is reported in literature about the level of Internet access among doctors, especially in Ayurveda and homeopathy practitioners and the use of electronic medical record systems in health-care facilities in India. Hence, the study was conducted to assess the knowledge and utilization of computers among health-care professionals in Mumbai, India.

METHODOLOGY

A cross-sectional questionnaire research was conducted to assess the knowledge and utilization of computer among health-care professionals in Mumbai, India. The study included dental, medical, Ayurveda, and homeopathy practitioners. Ethical clearance was obtained from the Institutional Review Board (Ref no TDC/IRB-EC/84/2018), and an informed consent was obtained from the study participants.

Pilot study

A pilot study was conducted among fifty dental and medical practitioners to check for the face and content validity of the developed questionnaire and also to test its reliability and to derive the sample size. The questions were framed after thorough review of the literature, and with the help of four experts, the questions were reviewed for content validity. Cronbach's coefficient was found to be 0.80, which showed good internal reliability of the questionnaire. Based on the results of pilot study, the sample size was calculated to be 250 in each group. The sample size was calculated using G*Power 3.0.10 Universitat Dusseldorf based on responses observed in the pilot study (alpha error at 5%, power of study at 80%, $P_1 = 79\%$, $P_2 = 70\%$).

All participants were interviewed by a single investigator. Questionnaire included 21 questions. Questions were both closed ended and open ended. Respondents' names were not elicited in the questionnaire in order to enhance participation and to maintain confidentiality. The first section of the questionnaire sought sociodemographic information of the respondents which included age, gender, type of hospital attachment, years in practice, and highest qualification. The second section sought information on the level to which health-care practitioners apply computers to tasks at their places of work, accessibility of the Internet, views regarding the cost of a computer, and the problems associated with the medical recording system at their places of work.

Data analysis

The data were analyzed using SPSS version 17 (Inc., Chicago, IL, USA). $P \leq 0.05$ was considered as statistically significant (confidence interval of 95%). Descriptive statistics were carried out to calculate responses for each question. Responses were compared between the different professions. Further analysis was performed to find the association between computer utilization and different variables using Chi-square test.

RESULTS

Demographic profile

Out of the total 1000 respondents, 60.6% were male, whereas 39.4% were female. The mean age was 38.73 ± 4.9 years and ranged between 23 and 65 years. About 44.6% of the respondents had 6–15 years of practice and 32.7% had postgraduate degree [Table 1].

Personal skills/competencies

Knowledge about SPSS software was highest among dental professionals and lowest in Ayurveda practitioners. These differences were found to be statistically significant ($P < 0.05$). More than 80% of the respondents could prepare slides for presentation. More than half of the respondents could use Medline/PubMed, but very few had published a paper. Medline/PubMed use and publications were highest among dental and medical practitioners, which was statistically significant ($P < 0.05$). Majority of the participants could use word processing program with dentists being the highest (90.4%) [Table 2].

Table 1: Demographic information of study participants	
Variables	***n* (%)**
Gender	
Males	606 (60.6)
Females	394 (39.4)
Years of practice	
0-5	303 (30.3)
6-15	446 (44.6)
>15	251 (25.1)
Qualification	
Undergraduate	673 (67.3)
Postgraduate	327 (32.7)
Hospital	
Primary	652 (65.2)
Secondary	193 (19.3)
Tertiary	155 (15.5)

Medical recording system

In this study, more than two-third of the respondents supported the use of electronic/computerized record system, but merely one-third of respondents had this type of facility at their workplace**.** When asked about the problems with the recording system, most of the respondents mentioned time waste, lack of durability, cumbersome, and inaccessibility to the health records of patients as common problems. Reasons given by respondents in favor of computer utilization were time saving, better accessibility of records, easy to track the records of patients and safe and effective [Table 2, Figure 1].

Knowledge and utilization according to the qualification

This study showed that computer knowledge and utilization was significantly higher among respondents having postgraduate degree. More number of postgraduates had knowledge about word processing programs, SPSS, access to the Internet at their workplace, and had more number of publications. Medline/PubMed search was higher among postgraduate professionals. Significantly more number of the professionals with postgraduate degree were utilizing computerized record system. They also found electronic record system better than paper-based record system. These differences were statistically significant ($P < 0.05$) [Table 3].

Knowledge and utilization according to years of practice

Study participants were divided into three groups based on the years of practice as 0–5 years, 5–15 years, and more than 15 years of practice. The use of word processing program, SPSS, and slide preparation was significantly more in professionals having <15 years of practice compared to senior practitioners (>15 years) ($P < 0.05$). The mean number of publications was 1.33 ± 1.2 in senior practitioners (more than

15 years of practice) and 0.78 ± 1.2 in participants having practice of <5 years ($P < 0.05$) [Table 4].

Discussion

Information technology (IT) has radically changed the way that many people work and think.[11] Health-care professionals can no longer ignore the application of IT in health care.[12] Doctors need IT skills to deliver health care in the 21st century. There is concern that those who trained before the "information age" will be inadequately equipped for their work.[13]

India has made great stride in the field of telemedicine and e-health. Most of the telemedicine activities are in project mode supported by the Indian Space Research Organization, Department of IT, which is being implemented through state governments. Few corporate hospitals have recently developed their own telemedicine network. Besides, some of the nationwide
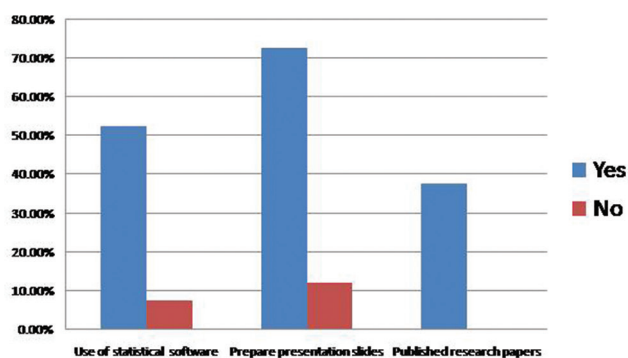

Figure 1: Comparison of word processing software knowledge and other skills

Table 2: Comparison of computer knowledge and utilization among health-care professionals

Variables	Dental, *n* (%)	Medical, *n* (%)	Ayurveda, *n* (%)	Homeopathy, *n* (%)	*P*
Use word processing program	226 (90.4)	222 (88.8)	200 (80.0)	220 (88)	0.04*
Use SPSS	164 (65.6)	152 (60.8)	133 (53.2)	163 (65.2)	0.003*
Prepare slides for presentation	215 (80.6)	214 (85.6)	207 (82.8)	224 (89.6)	0.60
How did you learn the above program					
Self-study	129 (51.6)	123 (49.2)	108 (43.2)	97 (38.8)	0.002*
Formal training	33 (13.2)	56 (22.4)	61 (24.4)	67 (26.8)	
Both	88 (34.2)	71 (28.2)	86 (30.6)	86 (34.1)	
Search world wide web/Internet	237 (94.8)	242 (96.8)	235 (94.0)	240 (96.0)	0.56
Access to Internet at workplace	86 (34.4)	87 (34.8)	81 (32.4)	97 (38.8)	0.78
Own a personal computer	240 (96.0)	240 (96.0)	220 (88.0)	229 (91.6)	0.89
Cost of the computer within limits	168 (67.2)	183 (73.2)	180 (72.0)	165 (66.0)	0.04*
Ever published a paper	111 (44.4)	96 (38.4)	85 (34.0)	85 (34.0)	0.03*
Mean number of publications (mean±SD)	1.26 (2.3)	1.33 (2.1)	0.85 (1.4)	0.93 (1.4)	0.02*
Search Medline/PubMed	154 (61.6)	159 (63.6)	129 (51.6)	135 (54.0)	0.003*
Computerized record system in health-care facility	87 (34.8)	85 (34.0)	64 (25.6)	87 (34.8)	0.001*
Problem with medical record system (inaccessibility, time waste, and lack of durability)	198 (79.2)	182 (72.8)	166 (66.4)	174 (69.6)	0.002*
Electronic system is better than paper-based system	215 (86.0)	201 (80.4)	195 (78.0)	207 (82.8)	0.67
Respondent who said that electronic system is time saving, have better accessibility, easy to track, and safe	168 (67.2)	149 (59.6)	110 (44)	124 (49.6)	0.003*

Chi-square test, *Statistically significant. SD – Standard deviation, SPSS – Statistical Package for the Social Sciences

Table 3: Comparison of knowledge and utilization of computer according to qualification

Variables	Undergraduate, *n* (%)	Postgraduate, *n* (%)	*P*
Use word processing program*	574 (85.3)	294 (89.9)	0.001*
Use SPSS*	384 (57.1)	228 (69.7)	0.001*
Prepare slides for presentation	573 (85.1)	287 (87.8)	0.56
How did you learn the above program*			
Self-study	288 (42.8)	169 (51.7)	0.002*
Formal training	161 (23.9)	56 (17.1)	
Both	213 (31.6)	99 (30.3)	
Search world wide web/Internet	638 (94.8)	316 (96.6)	0.78
Access to Internet at workplace*	233 (34.3)	120 (36.6)	0.04*
Own a personal computer	626 (93.0)	303 (92.7)	0.77
Cost of the computer within limits*	478 (71.0)	218 (66.7)	0.023*
Ever published a paper*	210 (31.2)	167 (51.1)	0.003*
Mean number of publications**	1.01±0.23 (1.8)	1.27±0.26 (2.0)	0.02*
Search Medline/PubMed*	359 (53.3)	218 (66.7)	0.04*
Computerized record system in health-care facility*	200 (29.7)	123 (37.6)	0.004*
Specific problem with medical record system at workplace (inaccessibility, time waste, and lack of durability)	335 (33.5)	351 (35.1)	0.78
Electronic system is better than paper-based system*	537 (79.8)	281 (85.9)	0.023*
Respondent who said that electronic system is time saving, have better accessibility, easy to track, and safe*	533 (79.1)	298 (92.2)	0.012*

Chi-square test, Student's *t*-test, *Statistically significant. SD – Standard deviation, SPSS – Statistical Package for the Social Sciences

Table 4: Comparison of computer knowledge and utilization according to years of practice

Variables	0-5 years	6-15 years	>15 years	*P*
Use word processing program*	257 (84.8)	401 (89.9)	210 (83.7)	0.001*
Use SPSS*	173 (57.1)	290 (65.0)	149 (59.4)	0.001*
Prepare slides for presentation*	258 (85.1)	402 (90.1)	200 (79.7)	0.003*
How did you learn the above program*				
Self-study	142 (46.9)	195 (43.7)	120 (47.8)	0.045*
Formal training	67 (22.1)	96 (21.5)	54 (21.5)	
Both	90 (29.7)	153 (34.3)	69 (27.5)	
Search world wide web/Internet	289 (95.4)	426 (95.5)	239 (95.2)	0.45
Access to Internet at workplace*	97 (9.7)	157 (15.7)	99 (9.9)	0.002*
Own a personal computer	280 (92.4)	420 (94.2)	229 (91.2)	0.56
Cost of the computer within limits*	202 (66.7)	331 (74.2)	163 (64.9)	0.003*
Ever published a paper*	97 (32.0)	181 (40.6)	99 (39.4)	0.002*
Mean number of publications*	0.78 (1.2)	1.17 (2.0)	1.33 (1.33)	0.001*
Search Medline/PubMed	172 (56.8)	258 (57.8)	147 (58.6)	0.50
Computerized record system in health-care facility	98 (32.3)	134 (30.0)	91 (36.3)	0.50
Problem with medical record system at workplace (inaccessibility, time waste, and lack of durability)	221 (72.9)	343 (76.9)	189 (75.6)	0.78
Electronic system is better than paper-based system	240 (79.2)	364 (81.6)	214 (85.3)	0.98
Respondent who said that electronic system is time saving, have better accessibility, easy to track, and safe*	269 (88.7)	401 (89.9)	153 (60.9)	0.001*

Chi-square test, *Statistically significant. SPSS – Statistical Package for the Social Sciences

projects are being taken up by the Ministry of Health. The Telemedicine Standardization and Practice guidelines are being developed by the IT department. The National Telemedicine Task Force has been set up by the Health Ministry.[14]

The present study showed that knowledge about word processing, SPSS, slides preparations, Medline/PubMed search, and publications was higher among dental and medical practitioners compared to other professions. Information and communication technology is an increasingly important tool in medical and dental education. The current concern on evidence-based health care may have increased the need for computer and Internet usage in medical and dental practice. Online databases such as PubMed, Medline, and Google are key tools in search for the best evidence and their use depends on computer knowledge and Internet access.[15] In the present study, almost 80% of the professionals reported problems with paper-based recording system and were in opinion that

electronic system is better than paper-based system. However, merely one-third of the professionals had computerized recording system at their workplace. Traditionally, in India, patient medical records have been paper based and continue to be confined to the facility that the patient has attended. Because of the nature of the health-care system in India, which includes primary, secondary, and tertiary health-care facilities spread across both government and private sectors, the options of health-care providers are practically endless. No conclusive data regarding adoption of electronic health record system in India are available. This lack of data can be attributed to challenges such as long implementation time, security and privacy issues, and user resistance to adoption, complex organizational environment, overpopulation, and lack of resources and infrastructure.[16]

In India, traditional medicine and contemporary and alternative medicine have been used for thousands of years for prevention, diagnosis, and treatment for wide variety of illnesses. With establishment of AYUSH scheme, it now provides important health-care services to patients, especially with those with a limited geographic and financial access to "modern system of medicine".[17]

Currently, there are more than 7 lacks AYUSH practitioners in India, thus contributing significantly in health-care task force.[17] On comparison, the study showed major deficiencies among Ayurveda and homeopathy practitioners regarding computer knowledge as well as utilization in their practice, which needs to be addressed.

On comparison according to the qualification, knowledge and utilization of computer was higher among professionals having postgraduate degree. This can be justified by the fact that postgraduates have more exposure and utilization of computer during their academic tenure. This gap can be fulfilled by imparting essential computer training program at the undergraduate level.

The present study showed that knowledge about word processing program, SPSS, Medline/PubMed search, and publications was more among practitioners having <15 years of practice compared to senior practitioners, which indicates that the younger generation is more involved with newer technology. This is supported by the study done by Nilsson and Pilhammar.[18] Gender-wise comparison showed higher knowledge and utilization among males compared to female practitioners suggesting a gender-based digital gap. This is in line with the other studies.[19,20]

The present study supports the findings shown in the study done by Asangansi *et al*.[21] that there is an association between the information handling competencies such as word processing, statistical analysis, and slide presentation-making skills. The doctors with one of these skills were more likely to have the other skills.

Health and financial resources in developing countries such as India are limited and unevenly distributed. In addition, geographic and socioeconomic factors prevent the transfer of rapid information between patients and health-care providers. By the use of IT, we can cross these barriers to provide timely medical care in the remotest corner of the country.[12,22,23]

CONCLUSION

The study showed average knowledge but lack of utilization of computers by health-care professionals in routine practice. More research should be done into the factors that play an important role in computer use among health-care professionals in developing societies. It is also recommended that medical curriculum should include training on basic computing skills. Basic computer and Internet facilities should be provided in every hospitals and health centers which will help in maintaining huge amount of patient's data more efficiently.

LIMITATIONS

The present study was done to find the knowledge and utilization of computers among medical, dental, Ayurveda, and homeopathy practitioners. Health-care professionals working in government or private hospital setting were not included in the present study. Furthermore, the barriers for underutilization of computers were not investigated. Further studies are recommended to throw light on such issues.

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Conflicts of interest
There are no conflicts of interest.

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