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Perception, Attitude & Barriers Amongst Dentists Using Digital and Electronic Technology

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ABSTRACT

Introduction: In recent decades, digital technologies have become increasingly essential in dentistry, continuing the field's long-standing necessity of cutting-edge technology and innovation.
Aims & Objectives: The objective of the study was to determine the perception and attitude of dentists towards the use of digital and electronic technology.
Place and duration of study: Islamabad Dental Hospital from April to Sep 2020.
Material & Methods: A cross-sectional study was conducted amongst 429 practicing dentists having more than 10 years of clinical experience. The questionnaire was distributed Those who are proficient with digital technology were sent the questionnaire electronically, while those who are not were given a printed copy. The data from the filled forms was then compiled in a spreadsheet. The data was analyzed using IBM-SPSS (Statistical Package for Social Studies) Version 22. P-Value < 0.05 was taken as significant.
Results: Out of 800 distributed questionnaires, 429 completed questionnaires were received with a response rate of 54%. 145 respondents (33.8%) were 98.8% (n=424) demonstrated acceptance towards digital photography, 99.5% (n=427) were ready to utilize digital radiography, electronic or virtual models was appreciated by 97.7% (n=419. 138 (32%) of them thought it required proper technical training, 43 (10%) showed lack of comfort with the technology and 36 (8%) experienced lack of inter-doctor co-operation.
Conclusion: While the vast majority of dentists see digital and electronic technologies as helpful for their work, many have noted challenges to more widespread adoption.

Keywords: Perception, Attitude, barriers, digital technology, electronic technology.

INTRODUCTION

Dentistry has a long-standing relationship with cutting-edge technology and innovation[1]. As dental technology has progressed over the last few decades; digital technologies have become increasingly important.[2] Communication and information handling in dental practices are more computer mediated now than before. Also, digital imaging and photography are increasingly common in diagnosing, and digital methods are being used more for processes such as impression taking, treatment planning and implant surgery[2].

All areas of life are being transformed by technological advancements, including dentistry. digitization of medical information, 3D modelling, and even artificial intelligence are just a few examples of the major technical advancements that have revolutionized the dental industry (AI)[3]. Modern medical care and treatment are being revolutionized by digital technology. Dentistry has to increase its understanding of how dental applications digital workflow models and digital health information is revolutionizing and disrupting dental practice to foresee how this digital transition will affect dentistry[4].

Increased patient happiness, improved workflow, higher-quality records & accurate diagnosis are some of the benefits of Digital dentistry. Others being better doctor-patient communication, lower overhead costs, less time spent in the dental chair, less exposure to radiation, and shorter appointment times is important for quality care[5].

Clinical change in healthcare is studied through a series of obstacles and motivations, including cost, lack of comfort and knowledge with technology and cost.[2] A study conducted at Thames Valley Strategic Health Authority region states that 241 (77%) of the dentists were able to handle digital technologies, few of them were competent enough to utilize these gadgets[6].

We set out to learn how widespread the usage of computers is in dentist offices and what they're utilized for in the Pakistani dental setup. Since there is currently no study accessible in the local literature on this topic, doing studies on it will allow the dental profession and industry to prepare for the

future adoption and application of electronic and digital technology.

MATERIAL AND METHODS

A cross-sectional study was conducted at Islamabad Dental Hospital among dental practitioners from April to Sep 2020 to determine their judgment and thinking towards adaptation of digital and electronic technologies. Data was collected after the approval from the Ethical Review Committee ref no IMDC/DS/IRB/153, dated 25 April 2020. A sample size of 429 was derived from a study conducted at Thames Valley Strategic Health Authority region[6] using Rao soft sample size calculator keeping 95% confidence interval & 5% margin error. Nonprobability sampling technique was used.

All practicing dentists having more than 10 years of clinical experience were included in our study. Dentists not willing to consent or having less than 10 years clinical experience & incompletely filled questionnaires were excluded from our study.

The questionnaire was distributed to those who are proficient with digital technology and were sent the questionnaire electronically, while those who are not were given a printed copy. The data from the filled forms was then compiled in a spreadsheet.

The data was analyzed using IBM-SPSS (Statistical Package for Social Studies) Version 22. The data was presented as the perception and attitude of each group in the form of frequency and percentage. The descriptive statistics of overall sample data were reported in form of mean and standard deviation for quantitative variable(s) i.e., gender. Results were graphically displayed as tables and bar charts.

RESULTS

Out of 800 distributed questionnaires, 429 completed questionnaires were received (response rate 54%). majority of the participants were females (n=284/429, 66.2%). In present study 393 (91.6%) perceived digital photography and 415 (96.7%) perceived digital radiography as quite or very useful. Whereas 388 (90.4%) and 349 (81.4%) thought that electronic or virtual models and paperless charting were quite or very useful, respectively. Almost all of the respondents showed their willingness for using these technologies, out of 429 respondents agreed for using digital photography 98.8% (n=424) demonstrates acceptance towards digital photography, 99.5% (n=427) were ready to utilize digital radiography, electronic or virtual models was appreciated by 97.7% (n=419) whereas paperless charting was adopted by 92.1% (n=395) (Table-1).

Question	Options	Frequency (%)
What is your perception of the usefulness of digital photography?	Not useful at all	0
	somewhat useful or Useful	36(8.4)
	Quite or Very Useful	393(91.6)
What is your perception of the usefulness of digital radiography?	Not useful at all	0
	somewhat useful or Useful	14(3.3)
	Quite or Very Useful	415(96.7)
What is your perception of the usefulness of electronic or virtual models?	Not useful at all	2(0.5)
	somewhat useful or Useful	39(9.1)
	Quite or Very Useful	388(90.4)
What is your perception of the usefulness of paperless charting?	Not useful at all	15(3.5)
	somewhat useful or Useful	65(15.2)
	Quite or Very Useful	349(81.4)
If you have an opportunity, will you use digital photography?	No	5(1.2)
	Yes	424(98.8)
If you have an opportunity, will you use digital radiography?	No	2(0.5)
	Yes	427(99.5)
If you have an opportunity, will you use electronic or virtual models?	No	10(2.3)
	Yes	419(97.7)
If you have an opportunity, will you use paperless charting?	No	34(7.9)
	Yes	395(92.1)

Table-1: Perception and willingness to use electronic and digital technologies.

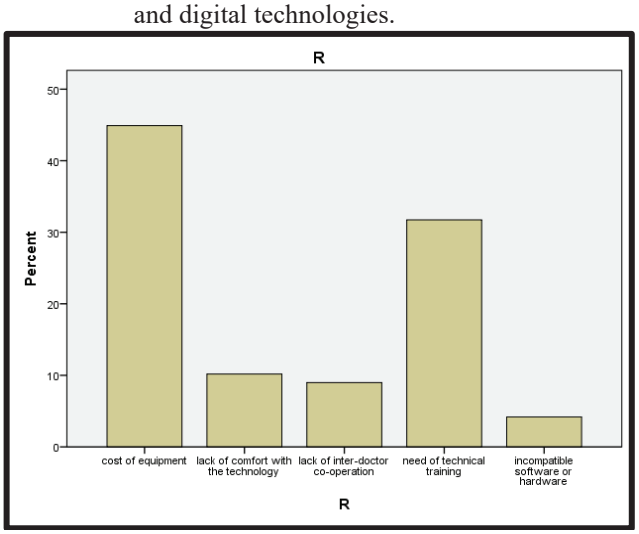

Fig-1: Charting Dentists: Why the Paperless Movement Isn't Happening.

However, most of the dentists were reluctant in adopting the latest techniques in digital dentistry because 194 (45%) of the dentists complains of increased equipment cost, 138 (32%) of them think it requires proper technical training, 43 (10%) showed lack of comfort with the technology, 36 (8%) experienced lack of inter-doctor co-operation and 29 (5%) of them were of an opinion that the software or hardware used in digital dentistry was incompatible as shown in (Fig-1).

DISCUSSION

Our study shows three hundred and ninety-three people (79%) said digital photography was either somewhat or extremely helpful. 194 dentists (45%) are unhappy with the rising price of dental equipment, and 138 dentists (32% are concerned that the job requires specialist knowledge). Forty-three (10%) of dentists reported feeling uneasy using the technology; thirty-six (8%) had difficulties in coordinating with other dentists; and twenty-nine (5%) said that digital dentistry's software or hardware was incompatible.

There is a clear advantage to new technologies for them to be widely accepted by professionals in any given field. It has always been proven that the Internet and other similar technologies can improve productivity and quality in almost any industry[7]. According to a study done at the University of Alberta, 46 (15%) respondents said digital models are quite or very useful; 224 (73.6%) people, strongly agreed that they use digital and electronic technology to consult with other dental specialists; 69%, or 210 people, agreed with using digital and electronic technology to share patient information; 168 (55%) agreed or strongly agreed with using digital and electronic technology to share patient information; 113 (37.4%) disagreed or strongly disagreed[8].

According to research conducted at the University of Otago in Dunedin, New Zealand, males and females used dental implant systems at different rates 183(41.6%) for men and 107 (24.1%) for women, and (53.6%) and 175 (39.8%) respectively, for intra-oral cameras[9]. A total of 349 dentists (81.4% of the sample) agreed that digital and electronic tools were somewhat or very helpful in their practices. Electronic and virtual models, as well as paperless charting, were determined to be less beneficial than digital photography and radiography by Dölekolu et al[10]. This is because both the equipment and the highly skilled personnel needed to operate it are too expensive. In keeping with the findings of Dölekolu et al, 424 (98.1%) of participants in the current study found digital photography to be quite useful, whereas 427 (99.5%) of participants found radiography to be quite useful. The results of this study support the conclusions of prior research showing that dentists can benefit from using digital and electronic technologies.

According to research conducted by the University of Western Australia, 108 participants (80%) agreed that tele-dentistry will enhance communication with peers, guidance, and referral of new patients within the dental profession[11]. Our findings are consistent with a similar study at the Marshfield Clinic Research Institute [12] and reported that 347 (75%) of participants were willing to use paperless charting and found it useful. This more positive reception can be attributed to the enhancement of dental practice, patient satisfaction, patient management, and efficiency made possible by the use of electronic technologies.

According to Advimago, Center for Advanced Oral Imaging in Brussels, Belgium, digital imaging is an important part of this procedure. Clinicians need to be able to manipulate digital datasets and know about potential dangers in the digital chain, in addition to understanding the technological aspects of digital images. As 3D low-dose volumetric CBCT imaging and 3D intraoral optical imprints find their way into general dental practice, new applications for follow-up provide exciting possibilities for patient maintenance[13,15].

Controversially Wenzel et al[16], in his research work detected only 319 (14%) dentists are using digital radiography. However, a study reports the number of Brazilian dentists who have used digital radiography examinations has increased dramatically from 2011 to 2015, from 101 (55.6% of respondents) to 154 (85.4%), with 110 (71%) preferring it over conventional pictures[17].

The findings demonstrated that dentists would take advantage of the option if given the chance. The integration of information and communications technology (ICT) into clinical practice is hindered by factors such as cost, time, security, unclear remuneration guidelines, lack of direct contact, and comfort with technology.[5,6,7] Barriers (program limitations, a steep learning curve, cost, and infection control concerns) to use technologies were still present in the era of 2006, Schleyer et al[7] recognized 19 (1.8 percent) general dentists using computers.

In our study, few of the study participants (n=34 of dentists, 7.9%) were also reluctant to implement the

technology because of the high cost of equipment and the need for technical training. By focusing on how technology can improve specific aspects of dental practice, dentists will be more likely to incorporate it into their daily routines.

Limitations & strength:

This current study includes a very small sample size and conducts in a single center. We were unable to locate any research that compares the various digital technologies now utilized by dental offices, both old and new. The questionnaire was developed using in-depth interviews with experts in dentistry, dental technology, and dental education, as well as comparisons to the afore mentioned dental and social scientific literature, to form a measurement of technology use that is specifically suited for measuring currently present technologies in the context of dental practice. Therefore, we decided to focus on the perceived positive benefits of digital and electronic technology on increased office efficiency and production.

CONCLUSION

Though there are some barriers identified in using digital technologies which can be eliminated by providing technical support. However, majority of the dentists accept beneficial effect of digital and electronic technologies to their profession.

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