Laya S A R[1] Sarkawi F[2] Mohd Noor S N F[1]

[1]Advanced Medical and Dental Institute, Universiti Sains Malaysia.

[2]Private Practitioner, Penang, Malaysia.

(Received January 25th 2012 . Revised April 10th 2012. Accepted April 20th 2012. Published *Online* June 28th , 2012.)

Correspondence: Siti Andi Rahmayanti Laya
Email: sitti_andi@amdi.usm.edu.my

Profile of Dental Practitioners and Factors Associated with the Utilization of Digital Dentistry in Malaysia.

Abstract: Technology application in dentistry has evolved dramatically allowing easy data management. Dental practice equipped with information and communication technology (ICT) enables improvement of work flow. The efficiency of ICT due to a huge number of software available that serves many non-internet clinical applications as well as administrative application technology. The purpose of this study is to describe the profile of dental practitioners who utilize the service of digital dentistry in Malaysia. The study was conducted among dentists both in the government and private sector in Malaysia. The survey was being done through distribution of questionnaires through regular mail, direct survey through the phone and visit to dental clinics, and online survey through the internet. Approximately 500 questionnaires were sent out and only 184 dentists responded (36.8%). Descriptive data were analyzed using PASW statistic 18.0. The results showed that the majority of the respondents are female (64.7%) with age <30 years (39.1%). Most dentists hold a bachelor degree (69%) and work in the Government sector (59.8%). Most dentists have a personal computer at home (96.7%) with >5 years-experience of using computer (82.1%) with 76.1% claim to have had the experience of using the internet. Even though 93.5% have computers in their clinic, they are not applying digital dentistry (71.7%). As a conclusion, dental practitioners in Malaysia are at the initial pace in applying digital dentistry. Further analysis is needed regarding the TRI. TRI is the technology-readiness index introduced by Parasuraman, "people's propensity to embrace and use new technologies for accomplishing goals in home life and at work" thus the construct can be viewed as an overall state of mind resulting from a gestalt of mental enables and inhibitors that collectively determine a person's predisposition to use new technologies.

Keyword: Digital Dentistry, dental practitioners, profile, Malaysia

Introduction

Technology information (TI) has expanded and advancement in the field of TI has increased rapidly during the last decade. For instance, in the end of 1998, there were 364 million computers installed broadly in the world[1], thus computers have become among the most important parts of daily life. Computer technology has resulted in many changes in various fields of science, including the dental field. Currently, dental practice activities cannot be separated from computer technology; it has become the integral part of dentistry which supports efficiency in management practice. For example, educational software as an intelligent assistant can help in taking a decision in clinical practice as well as the dissemination of best practice effectively[1].

Technology advancement in dentistry evolved dramatically allowing ease and comfort for both dentists and patients. The importance of using computer technology in dentistry, for example, a dental practice which is equipped with an ICT application enables an improvement of work flow and efficiency due to a huge number of software available that serves many non-internet clinical applications. There are many softwares providing dental and medical history, oral-health status, charting, digital imaging, diagnostic, treatment planning and decision support application as well as administrative information technology to use in dental practices[2]. Digital dentistry can be beneficial in dental practice, one of the examples is the dental imaging. The developments of dental radiographs are on the rise for instance, in the 1980s the first digital imaging developed was the first intra-oral sensor for use in dentistry. In the current years, digital radiography has become a more superior alternative than conventional film imaging due to the cost effectiveness of intra-oral and extra-oral digital technology. Dental imaging system allows dentist to capture images and a computerized film imaging faster on the chair side computer by adjusting and analyzing images to aid an accurate diagnosis, thus the dental imaging record can be saved into compact storage[3]. However, there are problems on the rise during the advancement of dental technology, the problems such as uneasiness, rigidity in using technology in dentistry as well as low response in digital dentistry readiness surveys still occur among dentists. A research in

Canada found that dentists often used digital technology to consult with the colleagues rather than with the patients. It also showed that the attitude and perception among dentists have also been influenced by the differences between cultures and countries[4]. Scholarly research pertaining to this area is still few and it has become critical due to high demands from people in accessing fast and quality health care services[5, 6]. Hopefully in the future, friendly and end-user technology approach can be created as well as the preparation on perception and attitude can be done in better methods and manner by understanding the profile of dental practitioners and its factor that associated with digital dentistry application.

Methods and Material

A. Survey Instrument

A list of 10 questions was developed for the questionnaire in this study in order to describe the demographic data and information about computer and internet usage as well as usage of digital dentistry among dental practitioners in Malaysia.

B. Survey distribution

Based on statistics[7], there was a total number of 3,165 dentists in Malaysia, with a ratio between population and dentist of 1:8,586. 500 dentists were randomly selected. Surveys were carried through various methods such as questionnaires sent through regular mails, direct surveys through the phone or visiting dental clinics as well as online by using e-mail, website or Facebook. A regular mail survey was distributed in a pack which included a self-addressed, stamped return envelope and an introduction letter of the research outline. For the online survey, an introductory information was also provided with the questionnaire. The survey was selected to be distributed in Peninsular Malaysia.

C. Data Analysis

Statistical analysis was performed using PASW statistic 18.0. Descriptive statistics were used to characterize the sample population. The demographic data (academic qualification, type of clinics) were compared by using a Pearson chi-square, the experience using digital dentistry on the status of applying digital dentistry was performed by Fisher exact, considering the distribution of each group is less than 30 and the normality assumption is not satisfied.

Result

Of the 500 questionnaires, 184 were returned with 64.7 % of respondents being female. Almost half of the respondents are below 30 years of age (Table 1). The highest proportion of respondents are in the <30 age group, hold a bachelor degree (69%) and work in the Government sector (59.8%). Although descriptive results showed that most of respondents have personal computer at home (96.7%) and clinic (93.5%); use the internet (76.1%) and computer for more than 5 years (82.1%), most had never experienced applying digital dentistry (54.9) and never currently applying digital dentistry (71.7%).

Discussion

This is the first study reporting about the descriptive profile of dentists in Malaysia using digital dentistry. Despite the various initiatives employed to distribute the questionnaires to all dentists, only 184 questionnaires were returned and only 28.3% of the respondents applied digital dentistry in their daily life. The main weaknesses of this study are the small number of returned questionnaires, and there is no assigned respondent ID for each questionnaire sent. This may cause duplication of either sending or receiving the questionnaire by the same respondent. These problems may also lead to sample bias. The general population of dentists in Malaysia was reported at 3,165 [7], However, we did not check their status if they were still active or otherwise. Despite these limitations, this study is important for us to know the number of dentists in Malaysia that apply digital dentistry. This knowledge will enable the policy makers and technology inventors to create awareness, new approach and strategies for the dental practitioners to use digital dentistry thus allowing more dentists to be equipped with the new technology in their dental practices.

In developing countries, a few studies were conducted regarding the use of digital dentistry and the results showed low responses in using new technology[4,8]. The result of this study is important and can be used as a preliminary measure on as how far one dentist can benefit the community by utilizing digital dentistry. In tertiary health care services where there are many patients and higher demand for better health care facilities, the use of digital dentistry in the clinical setting may allow better services to the patients. Digital technologies in dentistry have potential roles in improving accurate diagnosis,data storage, transfer and retrieval as well as keeping backup of patients' data should the practice encounters natural disasters such as fire, flood or earthquake[9].

Many ways are available to allow dentists to familiarize themselves in using digital technology. One of the ways is by giving education with digital dentistry–based in academic curricula for dental students from the initial stage of their training so that they will be able to adopt and use this technology in the clinics[10]. The changes in the

behavioral aspects of the dentists at training schools and in the dental curriculum may produce dentists who can adopt new technology for the improvement of patient care and face any sensitive issues that may arise[11].

Conclusion

Currently dentists, who practice in Malaysia, are still keeping pace in applying digital dentistry. Our study showed that the dentists in Malaysia are already accustomed to using computers in the clinics for many years; only few dental practitioners have already applied digital dentistry in their practices. Therefore, new software development that is easy to use and capable of attracting dentists to use and implement it as a tool of patient care is crucial. This may one day increase the use of digital dentistry by dentists in more clinics in Malaysia.

Acknowledgment

This study was supported by a short term grant (304/CIPPT/639069) from Universiti Sains Malaysia.

References

1. *Schleyer Titus K.L. Digital dentistry in the computer age: Dentistry technology. J Am Dent Assoc 1999, 130:1713.*
2. *Kirshner M. The role of information technology and informatics research in the dentist - patient relationship. Adv Dent Res 2003, 17:77-81.*
3. *Brennan J. An introduction to digital radiography in dentistry. Br J Orthod 2002, 29:66-69.*
4. *Flores-Mirr C, Palmer Neal G, Northcott H.C, Khurseed F, Major Paul W. Perception and attitudes of Canadian dentists toward digital and electronic technologies. J Calif Dent Assoc 2006, 72(3):243-243e.*
5. *Koch S. Designing clinically useful systems: Example from medicine and dentistry. J Adv Dent Res 2003, 17-65-68.*
6. *Diogo Steven.The year of digital dentistry. 2000. Available at http://www.dentalcompare.com/featuredarticle.asp?articleid=215. Accessed April 2009.*
7. *World Health Organization, WHO Oral Health Country/Area Profile Program. Available at: http://www.whocollab.od.mah.se/wpro/malaysia/data/malaysiamanpow.html Accessed April 2009.*
8. *Selvi Firat, Ozerkan Altan G. Information-seeking patterns of dentists in Istanbul, Turkey. J Dent Educ 2002, 6(8):977-980.*
9. *Farman Allan G, Levato Claudio M, Gane David, Scarfe William C. In practice: How going digital will affect dental office. J Am Dent Assoc 2008, 139:14S-19S.*
10. *Ardakani F.E, M Faghihi, MH Sheikkha. Designing an educational software for teaching and evaluation of radiology course in dentistry. J Med Educ 2008, 12(3,4): 71-75.*
11. *Bartfield E.D, Lausten L. Why practice culturally sensitive care? Integrating ethics and behavioral science. J Dent Educ 2002, 66(9):1006-101.*
12. *Parasuraman A."Technology Readiness Index (TRI): A Multiple-Item Scale to Measure Readiness to Embrace New Technologies", Journal of Service Research 2000, 2(4):307-320.*

Table 1: Demographic of samples

Characteristic	No (%) of Respondents N=184
Gender	
Female	*119 (64.7)*
Male	*65(37.3)*
Age	
<30	*72(39.1)*
31-40	*49(26.6)*
>40	*63(34.2)*
Academic Qualification	
Degree	*127(69)*
Post Graduate	*57(31)*
Type of Clinics	
Private General	*27(14.7)*
Government General Practice	*110(59.8)*
Private Specialist Clinic	*4(2.2)*
Government Specialist Clinic	*43(23.4)*
Personal Computer at Home	
Yes	*178(96.7)*
No	*6 (3.3)*
Experience of Applying Digital Dentistry	
Never	*101(54.9)*
<1 year	*41(22.3)*
1-2 year	*17(9.2)*
2-3 year	*25(13.6)*
Years of Using Computer	
<1 year	*4(2.2)*
1-2 year	*3(1.6)*
2-3 year	*9(4.9)*
3-4 year	*8(4.3)*
4-5 year	*9(4.9)*
>5 year	*151(82.1)*
Years of Using Internet	
<1 year	*2(1.1)*
1-2 year	*8(4.3)*
2-3 year	*12(6.5)*
3-4 year	*9(4.9)*
4-5 year	*13(7.1)*
>5 year	*140(76.1)*
Computers at Clinic	
Yes	*172(93.5)*
No	*12(6.5)*
Currently Applying Digital Dentistry	
Yes	*52(28.3)*
No	*132(71.7)*

Table 2: Association between academic qualification and current application of digital dentistry

Variable	*N*	*Yes Freq (%)*	*No Freq (%)*	*X^2 statistic (df)*	*P Value*
Academic Qualification					
Degree	*127*	*24(18.9)*	*103(81.1)*	*17.73(1)*	*<0.001*
Post Graduate	*57*	*28(49.1)*	*29(50.9)*		

**Chi-square for independence*

Statistical analysis (table 2) applying digital dentistry is significantly different between academic qualification.

Table 3: Type of clinics associated with current application of digital dentistry

Variable	*N*	*Yes Freq (%)*	*No Freq (%)*	*X^2 Statistic (df)*	*P Value*
Type of Clinics					
Government General Practice	*110*	*21(19.1)*	*89(80.9)*	*11.34(1)*	*<0.001*
Other types of Dental Practice	*74*	*31(41.9)*	*43(58.1)*		

Fisher's Exact

Table 3 showed there is a significant association between type of clinics and current application of digital dentistry.

Table 4: Comparison experience in digital dentistry and current application of digital dentistry

Variable	**N**	**Yes Freq(%)**	***No Freq(%)***	**X2 Statistic (df)**	***P* Value**
Experience of Applying Digital Dentistry					
Never	101	2 (2)	99(98)	76.28(1)	<0.001
<1-3 years	83	50(60.2)	33(39.8)		

*Fisher's Exact

The same result (table 4) is performed significant association between experience in digital dentistry and current application of digital dentistry.