

A Survey of Professional Attitudes Towards the Utilization of Information Technology (IT) in Dental Practice

การสำรวจทัศนคติของวิชาชีพทันตแพทย์ในการนำเอาระบบ เทคโนโลยีสารสนเทศไปใช้ในการปฏิบัติงานทางทันตกรรม

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บทคัดย่อ

ประสิทธิภาพของข้อมูลสารสนเทศและการได้มาขององค์ความรู้, ขบวนการถ่ายโอนข้อมูลอย่างเป็นระบบนับว่าเป็นปัจจัยหลักของการบูรณาการปฏิบัติงานทางทันตกรรมของทันตแพทย์ไทย คำกล่าวนี้ได้รับการสนับสนุนจากการทบทวนวรรณกรรมที่เกี่ยวข้องในการถ่ายโอนองค์ความรู้ซึ่งเป็นหลักฐานที่สำคัญทางทฤษฎีอันหนึ่งที่น่ามาใช้ในการสนับสนุนต่อการนำเอาระบบเทคโนโลยีสารสนเทศไปใช้ในการปฏิบัติงานทางทันตกรรม อันจะก่อให้เกิดประโยชน์สูงสุดต่อวิชาชีพ

การสำรวจพฤติกรรมของวิชาชีพทันตแพทย์ต่อการนำเอาระบบเทคโนโลยีสารสนเทศมาบูรณาการทางคลินิกร่วมกับการปฏิบัติงานทางทันตกรรมในครั้งนี้ได้ทำการสำรวจทันตแพทย์ที่ปฏิบัติงานอยู่ในจังหวัดเชียงใหม่ของประเทศไทย

ข้อมูลที่ได้จากการสำรวจพบว่าทันตแพทย์ส่วนใหญ่มีความรู้สึกในเชิงบวกที่จะนำเทคโนโลยีสารสนเทศไปบูรณาการใช้ร่วมกับการปฏิบัติงานในวิชาชีพของตน เมื่อวิเคราะห์หาปัจจัยที่เกื้อหนุนต่อการนำเอาระบบเทคโนโลยีสารสนเทศไปบูรณาการใช้ร่วมกับการ

Abstract

Efficient information and knowledge acquisition, processing and application is vital to the progress and continued modernization of the Thai dental profession The literature in the field of knowledge transfer provides a theoretical basis which supports the argument that the introduction of IT into dental practice would greatly enhance the ability of the profession to cope with change and implement high quality clinical practice throughout the profession.

This paper reports on a survey conducted to ascertain the attitude of dental professionals in the Chiang Mai province in Thailand toward the introduction of an electronic information system into clinical practice.

Results indicate that a large majority of dental professionals surveyed are positive towards the introduction of such a system, though considerable upgrading and retraining in

ปฏิบัติงานทางทันตกรรมแล้วพบว่าการเพิ่มพูนความรู้ และได้รับการสนับสนุนปฏิบัติการทางเทคโนโลยีมีนัยที่สำคัญต่อความสัมฤทธิ์ผลในการนำเอาระบบเทคโนโลยีสารสนเทศไปบูรณาการใช้กับงานทางทันตกรรม ผลลัพธ์ที่ได้จากงานวิจัยนี้ยังชี้ให้เห็นอีกว่า ทันตแพทย์ยอมรับต่อความเที่ยงตรงของระบบเทคโนโลยีสารสนเทศและมองเห็นประโยชน์การใช้งาน ร่วมกับการปฏิบัติงานทางทันตกรรม ถึงแม้ว่าผู้ตอบแบบสอบถามบางส่วนยังคงกังวลในเรื่องความลับและความปลอดภัยของข้อมูลสารสนเทศ แต่ผลการศึกษาที่ได้บ่งชี้ถึงข้อพิจารณาในการเตรียมทันตแพทย์ให้มีความพร้อมต่อการนำเอาเทคโนโลยีสารสนเทศไปใช้ ร่วมกับการปฏิบัติงานทางทันตกรรมในอนาคต

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computer and keyboard skills will be required to bring many of them to the point where they can competently operate the kind of technological system that might be introduced. Results further indicate that there is a reasonable degree of confidence among professionals that an electronic system would be reliable, and that it would bring a range of benefits to dental practice. While some respondents have questions about such issues as privacy and security, it is generally believed that the introduction of IT into dental practice is the way of the future.

Key words: Information Technology, Dental Information, Knowledge Transfer

Introduction

It is the view of this writer that the integration of IT into dental practice has the potential to enable professionals to achieve the goal of lifting practice to the highest level. This research examines the intention of professionals with regard to the use of IT in the dental care context and will provide a valuable resource for assisting the process of adopting IT into dental practice in the future.

Literature Review

Gansky suggests that there are five steps in knowledge discovery and data mining.⁽¹⁾ Collection and Storage: Before utilising knowledge, it must be obtained by deriving it from past experience, by borrowing it from others, or by constantly searching or scanning information and data sources.⁽²⁾ Pre-Processing: By transforming written or verbal communications into a standardized form (such as an electronic data base) it is possible

to process knowledge efficiently.⁽³⁾ Analysis: Knowledge that is presented in an organized form must be analysed and processed so that it becomes usable by the individual or organization that acquires it.⁽⁴⁾ Validation: In order to act consistently within an organization, the members must agree to adopt new knowledge. Before knowledge becomes assimilated into the core routines, individuals in the organization must mentally accept the knowledge.⁽⁵⁾ Application: Application is the most important step in the knowledge discovery process. It transforms newly acquired knowledge into organized routines, interacting with policies that are necessary and important for progress. Information Technology provides the framework within which these five steps in knowledge discovery can be formally implemented, making the process of gathering and organizing knowledge efficient, and its utilization in dentistry most effective. Greenes⁽²⁾ points out the benefits of incorporating clinical

information in the knowledge base to support dental practice and enable knowledge to be available to the patient-doctor decision making process at the point of care. Furthermore, evidence-based dental information benefits the patient-dentist relationship by enabling patients to share in the decision making process when treatment is being considered.⁽³⁾

Methodology

The research forming the basis of this report is a cross-sectional study using a self-report questionnaire survey. It is acknowledged that the results of this type of survey are subject to inconsistency arising from differences between individual respondents' expression of the intensity of their agreement or disagreement with the item statements, but this form of data-gathering is justified as at present there appears to be no better way to access data of this type. The sample consisted of all the dental professionals practicing in Chiang Mai province. The questionnaire was adapted from a pilot study undertaken in the same geographic area earlier in.⁽⁴⁾ Concurrent validity was established by consultation with dental professionals working in the Faculty of Dentistry, Chiang Mai University. A reliability coefficient of 0.89 was computed, based on results from a test-retest program. Questionnaire packets were delivered to dental professionals practicing in Chiang Mai province, Thailand. Along with the questionnaires, each packet contained a covering letter stating the purpose of the study and the intended use of the data.

Data Analysis and Results:

Of the 220 questionnaires distributed to dental professionals practicing in Chiang Mai province, 135 were completed (over 95% of questions answered) and returned, giving a 61.36 percent response rate. If less than 95% of the questions

were answered questionnaires were excluded from the data analysis, being defined as incomplete.⁽⁵⁾ The demographic profile of the respondents returning usable data was as follows:

Table 1 Demographic profile of respondents

Demographic Characteristics	Respondent Profile
Total number of respondents	135
General dental professional (GP)	93
Dental Specialists	42
Average age of respondents	36.3 years
Percentage currently practicing	99.2%
Percentage not currently practicing	0.8%
Average years of dental experience	12.1 Years
Average days per week spent in practice	4.8 days
Percentage employed in government clinics	37.6%
Percentage in private practice	27.2%
Percentage in practices involving more than 2 dentists	84%

Dental professional opinions relating to IT

In the survey questionnaire, respondents were asked to express opinions in relation to IT systems in order to gauge their perception as to how well they understood the concept of an IT system that might be used in their dental practice. Accordingly, Question 1 asked, "Would you like an IT system to be introduced into your practice?" 129 respondents (95.56%) answered 'yes', six (4.44%) answered 'no', and all respondents replied to this question. This response indicated that most respondents could see the benefit of IT in their dental practices. Question 2 asked, "If your practice introduced an IT System, would you use it?" 95.56 % of respondents answered 'yes', 1.48% answered 'no', while 2.96% did not reply. This response indicates that most respondents have a positive attitude towards the use of the system as long as it is easy to learn and management insists on its introduction to reduce the time taken over paper work.

Respondents’ perception of their computer skills

Respondents were asked, “How would you rate your current ability to use computers and software?” Table 4.2 presents the percentage responses to this question, grouped under categories ranging from ‘Poor’ to ‘Excellent’.

Table 2 Basic computer skills of respondents

n = 135

Ability categories	Percentage (%)
Current ability to use computers and software	
Poor	9.77
Marginal	7.52
Below average	27.07
Average	27.07
Above average	19.55
Very good	7.52
Excellent	1.50
Total percentage:	100.00
Ability to type	
Can’t type at all	3.70
Can type a little	20.00
Average typing	47.40
Good typing	26.67
Excellent typing	2.22
Total percentage	100.00

As can be seen in Table 2, 71.43% of respondents rated their computer skills as ‘poor’ to ‘average’, indicating that many dental professionals do not have a high degree of confidence in their computer skills. Just 28.57% of respondents rated themselves as competent to use computers and software. To determine respondents’ basic typing skills they were asked the question, “Can you type?”, with response categories ranging from ‘Can’t type at all’ to ‘Excellent typing’. 71.1% rate their typing ability as average or below, while only 28.89% rate their typing skills as above average. It is apparent that most dental professionals do not rate their computing and typing skills very highly,

though their responses to the question (No. 2) as to whether they would use an IT system if it were introduced imply that they would be willing to be trained in these skills if the opportunity arose. Of the 129 giving positive responses to that question, 125 (93.28% of the total number of respondents) accompanied their responses by qualifiers such as “if it provided some benefits” or “if it reduced the time taken to complete the work”, or “if it helped to reduce dental treatment time”, or “if it were required by management”.

Current problems with dental information

Questioning relating to an automated system for helping dental professionals asked ‘Are there any areas of your practice that you think could be improved by the use of an automated system?’ In response, 100 respondents (74.63%) answered ‘yes’, three answered ‘no’ and 31 responded that they ‘didn’t know’. This question allowed for additional comments to encourage further responses by way of explication of their current problems. The current problems identified by the participants included: documentation, dental registration, dental prevention programs, health promotion, dental data, x-ray data, oral epidemiology, root canal treatment information, orthodontics, treatment planning, dental research, oral rehabilitation, restorative therapies, prosthodontics information, human resources management, statistics, management systems, decision making, dental care planning, medical information, progress notes, assessment, up-to-date resident information, continuity and expense of dental care planning, communication, training, and decision making. To confirm respondents’ perceptions a further question was asked, ‘What are the problems in the current dental management?’ This question produced responses similar to those made to the

previous question, indicating that respondents perceived there had been problems in their facilities regarding dental information documentation.

Attitudes towards electronic operations

Table 3 summarises the responses to the question, "To what degree do you trust the reliability of electronic operation?" 48.89% of respondents agreed that electronic operations are reliable, and 26.67% of respondents strongly agreed that they were reliable, so more than 75% of respondents indicated reasonable confidence in the reliability of electronic operations. Another question was asked, 'What are the perceived benefits if an electronic system was introduced into your dental practice?' Most respondents answered positively, listing benefits such as legibility, usefulness for their work, ease of use, usefulness for statistical analysis, saving time in completing tasks, reducing duplication of previously done work, reducing storage space requirement, ease of retrieval of resident information, decision support and convenience of operation. The response was similar to questions which asked respondents' opinions about the implications of the use of IT in their dental practices and asked about current management problems in their dental practices. Most respondents indicated that they thought the use of IT in their practices would make more time available for direct dental care, improve the workflow, make provision of better access to dental patient information (thus saving money) and improve the image of the dental profession.

The last question, 'What is your main reason for or against the introduction of an electronic system into your dental practice?' was intended to reveal the factors that might influence (either positively or negatively) the successful adoption of IT into dental practice. On the negative side

Table 3 *Level of trust in the reliability of an electronic system*

Level of trust (as %)	Responses	As % of n
Less than 25%	4	2.96
26 to 50%	26	19.26
51 to 75%	66	48.89
76 to 100%	36	26.67
No answer	3	2.22

N= 135 Total % = 100

39.69% of respondents thought an electronic system might not be easy to operate, 15.53% complained about the difficulty of updating information, 13.80% were concerned about the time it would take to complete a task using IT, 10.94% said it would be difficult for them to complete a job, 10.32% were concerned about not having the space to handle information, and 9.72% imagined it would not provide security for their personal information.

Discussion

If Thai dental professionals are ready to incorporate IT into their practices they will reap significant benefits. The major barriers to acceptance of IT-based information systems would be removed if the findings of this research were used to guide the development of a basic electronic dental information system for use in clinical practice. The provision of an IT infrastructure for dental professionals is one development that has the potential to increase the efficiency of staff, improve work performance and enhance the quality of dental care.⁽⁶⁾ Administrators and stakeholders who become involved with this new technology should also find that the appeal to work in their practices would increase.^(7,8) An IT system for the dental profession will differ from other healthcare IT systems because the scope of information needed for dental practices differs from that needed for other forms of healthcare. Dental professionals need detailed histories of their

patients, as well as descriptive information with a relatively large amount of treatment information which can be transferred between professionals and patients to provide a better understanding of the treatment being undertaken.

One of the strategies being employed by Thai dental professionals to improve their practices is to embrace this technology option. IT is actually not new to the dental profession,^(9,10) having been used in various applications.⁽¹¹⁾ Nevertheless, the transfer of IT-based dental knowledge into clinical practice has not been without problems. Recently, several large computerized systems have failed because physicians have rejected them as too cumbersome to use.⁽¹²⁾ When the introduction of new technology is being planned, serious consideration should be given to the provision of individual interfaces that are tailored to the particular needs and readiness of each dental professional. This survey has shown that 74% of dental professionals are aware of problems that could be alleviated by an electronic information and data-processing system. The most common of these problems are: case documentation, dental registration, dental prevention programming, health promotion, dental data processing, x-ray data processing, oral epidemiology, root canal treatment information, orthodontics, treatment planning, dental research, oral rehabilitation, restorative therapies, prosthodontics information, human resource management, statistics, organizational management systems, decision making, dental care planning, medical information processing, progress note keeping, assessment, up-to-date resident information, the continuity and expense of dental care planning, communication, training, and decision making. Continuing research aimed at finding solutions to these problems should focus on IT as a preferred option as 95.56% of respondents favoured adopting this technology

to enhance their practices. Respondents were also generally inclined to trust the reliability of electronic operations, but the reliability of practice-based systems should be further examined to address issues relating to personal information handling, privacy, etc. Responses to this survey indicate that the majority of dental professionals believe that IT could be a viable technological option for transferring their dental knowledge into their practices if it proves to be beneficial, easy to use, convenient to operate, able to eliminate duplication and if it reduces the time taken to complete the work.

Conclusion

All business and professional organizations must learn how to manage change. However when it comes to dealing with technology and the change it initiates, the dental healthcare sector has had little experience. A remarkable opportunity currently exists for dental professionals to benefit from the transformation of the information management process made possible by the introduction of IT into clinical dental practice, and professionals should grasp the opportunity presented to them. They should make themselves aware of the factors that have been shown to lead to success in the introduction of IT into clinical practice. IT will be the wave that carries the dental profession into the future, and Thai dental professionals must be careful not to let the opportunity pass them by.

Future Research

The transfer of dental knowledge through IT systems is being continually developed and constantly enhanced to encourage dental professionals to optimize the quality of dental services they offer. Some suggestions for further research are:

1. Replication of this study in different demographic regions in Thailand, examining both public and private sectors, to provide a wider pool of evidence on which to base dental policy recommendations.

2. Further investigation of the factors, both technological and sociological, involved in the readiness of dental practitioners to accept electronic information systems as an integral part of their clinical practice.

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