

Electronic Dental Records System Adoption

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Abstract

The use of Electronic Dental Records (EDRs) and management software has become more frequent, following the increase in prevalence of new technologies and computers in dental offices. The purpose of this study is to identify and evaluate the use of EDRs by the dental community in the São Paulo city area. A quantitative case study was performed using a survey on the phone. A total of 54 offices were contacted and only one declined participation in this study. Only one office did not have a computer. EDRs were used in 28 offices and only four were paperless. The lack of studies in this area suggests the need for more usability and implementation studies on EDRs so that we can improve EDR adoption by the dental community.

Keywords:

Electronic Dental Records; adoption; case study.

Introduction

During recent years, there has been an increase in the adoption of current generation technologies in dental offices. Some reasons for adoption include: increasing “green” practices, increasing efficiency, usage of technology as a marketing element, and exchanging patient information with insurance companies.

Green practices include the use of digital photography and radiographs as well as the use of EDR to decrease the consumption of paper and the production of chemical waste.

To improve efficiency and productivity, some offices use rotary instruments, apex locators, computerized anesthesia, intraoral cameras and scanners and CAD-CAM systems.

Additionally, the use of any of the above mentioned technologies themselves are perceived as marketing elements for the patient. The patient notices the up to date context of the office and services provided.

The presence of a computer in an office also allows usage of other applications such as patient scheduling, communication with patients, colleagues and providers, clinical and financial management and also the use of EDR systems.

Lastly, some offices have acquired computers to be able to exchange information with insurance companies, as these companies continually demand this exchanged information to be made digital.

Literature Review

As highlighted by the literature, the use of technologies in dental education began in 2000. In clinical practice computers, in particular, have already been used as an administrative management tool since the 1980's [1]. In 1996, Paul R. Rhodes discussed the main differences between electronic and paper records, as well as their advantages and disadvantages [2]. The visual resources of the EDR were the most positive

features in the author's opinion because once the patient was allowed to visualize graphically his or her clinical needs, the satisfaction and acceptance of the treatment were enhanced [2]. Visual resources were also seen as important features by Delrose and Steinberg for use in patient education [1].

As more technologies for dentistry became available on the market, research to evaluate the relationship between dentists and these technologies began to evolve. In Canada there was research to evaluate dentists' perception regarding the use of new technologies and also to determine the presence and use of computers in Canadian dental offices. Researchers verified that 60% of the dentists believed that technology could improve their clinical practice and 90% of the dentists already had computers in their offices [3, 4]. Similar results were found in the USA and England, with 85% of American dentists having computers in their offices while 77% of British dentists having or declaring the intention of acquiring a computer in the near future [5, 6].

Having established the presence of computers in the dental offices, and the use or intention of using an EDR system, authors began to investigate the annotation fields both in paper and electronic records. They noticed a great difference between the records and reasoned that the digital records have a limited coverage of the patient clinical information. Furthermore, they found that fields that are usually together in paper records, are often separated in the EDRs, possibly making it difficult to be filled by the dentists [7]. In order to investigate possible usability problems on EDR systems, Thyvalikakath et al carried out a heuristic evaluation of four systems [8]. The authors described 229 heuristic violations and suggested potential usability problems in all four systems [8]. Despite the deficiencies and difficulties already described, EDR systems are commonly used in dental offices in North America and Europe, as well as in some North American dental schools. Studies have also been performed in dental schools. These studies cover the use of EDRs for a wide variety of themes: pharmacology education [9], the use of controlled terminology to annotate diagnosis [10] and treatment planning by undergraduate dentistry students [11].

A literature review conducted in 2014 showed that despite the great number of articles regarding EDR published over the last decade, only 22% of those were about EDR design and architecture, while 78% were editorials, reviews or articles describing the use of EDR data. In addition, taking a closer look at the articles regarding EDR, only 20% of the studies represented research related to EDR use (adoption, usability, implementation, tools). The other 80% was research that used clinical data from the EDRs to make new scientific discoveries.

Objectives

This study aims to identify and evaluate the adoption of EDR systems in the São Paulo city area.

Methods

Due to the fact that the study comprises contemporary phenomena, a case study design with a quantitative approach was the chosen method for this research [12, 13].

The Ethical Committee of Universidade Federal de São Paulo approved this project.

First, a translation, adaptation and validation of the questionnaire, used by Schleyer et al [5] in a similar study in 2006, was performed. This occurred after getting permission from the mentioned author. This instrument was chosen for the study because it is well established and frequently used in the literature.

A dentist with proficiency in English did the translation and adaptation into Portuguese. In order to validate the translation, another dentist with proficiency in English back-translated the questionnaire into English. Both versions were compared and if there were a disagreements between the translations these were reconciled by both dentists [14].

A convenience sample of dentists working in the Sao Paulo city area was selected.

Due to the length of the questionnaire (31 questions) and the resistance of the dentists to spend 20 minutes over the phone answering it, the questionnaire was divided into two sections. The first section contained questions regarding the presence of computer and internet access, the size of the staff, quantity and location of computers; and therefore, could be answered by any staff member (receptionist, dental assistant, dental hygienist or the dentist himself). The second section, with more specific details over technologies and EDR adoption was shorter and more objective in order to be answered by the dentist himself.

Each office was contacted at least twice: on first contact the purpose of the study was explained and if consent to participate in the study was given, the first section of the questionnaire was answered. A second telephone contact was made at a more convenient time for the dentist to answer the second section of the questionnaire.

Results

Up to the present moment, seventy-one offices were contacted. For 28 offices there were no successful contacts and for the other 53, contacts were successful.

Of the 54 contacted offices, only one did not have a computer. Of the 53 computerized offices, three did not have internet access, and 47 had cable internet access. In two of the offices that did not have internet access, the computer was used rarely and at the third one daily. For the rest of the offices, the computer was used daily at 44 offices and weekly at the remaining four (Figures 1 and 2).

In terms of the location of computers: four offices had computers only the reception, ten offices had computers only in the office, 11 offices had computers in the reception and in the office, 13 offices had computers in the operating room and in the reception and 15 offices had computers only in the operating room (Figure 3).

The use of EDR systems was observed in 28 offices. The most commonly used system was Easy Dental™ (Easy Software SA, Brasil), being used in 19 offices. The software DentalMaster™ (Micro Imagem, Brasil) was used in four offices and Excel™ (Microsoft, USA) was used in two offices (Figure 4). The majority of offices kept only paper records (29 offices) and only six offices were paperless. The remaining 17

offices maintained records both in paper and in digital format. (Figure 5)

In the offices contacted, there was a great variation regarding the insertion of information in the records as shown in Figure 6.

Figure 7 shows the frequency of computer and internet use to search clinical information.

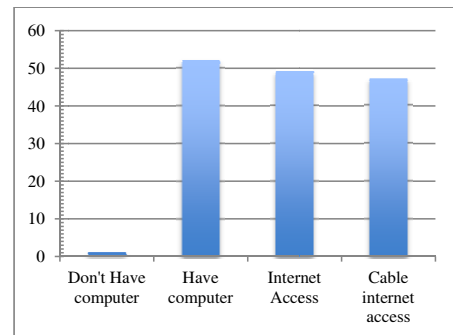


Figure 1- Presence of computers and internet access

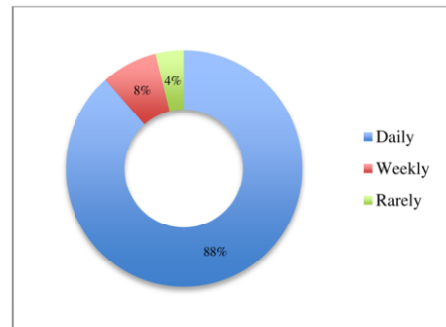


Figure 2- Computer use frequency

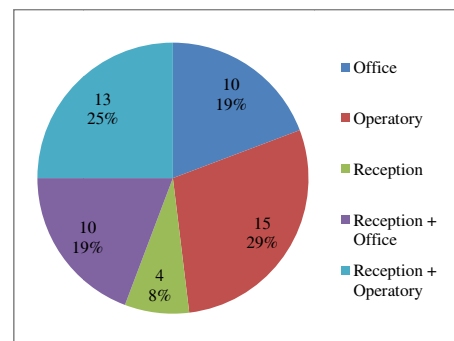


Figure 3- Location of computers

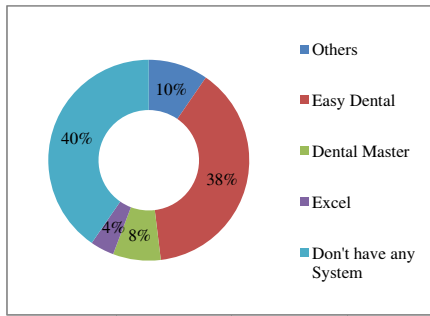


Figure 4- Adopted EDR Systems

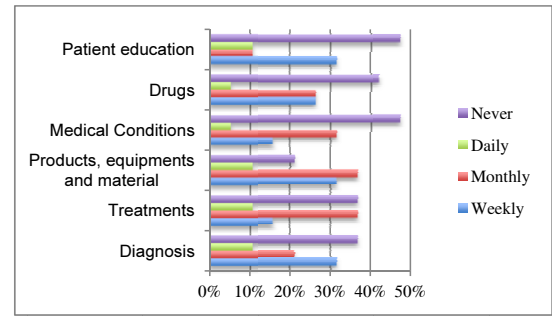


Figure 7- Clinical information search using internet and computers

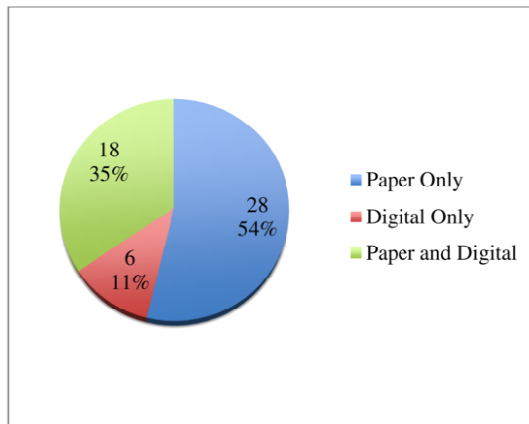


Figure 5- Dental records format

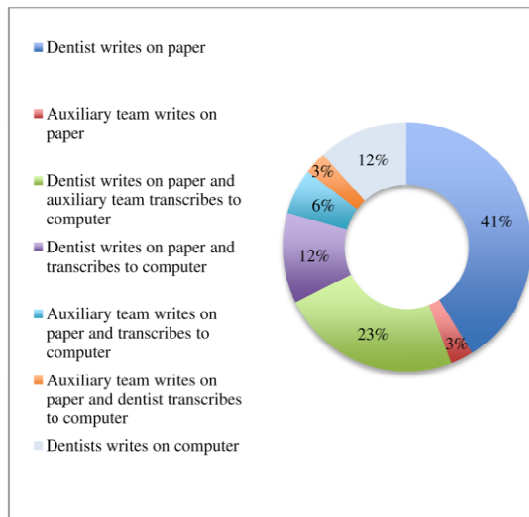


Figure 6- Insertion of information on dental records

Discussion

Although computers are available in the majority of the contacted offices (98%), EDR systems have not been used by most of the contacted dentists. The most common scenario is the duplication of records (paper and digital), resulting in an increase in the time spent writing notes on records and a decrease in productivity [5]. Some of the reasons for this duplication of records might be: difficulties in using the systems, mistrust for the EDR systems and a lack of a standardized nomenclature in dentistry. In Brazil, there are at least 14 available EDR systems, with some dating back to 1994. Even though they have been available for 20 years, none of the systems complies with the security requirements of the current Brazilian legislation. In addition, neither the federal, nor the regional Dentistry Councils issue digital certificates for the professionals.

The lack of a standardized nomenclature has been addressed in a number of studies, and specifically in Brazil, the nomenclature used dates from 1995 [15]. More recently, in 2007, the Brazilian National Health Agency established a nomenclature pattern to be used in the information exchange by all insurance companies, including dental ones. Since then, most EDR systems use this pattern to describe dental treatments, but still misses a standard for dental diagnosis. It is important to stress that only the dentists that are registered with the insurance companies use this nomenclature, and therefore, the other professionals are not familiar with it.

Another reason for the incomplete adoption of the EDR systems might be the fact that some of the dentists declared being forced into adopting the systems by the insurance companies, since processing issue treatment authorizations have to be done online. Therefore, they use only the functionalities that are necessary for the authorization process, i.e., registering the patient, his/her insurance information and the suggested treatments.

Although present in the majority of the contacted offices, Internet and computers are not usually used to obtain clinical information. Almost 50% of the contacted dentists never use them to obtain information on medical conditions, and almost 40% never use them to obtain information on diagnosis. Nevertheless, these results are similar to those found in other international studies [3, 5]. In our study, most offices (73%) had two or more dentists, therefore having more than one specialty in the clinic enabling them to consult with one another for this type of information.

People are not afraid of technology anymore. New generations grow up in a world where technology does not intimidate and the way we produce and store information needs to be

efficient [16]. In addition, patients subconsciously register that better dentists have tech savvy offices; while those that do not adopt technology tend to be considered less competent [17].

Even though technology is usually charged with being responsible for impersonal relationships, professionals using them are more productive. This leaves more available time for dentists to bond with the patient in order to strengthen their relationship, resulting in greater acceptance of the suggested treatments and a more satisfied patient.

Even though the sample of this study is small, and not representative of the entire country's dental community, it should influence local councils to issue more comprehensive surveys in order to describe the regional scenario with more details. This way, policies and incentives might better influence the EDR systems adoption by the dental community.

Conclusions

This case study demonstrates a high level of modernization in dental offices as well as adoption of EDR systems, but little clinical use. Contacts with the dentists are still being made until the end of January 2015.

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