Discrepancies between dental and medical records of cardiac patients in AlHada Armed Forces Hospital, Taif, Saudi Arabia

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Abstract

Aims and Objectives: This study aims to estimate the prevalence of medical information discrepancies between dental and medical records of cardiac patients at AlHada Armed Forces Hospital in Taif and to identify the factors contributing to these information discrepancies. Materials and Methods: The study applied a descriptive retrospective medical and dental records review of a stratified proportional sample of 289 cardiac patients, which was extracted from 1154 cardiac patients who visited both the cardiology and dental clinics at the AlHada Armed Forces Hospital between 2007 and June 2012. Data were analyzed using the Statistical Package for the Social Sciences version 19. Results: The main results of this study are the following: The mean and standard deviation of patient's age was 56 ± 16.9, female patients represented 47.8% of the study population. A total of 78.5% of dental records were documented by dental residents whereas 48.4% of the dentists had more than 6 years of experience. Two hundred and seventy-nine (96.5%) of the 289 dental records had medical information discrepancies compared to the corresponding medical records. One hundred percent of systemic lupus erythematosus and rheumatic fever cases were not documented in the dental records followed by 93% of medications, 92% of stroke, and 88.5% of hyperlipidemia, whereas the least prevalent were cardiac disease (26%) and diabetes mellitus (22.2%). Conclusion: Approximately 75% of the patients who directly or indirectly accessed the dental services showed discrepancies. The researcher concludes that critical information gaps exist between dental and medical records that mostly attributed to system level problems. A well-established model for efficient communication among medical and dental care providers caring for cardiac patients does not appear to exist. The absence of such a model can threaten the overall health of patients.

Key words: Dental records, health care system, medical emergency, medical records

INTRODUCTION

The dental record is a legal document owned by the dentist and contains subjective and objective information about the patient. Results of the physical examination of the dentition and supporting oral and surrounding structures must be recorded.[1] Medical and dental care have evolved as separate entities, each with its own professional diversity, terminology,
associated technologies, research interest, and information recording methods. Absolute knowledge of a patient’s health information is an essential aspect of the dentist's responsibility and is essential for providing safe and appropriate dental treatment in the context of any systemic disorders.2

The evidence is accumulating regarding the association between dental and medical conditions including diabetes, cardiovascular disease, and chronic renal disease.3 These conditions need to be addressed by dental professionals to select safe and effective dental care approaches without precipitating a medical crisis.4

Communication problems were the second most frequently identified cause of sentinel events between 2004 and 2012. Poor communication among medical and dental care providers as well as the lack of adherence to best practices guidelines often leads to duplication of and inconsistencies between medical and dental records.5

Stewart et al.5 conducted a validation of self-reported medical history data in dental charts by comparing them to data abstracted from medical records of 246 randomly selected charts at the Northwest Armed Forces Hospitals. Forty percent of anemia cases, 75% of renal, and 75% of high blood pressure cases were not recorded in dental records. Seven out of 10 medical information showed poor agreement between the records. Researchers recommended that dentists should have access to medical charts or the medical database.6 In both studies, medical and dental records were compared and an agreement was calculated with a difference that population in this study was that of cardiac patients.

Eze-Nliam et al.7 studied the discrepancies between the medical records and the reports of patients with acute coronary syndrome regarding important aspects of the medical history and stated “It is possible that patients may not be able to reliably recall health conditions due to the stress of acute illness or the hospitalization itself, or while being treated with certain medications.”

The relationship between dental and medical health is clear and ignorance of one side by the other can lead to more severe medical problems, untreatable medical problems, or a mistake that causes a new medical problem.

This research principally aims to identify and evaluate the degree of compatibility and integration in the provided medical information on the cardiac patients’ medical records and corresponding dental record with two main objectives:

• To estimate the prevalence of discrepancies of medical information of cardiac patients between dental and medical records.
• To identify the factors contributing to information discrepancies, if any.

MATERIALS AND METHODS

Patients’ health information could be obtained from different sources such as medical records, health questionnaires, and patients’ self-report of the condition, reports from other health-care providers, or a combination of these sources.

The research proposal and methodology were approved by the Regional Research and Ethics Committee of Taif Region, Armed Forces Hospitals followed by the Hospital Director’s approval. Confidentiality was ensured as all information related to patients, physicians, dentists, or Taif Region Armed Forces Hospitals obtained throughout the research, including data analysis and retention, were strictly confidential and were used for research purposes only. This study was completed in 12 months.

A self-administered health questionnaire is the most commonly used method in dental settings. A study of the validity of a risk-related patient-administered medical questionnaire for dental patients compared the answers on the questionnaire with the results of a verbal history taken by a physician8 and found that the sensitivity and specificity of the questionnaire appeared to be sufficiently high. The questionnaire was found to be valid for the registration of medical problems in dental patients, however, a combination of the two methods is recommended. This study emphasized the role of the physician or dentist in taking the history as the verbal communication and discussion may reveal more information. There were two examiners who investigated the records. They were trained by the principal investigator for this study.

The population studied in this research consisted of 1154 cardiac patients who visited both the cardiology and dental clinics at least once between 2007 and mid-2012. Cardiac patients refer to those who were diagnosed with cardiovascular disease, which is a group of disorders in the heart and blood vessels that includes coronary heart disease, cerebrovascular disease, rheumatic heart disease, congenital heart disease, and deep vein thrombosis and pulmonary embolism.9
A representative sample is a subset of a statistical population that accurately reflects the members of the entire population. A proportional stratified random sampling technique was used. In this study, a sample size was calculated based on open source epidemiologic and statistical calculator using the following formula: $n = \frac{(\text{DEFF} \times Np(1-p))}{(d^2/Z^2) \times (N - 1) + p \times (1-p)}$ with 95% confidence level.

In this research, qualitative data were collected from medical records, dental records, medical staff database, and hospital information system.

**Inclusion criteria**

The following records were included in the research:
- Records of cardiac patients who visited both the cardiology and dental clinics at least once between January 2007 and June 2012.

**Exclusion criteria**

- Missing or inactive medical or dental records.
- Documents dated after the review period end date.

**Data collection tool**

Data were collected using a data collection sheet adopted and modified from the Medical Services General Directorate Health History form that was based on American Dental Association Health History form.

The data collection sheet consisted of four sections:
- Patient demographic characteristics
- Dentist demographic characteristics
- Source of dental patient
- Medical information.

**Data collection technique**

Lists of medical identification numbers of all patients who visited both cardiology and dental clinics between 2007 and mid-2012 were obtained from the Communication and Information Technology Department using the hospital information system “HIS.” Each record was screened by medical records staff to confirm the presence of cardiac disease. Documents covering an entire research period in both medical and dental records were reviewed indicating if the patient has a record of ever having any of the listed conditions during the year under study or before. Records indicating the listed items were marked with “Yes” and those which did not clearly document the listed item were marked with “No.” Medical staff database and HIS were used to complete the data collection by the researcher. Data collection sheets were collected, labeled per year, reviewed, and prepared for data entry.

Accordingly, data were analyzed using the SPSS Statistics for Windows, Version 19.0. Armonk, NY: IBM Corp. and Kappa statistics, Fisher’s exact test to examine the association between demographic variables and the outcome (prevalence of discrepancies) at a significance level of $\alpha = 0.05$.

**RESULTS**

A total of 289 eligible Saudi and non-Saudi cardiac patients of both the genders were included in this study. The age of patients ranged between 2 and 92 years with a mean of 56 ± 16.9 years. More than half of the patients 151 (52.2%) were females, and the majority of patients 279 (96.5%) were Saudis.

A total of 1608 medical information were found in 289 patients’ medical records, with a mean ± standard deviation of $5.6 \pm 1.8$, among which 752 (46.4%) medical information was correctly identified and recorded in the patients’ dental records whereas 867 (53.5%) medical information was missing. A total of 778 medical information were found documented in the dental records, of which 752 (96.7%) were found to be correctly identified and documented by the dentists whereas 26 (3.3%) were observed to be false-positive where the disease was marked as present in the health questionnaire by either the dentist or the patient while it does not really exist.

A great majority [297 (96.5%)] of cardiac patients’ dental records had at least one medical information discrepancy when compared to the corresponding medical records, with a range of 0–10 and a mean and standard deviation of $3.17 \pm 1.7$.

Table 1 shows that all cases of systemic lupus erythematosus ($n = 2$) and rheumatic fever ($n = 5$) were missed in the dental records followed by 249 (93%) of medications, 23 (92%) stroke, and 163 (88.6%) hyperlipidemia, and that the least discrepant records were related to anticoagulants 69 (27.8%), cardiac diseases 75 (26%), and diabetes mellitus 38 (22.2%).

Table 1 also shows that the Kappa measurement of agreement between dental and medical records beyond chance showed poor agreement in medication, hyperlipidemia, stroke, and rheumatic fever ranging...
between 0.006 and 0.137; 50% of the medical conditions showed fair to moderate agreement (0.21–0.60) whereas only 3 medical conditions, i.e., diabetes mellitus, kidney transplant, and cancer/therapy showed good agreement.

Table 2 shows that the lowest prevalence of discrepancies between medical and dental records was recorded in 2009 (94.3%), whereas the highest rates were recorded in 2007 and 2011. These differences were not statistically significant, $P > 0.05$.

The association between patients’ characteristics and discrepancies between dental and medical records is shown in Table 3. Associations between the source of the dental patients and the discrepancies examined are listed in Table 4. Dental records of in-patients and patients who were referred from the outpatient department to the dental clinic for consultation or treatment showed the highest detected discrepancies (88.9% and 82.4%, respectively), whereas the least was found in the records of patients referred from the cardiology clinic (70%).

The association between discrepancies between dental and medical records and dentists’ characteristics (gender, category, nationality, and experience) showed no statistical significance ($P > 0.05$), as shown in Table 5.

### DISCUSSION

The purpose of this research was to contribute to a better understanding of the information gap that exists...
The findings in this study were consistent with previous studies. Although it is still much higher than 10%, 40%, and 65% reported by Lewis et al.,[11] Haughney et al.,[12] and Greenberg and Glick,[13] respectively, the discrepancies in this study were close to Lutka and Threadgill,[14] findings, which identified more than 86% discrepancies between dental and medical records. The higher prevalence of discrepancies in this study compared to the referent groups could be due to the fact that this study was restricted to cardiac patients who were most likely to have other medical problems that have been previously considered to be risk factors, and while the predominant causes of cardiovascular disease are obesity, hypercholesterolemia, diabetes mellitus, excessive food intake, smoking, hypertension, and lack of physical activities.[16] The characteristics of patients whose records have been reviewed in this study support this evidence. A little over 63% of the patients in this study were found to have hypercholesterolemia, 53% were diabetics, and 69.5% were hypertensive.

Patients’ mean age and median were 56 and 59, respectively, which is an older profile than that of the general population (CIA, 2013). Forty-six percent of the study sample was above 60 years of age and was found to have more discrepancies compared to younger patients. On one hand, this could be due to the fact that most of the young patients have congenital heart diseases that were not originally associated with other risk factors compared to older patients who have an increased risk of diseases.

In addition, the characteristics of the diseases themselves or age-related disorders and problems or deficits, such as impaired cognition or difficulty in recalling or hearing, cause difficulty in describing problems or communicating with the healthcare provider (Merck Manual, 2012) and eventually lead to inaccurate medical information.

There is a low level of patient awareness regarding the medical conditions, as has been reported by Al-Baghli et al.[17] and Saeed et al.,[18] who evaluated the awareness of hypertension among the Saudi adult population and reported that only 44.7% of hypertensives were aware.

The findings of this study showed that, at 0.05 level of significance, there is no sufficient evidence to indicate that dentists with higher qualifications or longer experience document more complete or accurate records than junior staff ($P = 0.340$).

As expected, dentists with minimum experience had more discrepant records. The results of this study also indicated that non-Saudi dentists showed slightly better documentation compared to Saudi dentists, of which 82% had less than 2 years of experience.

Several different factors are believed to be related to systems and not individuals. First, the current four-page comprehensive health history questionnaire was found to have no advantage over the previously used single-page concise form in reducing the medical information gap.
Second, communication between physicians and dentists through consultations and referrals has surprisingly resulted in more or less similar levels of discrepancies as those of patients who have directly accessed the dental services.

Third, communication among dental professionals through documentation proved to be inadequate. Dental notes related to telephone consultations with patient’s treating physician were limited to the instructions or the required precautions, not the patient’s health condition such as instructions on pre-medications or holding anticoagulants before dental procedures. Some other notes refer to the medical record, such as in-patient cases.

Fourth, the mode of administration of the questionnaire might also have contributed to incomplete or inaccurate medical information, because in the cases of very young, old, and illiterate patients, a different person other than the patient would usually fill out the form and jointly, with the lack of appropriate review of the information by the dental professionals, even bigger gaps result.

Fifth, from a different perspective, the existing paper-based structure of the medical records make it difficult for the dental professionals to obtain complete, up-to-date, and relevant information, especially because some patients have several volumes of the medical record in addition to the non-standardized method of physicians’ documentation.

Limitations

Patients in this study were restricted to cardiac patients which obviously reflected on patients’ ages, with a predominance of patients over 40 years of age. Considering both of these annotations, the generalizability of these findings to dental patients’ population is unknown.

International Classification of Diseases coding is not implemented in the hospital which consequently leads to difficulty in conducting researches based on diagnosis.

Finally, the current paper-based structure plus separate medical and dental records require enormous efforts to change the existing practice record into the research record that would probably discourage future researches with larger samples or longer periods.

CONCLUSION

Critical gaps have been identified between dental and medical records, a high proportion of the discrepancies in this study were attributed to system level problems. A well-established model for efficient communication among medical and dental providers caring for the same patient is essential; however, it does not exist. It can be overcome by providing proper training to maintain the records in the same manner which can reduce the information gap between medical and dental records.

A fragmented approach in managing medically compromised patients in general and high-risk patients, in particular, might place these patients at further risk and can best be addressed within an integrated medical-dental system.

Interventions that target structures or processes will probably have a broad, lasting impact on the delivery of safe, high-quality, efficient care.

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Conflicts of interest

There are no conflicts of interest.

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