

## Validation of self-reported medical history data in dental charts

Dr. Barry L. Stewart, BDSc, LDS, MDSc, FRACDS

Dr. Wael A. Sabbah, BDS, DDPH, MSc

Dr. Abdulaziz M. Alrasheed, BDS

تهدف هذه الدراسة إلى التحقق من مدى دقة ، واكتمال المعلومات الطبية والشخصية المدونة بسجلات مراجعي عيادات الأسنان ببرنامح مستشفيات القوات المسلحة بالسعودية العربية ، وذلك عن طريق مقارنتها بمثلها من المعلومات المدونة بالسجلات الطبية . ولقد تم اختيار ٢٤٦ سجلًا لمراجعي الأسنان بطريقة عشوائية لمقارنتها بالسجلات الطبية بالمستشفى . كما تم إعادة فحص ١٠ بالمائة للتأكد من دقة عملية الفحص . تم تحليل المعلومات إحصائياً .

وقد تبين أن عملية مراجعة السجلات كانت دقيقة بنسبة أكثر من ٩٠ .٠ . و تمقارنة سجلات الأسنان بالسجلات الطبية تبين أن البيانات الشخصية في سجلات الأسنان متطابقة إلى حد ما مع السجلات الطبية ( بنسبة ٦٤ .٠ ) . كما اتضح انخفاض دقة سجلات الأسنان في تسجيل حالات مرضي الكبد الوبائي ، ونقل الدم ، وارتفاع ضغط الدم ، وأمراض الكلى ، بينما كانت مرتفعة نسبياً في أمراض أخرى مثل السكري وفقر الدم . أما بالنسبة لمراجعي الأسنان الأصحاء بدنياً فقد كانت البيانات الخاصة بهم دقيقة إلى حد كبير . و تبين كذلك أن نسبة الحالات الصحيحة للغير صحيحة بسجلات الأسنان كانت منخفضة في بعض الأمراض مثل فسر الدم (٣٨ .٠) ونقل الدم (٢٥ .٠) وارتفاع ضغط الدم (٥ .٠) .

و من الممكن تفسير فلة الدقة في تدوين الحالة المرضية للمراجعي غير الأصحاء بدنياً في سجلات الأسنان إلى عدم معرفة المراجع بحالته المرضية أو احتمال ميله أحياناً إلى إخفاء مرضه عن طبيب الأسنان حتى يحصل على علاج الأسنان دون تأخير . كما يمكن تفسير ارتفاع الدقة في المعلومات المدونة بسجلات الأسنان الخاصة بالأصحاء بدنياً إلى أن غالبية مراجعي الأسنان أصحاء بدنياً . وبالرغم من فلة عدد مراجعي الأسنان الذين يخفون حالاتهم المرضية ، إلا أن طبيعة تلك الحالات وخطورتها تختم ضرورة الإبلاغ بها . لذا يجب عدم الاعتماد كلياً على المراجعي لمعرفة حالته المرضية ولا بد أن يتاح لأطباء الأسنان إمكانية الاستعانة بالمعلومات المدونة بالسجلات الطبية أو بالحاسب الآلي .

The purpose of this study was to assess the completeness and validity of medical and demographic data in dental charts in Northwest Armed Forces Hospitals (NWAFFH) by comparing them to data abstracted from medical records. Demographic and medical data were abstracted from 246 randomly selected, dental charts and the corresponding medical charts. Ten percent of the charts were re-examined to assess the reliability of examiners. Sensitivity, specificity and positive predictive values of the medical history recorded in dental charts were calculated. Reliability in chart abstracting was high ( $\kappa > 0.9$ ). Agreement on demographic data between dental and medical charts were moderate ( $\kappa = 0.64$ ). Sensitivity of medical conditions in dental charts was low in conditions such as hepatitis B, blood transfusion, high blood pressure and renal disease, and was substantial for diabetes and anaemia. Specificity was very high for almost all the conditions, and positive predictive value was low for anaemia (0.38), blood transfusion (0.25) and high blood pressure (0.5). The low sensitivity of self-reported medical history could be attributed to patients' ignorance of their medical conditions and/or their probable tendency to conceal information in order to avoid delays in dental care. The high specificity could be explained by the very small number of sick persons who seek dental care in NWAFFH. The results indicated that, although the number of patients apparently concealing their medical conditions was small, the nature of these conditions could lead to potentially harmful sequelae during or after dental treatment. Therefore, dentists should not rely completely on self-reported medical history but ideally have access to patients' medical records or database when available.

### Introduction

Identifying and understanding patient's medical history is an essential process before providing any dental treatment, and the safety of both dental health care providers and patients may depend on provision of an accurate medical history. Although the dental treatment plan is mainly based on dental diagnosis supported by clinical and radiological findings, it could be affected by medical history. Despite the obvious importance of medical history to dental care, there is some doubt about its validity. For example, several studies have examined the validity of self-reported heart conditions and concluded that, if dentists rely solely on self-reported and medically unconfirmed history of a heart condition, either unnecessary antibiotic pre-medication or failure to pre-medicate might result.<sup>1,2</sup> Furthermore, patients might not reveal certain infectious diseases to their dentists or hygienists,<sup>3</sup> while

other studies that examined the validity of self-reported chronic conditions in other health care settings found inaccuracy in reporting these conditions.<sup>4</sup>

In the Northwest Armed Forces Hospitals (NWAFFH) Dental Department (Tabuk, Saudi Arabia) dentists rely on self-reported health history documented in the dental charts. During the first dental visit, patients are required to answer an approved questionnaire about their medical history through an Arabic-speaking dentist or an interpreter. The questionnaire contains questions pertaining to relevant medical conditions such as cardiac, renal and haematological diseases, diabetes, blood transfusion, drug allergies, problems encountered with previous dental treatment, etc. In addition to these defined questions, there are open questions regarding any other medical problems not stated elsewhere, and previous admissions to hospitals for any reason. Once medical history is completed, dentists record any relevant medical history and medical alert in

Received 8 May 2002; Revised 6 November 2002;

Accepted 9 November 2002

North West Armed Forces Hospitals

Department of Dental Services

P.O. Box 100, Tabuk, KSA

Address reprint request to:

Dr. Barry L. Stewart

NWAFFH, Dental Services

P.O. Box 100, Tabuk, KSA

separate boxes to be readily identified by other dentists. While a number of studies suggested that self-reported medical history might not be accurate,<sup>1,2,4</sup> similar phenomena were observed in NWAFFH dental department where some patients appeared to have concealed certain medical conditions, possibly to avoid referral for medical consultation and hence, avoid delay in receiving dental care. Another observation in the department has been inconsistency and inaccuracy in the self-reported medical history. This might have an impact on prescribing, for example, prophylactic antibiotics for patients with history of heart diseases. Inaccurate medical history might also have an effect on conditions such as tuberculosis and active herpes simplex, which require postponement of elective dental treatment to minimize the risk of disease transmission within the dental clinic.<sup>5</sup>

Several studies have shown that medical charts provide an accurate and reliable source of medical and demographic data,<sup>6,7,8,9</sup> which would be necessary in order to validate data recorded in the dental charts.

Therefore, it was deemed essential to examine the appropriateness of relying on self-reported medical history before providing dental care. Hence, this study set out to assess the validity of self-reported medical history in dental charts in the NWAFFH to determine the extent of the problem and whether it might necessitate any changes in the department policies and procedures. The study also assessed importantly the quality of administrative data, which serve as indicators for the overall quality of data in the charts.<sup>6,10</sup>

### Objectives

The specific objectives were:

1. To compare the completeness and consistency of demographic data, including name, gender, address, nationality, marital status and occupation, in dental charts with that in medical charts.

**\*Sensitivity:** The probability that dental charts positively record a disease when it is present.

**Specificity:** The probability that dental charts negatively report a disease when it is absent.

**<sup>1</sup>Positive Predictive Value:** The probability of a true disease in a patient when it is positively reported in dental charts

**<sup>§</sup>Significance level:** The probability of incorrectly rejecting the null hypothesis when it is true.

**\*\*Test power:** The probability of rejecting the null hypothesis when it is false.

2. To assess the validity, sensitivity\*, specificity<sup>†</sup> and positive predictive value<sup>‡</sup> of medical history in dental charts by comparing it with data in medical charts, particularly in relation to relevant medical conditions for example, diabetes, heart disease and infectious diseases such as TB, active herpes infection and hepatitis.

### Methods

In a preliminary assessment within the dental department in the NWAFFH, it was found that relevant medical conditions were documented in 9 and 25 percent of dental and corresponding medical charts, respectively. Thus, the following equation was used for estimation of significant difference between two proportions at the 0.02 level and with a test power 98 percent,<sup>11</sup>

$$n = \frac{\{Z_{\beta} \sqrt{[p_1(1-p_1)+p_2(1-p_2)]} + Z_{\alpha} \sqrt{2 [p_0(1-p_0)]^2}\}}{(p_2 - p_1)^2}$$

where  $\alpha$  = significance level<sup>§</sup>,  $\beta$  = test power\*\*,  $p_1$  = first proportion,  $p_2$  = second proportion,  $p_0 = (p_1 + p_2) / 2$ . The calculated sample size was 207 pairs of charts, but 246 pairs of dental and medical charts were examined to improve the reliability.

A form was prepared for chart abstracting, and dental records clerks were requested to blindly select the required number of dental charts. Two of the co-authors and a number of Dental Surgery Assistants (DSA) received training on dental and medical chart abstracting.

One of the co-authors and four DSAs collected demographic and medical data from the selected dental charts and recorded findings in the abstract forms. Medical numbers were used to identify the abstract forms. The second co-author blindly selected 30 previously reviewed dental charts and rechecked them to test for reliability.

After completing the dental chart review, two of the co-authors and a DSA, blinded to the findings from dental chart abstracting, reviewed the corresponding medical charts and recorded their findings in independent chart abstract forms. Again, 30 of the medical charts were rechecked to test for reliability.

Data collected from medical and dental charts were entered in a computer database, and analyzed using SPSS<sup>12</sup> statistical software. Kappa values were calculated to measure reliability in the chart abstract process, and also to measure validity of demographic and medical data in dental charts

(medical charts serve as gold standard). Sensitivity, specificity and positive predictive values of medical history in dental charts were also calculated.

### Results

Overall reliability test of dental and medical charts reviews showed kappa of 0.93 and 0.97 respectively, indicating a high reliability in data collection. Reviewers' reliability in abstracting dental charts showed kappa of 0.83 for demographic data and 0.97 for medical data. At the same time, reliability in abstracting medical charts showed kappa of 0.93 for demographic data and 0.97 for medical data.

Data including patient's name and number in first page were missing in 21 dental charts (8.6 percent of total sample). At the same time patient's name and number in current treatment page, were missing in 46 dental charts (18.8 percent) and in 7 medical charts (2.9 percent). Demographic data showed very good agreement on gender and nationality (kappa: 1 and 0.96), whereas there was poor agreement on residential address (kappa = 0.007). The overall agreement on all demographic data was moderate at kappa = 0.64.

The results showed 100 percent agreement on absence of certain medical histories such as renal dialysis, HIV, tuberculosis and uremia. Table 1, on the other hand, showed the percentage of positive medical conditions not reported in dental charts. In the 246 medical records there were 3 cases of heart diseases, 2 cases of hepatitis B (HBV) and one case each of hepatitis A (HAV), hepatitis C (HCV), active herpes infection, blood transfusion and other haematological diseases, which were not recorded in dental charts. Also, 37.5 percent of all diabetic cases, 75 percent of renal, 75 percent high blood pressure and 40 percent of anemia cases were not recorded in dental charts. The charts review also showed that dental patients had a tendency to neglect reporting previous admissions to hospitals and other medical conditions, with only 15 and 2 percent documented in dental charts, respectively.

Table 2 showed kappa statistics for the measurement of agreement, sensitivity, specificity and positive predictive value for medical history in dental charts when compared to data obtained from medical records. Generally, the specificity of medical information in dental charts was very high with patients unlikely to report having a medical condition that was not really there. However, the measurement of sensitivity of medical information

in dental charts implied that patients might have a tendency to conceal some of their medical problems. Sensitivity was moderate in diabetes (0.63) and anemia (0.6), but low in renal disease (0.25), high blood pressure (0.25), other medical conditions (0.02), previous admissions to hospitals (0.15), HBV (0), HAV (0) and blood transfusion (0).

**Table 1.** Percentages of positive medical conditions NOT documented in dental charts (n=246)

| Condition                      | Number of cases | Missed in dental charts (percent) |
|--------------------------------|-----------------|-----------------------------------|
| Diabetes                       | 8               | 37.5                              |
| Renal disease                  | 4               | 75.0                              |
| Anaemia                        | 5               | 40.0                              |
| Cardiac disease                | 3               | 100.0                             |
| High blood pressure            | 4               | 75.0                              |
| Hepatitis A                    | 1               | 100.0                             |
| Hepatitis B                    | 2               | 100.0                             |
| Hepatitis C                    | 1               | 100.0                             |
| Blood transfusion              | 1               | 100.0                             |
| Other blood diseases           | 2               | 100.0                             |
| Active herpes                  | 1               | 100.0                             |
| Other infectious diseases      | 1               | 100.0                             |
| Other medical diseases         | 51              | 98.0                              |
| Previous admission to hospital | 101             | 85.0                              |

**Table 2.** Sensitivity, specificity and validity of medical history in dental charts.

| Condition                      | Sensitivity | Specificity | Positive predictive Value | kappa |
|--------------------------------|-------------|-------------|---------------------------|-------|
| Diabetes                       | 0.63        | 1.00        | 1.00                      | 0.76  |
| Renal disease                  | 0.25        | 1.00        | 1.00                      | 0.4   |
| Anaemia                        | 0.60        | 0.98        | 0.38                      | 0.49  |
| Kidney transplant              | 1.00        | 1.00        | 1.00                      | 1.00  |
| High blood pressure            | 0.25        | 0.99        | 0.50                      | 0.33  |
| Hepatitis A                    | 0.00        | 0.99        | 0.00                      | 0.004 |
| Hepatitis B                    | 0.00        | 0.99        | 0.00                      | 0.005 |
| Blood transfusion              | 0.00        | 0.98        | 0.25                      | 0.006 |
| Other medical diseases         | 0.02        | 0.98        | 0.25                      | 0.006 |
| Previous admission to hospital | 0.15        | 0.96        | 0.71                      | 0.12  |

The positive predictive value was also low in conditions such as anemia (0.38), high blood pressure (0.5), other medical conditions (0.25), HBV, HAV and blood transfusion (0). Agreement beyond chance (kappa) was perfect only for kidney transplant (1.0), moderately high for diabetes (0.76), moderate for anemia (0.49), renal disease (0.4), and poor for high blood pressure (0.33), previous admission to hospital (0.12), HBV (0.005), HAV (0.004), blood transfusion (0.006) and other medical conditions (0.006). Previous admissions to hospitals not recorded in dental charts included abortion (7), hyperglycemia (2),

nephritis (2), sickle cell anemia (1), thyroiditis (2), otitis media (1) and diaphragmatic hernia (1). Other medical conditions which were not recorded in dental charts included hyperthyroidism (2), hypothyroidism (1), hepatic cysts (1), febrile neutropenia (1), leukemia (1), pemphigus vulgaris (3), otitis media (1), recurrent drowsiness (2), duodenal ulcer (1), epilepsy (1), vitiligo (1), febrile convulsion (2), asthma (5), drug allergy (2) and peptic ulcer (1).

### Discussion

This study aimed at assessing completeness and validity of demographic and medical data in dental charts by comparing them to data abstracted from central medical records in the NWAFFH, Tabuk, Saudi Arabia. Demographic data were complete in more than 90% of dental charts. However, the completeness and accuracy of the demographic data in dental charts in this study were lower than that reported in other studies of medical chart reviews.<sup>13,14</sup> The results of this study also showed higher accuracy in recording administrative data compared to clinical data, as indicated in other studies.<sup>13,14</sup>

Specificity was very high for most of the medical conditions in dental charts, where patients were highly unlikely to report false positive conditions of diabetes, heart, or renal diseases. This finding was consistent with a study conducted in the United States to validate self-reported chronic conditions,<sup>4</sup> but inconsistent with another study in which diabetic dental patients appeared to report false positive heart conditions.<sup>1</sup> The high specificity in this study could be partially explained by the fact that dental patients in Tabuk are usually healthy individuals, as in other parts of the world.<sup>15,16</sup>

At the same time, dental patients in NWAFFH seemed more likely to avoid reporting some medical conditions and to completely ignore questions about admissions to hospitals and the presence of any other illness, even though these questions were included in the medical history questionnaire in dental charts. Sensitivity of medical history was moderate for diabetes and anemia and very low for conditions such as HBV, HAV, blood transfusion and renal diseases. Sensitivity was also very low for previous admission to hospital and other medical conditions. These two categories included many relevant medical conditions such as epilepsy, hyperglycemia, sickle cell anemia, leukemia, nephritis and abortion.

The probability of reporting medical history in this study was much lower than that reported in other studies.<sup>1,4</sup> Studies of the validation of medical history in dentistry suggested that patients might be reluctant to reveal their health history to their dentist because they perceived it unimportant or because of their desire for privacy.<sup>3</sup> Others also suggested that some patients might not be aware of their sickness.<sup>17,18</sup> Low sensitivity of medical history in dental charts in NWAFFH could be explained by the fact that patients might be worried if they revealed a positive medical history, as the dentist might refer them for medical consultation report, which could lead to postponement or cancellation of dental care.

Generally, the accuracy of medical data in dental charts in this study was lower than that reported in validation studies conducted on medical charts.<sup>13,14,19</sup> However, this study was consistent with other dental studies that suggested that dental patients are not accurate and tend to conceal medical history.<sup>3,20</sup> Although the majority of dental patients in NWAFFH are healthy, there are serious medical conditions that dentists cannot afford to miss, as they might place the patient and/or the dentist in a very serious situation if precautions are not taken. Examples of these conditions include, diabetes, heart diseases, renal diseases, epilepsy and abortion.

The results of the study indicate the need for more reliable sources of patients' medical information, which can be easily and reliably accessed and utilized. Therefore, it is recommended that dentists in NWAFFH should have access to medical charts or the medical database. It was also suggested that a universal system for writing diagnoses in medical charts be implemented to enable different health care providers to read and understand medical files.

### References

1. Guggenheimer J, Orchard TJ, Moore PA, Myers DE, Rossie KM. Reliability of self-reported heart murmur history: Possible impact on antibiotic use in dentistry. *J Am Dent Assoc* 1998; 129(7): 861-866.
2. Lockhart PB, Crist D, Stone PH. The reliability of the medical history in the identification of patients at risk for infective endocarditis. *J Am Dent Assoc* 1989; 119(3): 417-418.
3. McDaniel TF, Miller D, Jones R, Davis M. Assessing patient willingness to reveal health history information. *J Am Dent Assoc* 1995; 126(3): 375-379.
4. Martin LM, Leff M, Calonge N, Garrett C, Nelson DE. Validation of self-reported chronic conditions and

- health services in a managed care population. *Am J Prev Med* 2000; 18(3): 215-218.
5. Faecher RS, Thomas JE, Bender BS. Tuberculosis: A growing concern for dentistry. *J Am Dent Assoc* 1993; 124(1): 94-104.
  6. Iezzoni LI, Daley J, Heeren T. Using administrative data to screen hospitals for high complication rates. *Inquiry* 1994; 31: 40-55.
  7. Beers MH, Munekata M, Storrie M. The accuracy of medication histories in the hospital medical records of elderly persons. *J Am Geriatric Society* 1990; 38(11): 1183-1187.
  8. Iezzoni LI, Shwartz M, Burnside S, Ash AS, Sawitz E, Moskowitz MA. Diagnostic mix, illness severity, and costs at teaching and nonteaching hospitals. Springfield, VA: U.S. Department of Commerce, National Technical Information Service; 1989 Publication No.: PB 89 184675/AS
  9. Iezzoni LI. Risk adjustment for measuring health care outcomes. Ann Arbor, Michigan: Health Administration Press, 1994.
  10. Williams JI, Young W. Inventory of studies on the accuracy of Canadian health administrative databases. Toronto (ON) Institute for Clinical Evaluative Sciences (Canada), 1996 December, Pub No.: 96-03-TR.
  11. Dawson-Saunders B, Trapp RG. Basic and Clinical Biostatistics. Connecticut: Appleton & Lange. Prentice Hall International Inc., 1990: 156.
  12. SPSS Release 8.0. Standard version for windows. Copyright SPSS Inc., 1999.
  13. Tamblyn R, Lavoie G, Petrella L, Monette J. The use of prescription claims databases in pharmacoepidemiological research: The accuracy and comprehensiveness of the prescription claims database in Quebec. *J Clin Epidemiol* 1995; 48(8): 999-1009.
  14. Ontario Hospital Association, Ontario Ministry of Health, Hospital Medical Records Institute. Report of the Ontario data quality reabstracting study. Toronto, ON (Canada): Ontario Hospital Association, 1991.
  15. Sabbah W, Leake JL. Comparing characteristics of Canadian who visited dentists and physicians during 1993/94: A secondary analysis. *J Can Dent Assoc* 2000; 66(2): 90-95.
  16. Locker D, Leake JL. Inequities in health: Dental insurance coverage and use of dental services among older Ontario adults. *Can J Public Health* 1993; 84(02): 139-140.
  17. Sigvard P. Self-assessment of dental conditions: Validity of a questionnaire. *Community Dent Oral Epidemiol* 1991; 19(5): 249-251.
  18. Centers for Disease Control. Protection against viral hepatitis. *MMWR* 1990; 39 (No. RR-2): 8.
  19. Faciszewski T, Broste SK, Fardon D. Quality of data regarding diagnoses of spinal disorders in administrative databases. A multicenter study. *J Bone Joint Surg Am* 1997; 79(10): 1481-1488.
  20. Cohen AS, Jacobsen EL, BeGole EA. National survey of endodontists and selected patient samples: Infectious diseases and attitudes toward infection control. *Oral Surg Oral Med Oral Pathol* 1997; 83(6): 696-702.

#### **Acknowledgements**

The authors wish to gratefully acknowledge the Northwest Armed Forces Hospitals Program and Medical Research Committee (Chairman, Professor Zain Al Shareef and Academic Secretary, Dr. Adolphus Somorin) for the use of the Dental Department's clinical facilities and approval for the research project (MRC - 131) and the NWAFFH Medical Records Department.