Accuracy of Familial Reporting of a Child's Medical History in a Dental Clinic Setting

Jessie Naomi Schwarz, DMD Amy Monti, DDS Ilse Savelli-Castillo, DDS Linda P. Nelson, DMD, MScD

Dr. Schwarz is a pediatric dentistry intern, Department of Pediatric Dentistry, Children's Hospital, Boston, Mass; Dr. Monti is in private practice, Los Angeles, Calif, and a former pediatric dentistry resident, Department of Pediatric Dentistry, Children's Hospital, Boston; Dr. Savelli-Castillo is an assistant pediatric dental attending, Department of Pediatric Dentistry, Children's Hospital, Boston, and clinical instructor, Oral and Developmental Biology, Harvard School of Dental Medicine, Boston; Dr. Nelson is an associate pediatric dental attending, Department of Pediatric Dentistry, Children's Hospital, Boston, and assistant professor, Oral and Developmental Biology, Harvard School of Dental Medicine, Boston, Mass. Correspond with Dr. Savelli-Castillo at ilse.savelli-castillo@childrens.harvard.edu

Abstract

Purpose: Accurate reporting of medical history information is essential to provide safe and successful dental treatment to children. The purpose of this study was to evaluate the accuracy of health histories reported by parents/guardians of pediatric patients presenting for dental treatment by comparing them to the histories provided in the child's medical chart.

Methods: Data collection from the dental record was performed using the medical history questionnaire from the child's first visit as the data source. Data collected focused on knowledge of the child's medical conditions, current medications, allergies, immunization status, and need for prophylactic antibiotics. Corresponding data were collected from the child's medical chart. Statistical analysis included kappa analysis and calculation of sensitivity, specificity, and failure-to-report rates.

Results: The study group consisted of 226 children (99 girls, 127 boys), with a mean age of 10.35 years. The patients were divided into 2 groups based on their medical status (healthy vs medically compromised). For the medically compromised children, parents had high sensitivity reporting rates (>75% sensitivity) for only 2 out of the 9 medical categories. For both groups, <50% of the medicine, allergy, and need for prophylaxis categories had sensitivity rates above 75%. Failure-to-report rates of 40% to 60% were common, with some as high as 80%. Weighted failure-to-report rates were consistently higher for medically compromised children compared to healthy children.

Conclusions: Parents/guardians of children presenting for dental treatment are not always able to accurately report vital medical history information. Therefore, pediatric dentists need to more closely examine the dental health questionnaire and make every attempt to obtain accurate information to provide appropriate care for each patient. (*Pediatr Dent.* 2004;26:433-439)

KEYWORDS: PEDIATRIC MEDICAL HISTORY, REPORTING, PARENTAL KNOWLEDGE

Received July 24, 2003 Revision Accepted February 11, 2004

Advances in pediatric medicine and surgery have led to a dramatic reduction in morbidity and mortality among medically compromised children, resulting in a growing population of special-needs pediatric patients. The complex nature of their medical conditions and histories can place these children at risk when treated by a dental health care provider who has no access to an accurate medical history.

To standardize the approach for assessing risks in medically compromised patients, dentists have been increasingly encouraged to use a standardized health history format during their initial exam.[1-3] This format usually involves using a written questionnaire, which may or may not be followed up by a verbal interview.

Several studies have compared the accuracy of self-reported medical histories completed by adult medical patients.[4-11] Fewer have investigated the accuracy of medical histories provided by adult dental patients. Brady and Martinoff[12] studied more than 2,000 dental school patients, and found 32% of patients provided incorrect or missing

data on their medical history questionnaires. A direct comparison between dental record medical histories and outpatient medical records performed by Lutka and Threadgill[13] found an 86% error rate between the 2 histories. Scully and Boyle[14] studied 292 adult patients presenting for treatment at an oral medicine clinic, comparing medical history information attained using a health questionnaire vs an interview. Significant omissions in reporting of heart disease, lung disease, current medications, and adverse drug reactions were found using either the questionnaire or the dialogue format, indicating neither format produced an accurate medical history.

All the studies previously mentioned refer to adult patients. In the pediatric population, an additional source for error arises from the fact the only source for self-reported medical information is the accompanying family member or guardian. Not surprisingly, the few studies conducted have shown significant differences between parent-reported histories and those reported by the child's physician.[15-19] For example, Carraccio et al[15] interviewed 49 caretakers and found 53% were unable to diagnose their child's specific problem. Of these, only 50% could identify the organ system involved or acknowledge there was a medical problem. Only 71% of caretakers were able to report an accurate list of their child's medications, leading the authors to recommend the use of some additional form of information when a child comes to an unfamiliar health care provider for treatment.

To the authors' knowledge, there have been no studies on the validity of pediatric medical histories obtained from an accompanying family member or guardian when the child has presented for dental care. In this retrospective research project, the authors evaluated the accuracy level in the health history reported by parent/guardians and compared them to histories provided in the child's medical chart.

Methods

After approval from the Institutional Review Board, an initial population of 300 patients was selected at random from the active patient pool at the Dental Department of Children's Hospital, Boston. Half (150 patients) were drawn from charts indicating the presence of some medical condition (medically compromised), and half were chosen among patients with no medical issues noted in their chart (healthy). Medical charts were then examined for patients who had also received treatment at Children's Hospital. Because only children with complete medical and dental charts on file at the hospital were included, the final patient pool included 77 healthy and 149 medically compromised patients.

Data collection from the dental record was performed using the medical history questionnaire from the child's first visit as the data source. During the child's initial exam, this written history questionnaire had been completed by the accompanying adult and then reviewed verbally at the same appointment by the treating dentist. Data from the medical chart were collected by reviewing the child's medical record from the hospital. Medical and dental records were reviewed independently, using the medical record number (MRN) to later match the data sets.

Data collected included the patient's sex and date of birth, the party responsible for paying for the medical/dental treatment, and the person responsible for completing the medical history forms. In addition, the historian's primary language was noted, as well as the presence of an appropriate translator. Recorded data included whether the parent/guardian was able to report the major diagnosis for the patient (eg, cardiac, immunologic), as well as allergies and current medications. Reporting of the child's immunization status, as well as his/her need for prophylactic antibiotics, was also noted. The data were collected by 2 researchers; 20 (approximately 10%) of the charts were reviewed by both researchers to validate inter-rater reliability, and the kappa value for agreement between both researchers was found to be high (K=0.93).

Statistical analysis

Agreement between reported health histories and patient medical charts was assessed by a sensitivity/specificity analysis. In addition, kappa values were computed as an index of the strength of any apparent agreement or disagreement. Kappa scores >0.6 indicated substantial agreement, scores >0.4 indicated moderate agreement, and scores <0.3 showed poor agreement. Sensitivity is the fraction of reports that are true positives. For the purpose of this study, however, a more interesting measure is the percentage of responses failing to report an existing condition (failure-to-report rate=100%-sensitivity). As an easily interpretable index of the relative frequencies of misreporting in the general populations, a prevalence-weighted failure-to-report rate (WFRR) was computed. The formula for this measure is:WFRR=(100%-sensitivity) x prevalence.

Results

Of the 226 pediatric patients included in this study, 99 (43%) were female and 127 (56%) were male, with a mean age of 10.35 years. Using the medical chart as the gold standard, the patients were divided into 2 groups based on their medical status:

1. 77 (34%) were categorized as healthy (eg, no medical conditions reported)—the mean age was 10.5, with a nearly equal number of males and females (38 vs 39, respectively);
2. 149 (66%) were categorized as medically compromised (MC; eg, having 1 or more medical problems reported in the medical chart)—the mean age was 10.7, and 89 (59%) were male.

Information on insurance and language (including use of translators) was not analyzed due to inconsistent reporting in both the medical and dental chart.

The authors compared reporting of medical conditions, allergies, and medications between the medical and dental

Table 1. Comparison of Parental Report and Medical Record for Child's Medical History

	Prevalence (%)										Weighted failure-to-report rate (%)		
	+/+	+/-	-/+	-/-†	Total positive	Total	MC‡	Sensitivity (%)	Specificity (%)	κ	Failure-to-report rate (%) Total		MC‡
Medical conditions													
Cardiac	23	1	11	191	34	15	23	68	95	0.72	32	5	7
Hematological	13	7	9	197	22	10	15	59	96	0.56	41	4	6
Asthma	30	9	10	177	40	18	27	75	95	0.68	25	4	7
Apnea	1	5	5	215	6	3	4	17	98	0.28	83	2	3
Behavior	30	2	11	183	41	18	28	73	94	0.75	27	5	7
Neurological	70	3	11	142	81	36	54	86	93	0.83	14	5	7
Infectious	2	0	0	224	2	1	1	100	100	0.66	0	0	0
Endocrine	2	0	2	222	4	2	3	50	99	0.56	50	1	1
Renal	2	1	3	220	5	2	3	40	99	0.49	60	1	2
Allergies													
Medication	22	8	12	184	34	15	17	65	94	0.61	35	5	6
Latex	2	1	3	220	5	2	3	40	99	0.49	60	1	2
Food	13	12	3	198	16	7	11	81	99	0.58	19	1	2
Medications													
Cardiac	4	3	1	218	5	2	3	80	100	0.59	20	1	1
Behavior	17	1	5	203	22	10	15	77	98	0.77	23	2	3
Neurological	29	3	1	193	30	13	20	97	100	0.87	3	1	1
Hematological	4	3	3	216	7	3	5	57	99	0.53	43	1	2
Pulmonary	18	5	18	185	36	16	24	50	91	0.54	50	8	12
Endocrine	2	0	1	223	3	1	2	67	100	0.61	33	0	1
Antibiotic	5	1	3	217	8	4	5	63	99	0.62	38	1	2
Prophylaxis needed	18	1	1	206	19	8	12	95	100	0.86	5	0	1

†+/+, +/-, -/+, -/- indicate the presence or absence of an item's occurrence in each category for the dental and medical charts (ie, dental/medical).
‡MC=medically compromised. The number of medically compromised patients was determined from the incidence in the medical records.

charts. For the group of medically compromised patients, the authors found the prevalence of medical conditions ranged from 1% for infectious disease to 54% for neurological problems (Table 1). Sensitivity values (true positive rates) ranged from 16% to 100%. Specificity values were much less varied, ranging from 92% to 100%. Of the medical conditions, parents/guardians were the most accurate in reporting infectious conditions (sensitivity=100%) and least accurate in reporting apnea (sensitivity=16%).

Out of the conditions with higher prevalence (>20%), parents/guardians were most likely to correctly report if their child had a neurologic problem (sensitivity=86%), but least likely to accurately report hematologic problems (sensitivity=59%). Kappa values also varied widely (0.28 to 0.83), but only 1 category (sleep apnea) fell below 0.4.

The second group of comparisons focused on the reporting of any medications currently used by the patient. The prevalence of use medication categories noted in this study ranged from 2% to 24% among medically compromised patients, and from 1% to 16% for the overall population studied. In comparison to reporting medical conditions, the values for sensitivity, which ranged from 50% to 96%, were consistently higher in this category. Specificity values, which ranged from 91% to 99%—as well as kappa statistics of agreement, which ranged from 0.54 to 0.87—were also higher for medication use than for medical conditions.

Of the medicines misreported, parents/guardians were least accurate in reporting pulmonary medicines, the most commonly used drug group. These medications have a prevalence of 24% use in this population, but are only reported with 50% sensitivity. In addition, misreporting of the need for antibiotic prophylaxis, an area of particular concern in treating medically compromised patients, was also noted. The sensitivity for this category was relatively high (94%), with 1 of 19 patients misreporting the need for antibiotic prophylaxis.

Table 2. Patient Relationship to Dental Questionnaire Signer

	Parent/ guardian (%)	Other (%)	Not signed (%)
Healthy	86	5	9
Medically compromised	92	1	7

Table 4. Global Failure-to-report Rates

Medical condition	26%
Allergy	33%
Medications	29%

Table 3. Prevalence and Sensitivity for Allergies and Immunizations in Each Population

	Prevalence (%)		Sensitivity (%)	
	MC*	Healthy	MC	Healthy
Medication	17	12	72	44
Latex	3	1	25	100
Food	1	10	81	—
Immunizations current†	10	15	100	100

*MC=medically compromised.
†For currency of immunizations, a negative report (not current or no information) was used for analysis.

For both healthy and medically compromised patients, the authors found that a parent or legal guardian signed the majority of the forms and charts. Of note, both groups contained a small but significant proportion of unsigned charts (Table 2).

Reporting of allergies and immunization status was analyzed separately for the medically compromised and healthy groups (Table 3). Excluding food allergies, allergy prevalence among these populations was relatively similar; medically compromised patients had a prevalence of 17% for medication allergies and 3% for latex allergies vs 12% and 1% for healthy patients. By contrast, the sensitivity scores for these values varied significantly: 72% sensitivity for the medically compromised patients vs only 44% for healthy patients. There was a very low sensitivity (25%) for reported latex allergies among medically compromised patients. Although the prevalence is small for this category (3%), these finding indicate 3 parents/guardians did not report the child's latex allergy during the initial visit to the dentist.

WFRR was computed using the sensitivities found for each of the various medical categories. The WFRR rate ranged from 0% to 7% in the medically compromised group (Table 1).

Discussion

Due to time constraints, the average pediatric dentist, relies heavily on written health history questionnaires completed by an accompanying adult to provide basic information about a patient's medical status. This method of information gathering places a strong emphasis on a reporter's ability to recall each patient's significant medical issues. It is also dependent upon the reporter's judgment regarding information relevant to the dentist. This often leaves the dentist uncertain of the medical information's accuracy and places the child at risk for inadequate treatment. This study attempts to quantify the discrepancies in health history reporting in the dental office when compared to the gold standard of the medical record.

In general, the agreement between the dental health questionnaire and the medical record was good, as evidenced by the kappa values shown in Table 1. Most categories scored better than 0.60, indicating a high agreement between the 2 reports. For neurological conditions, the kappa was 0.83, and for neurological medications the kappa was 0.87, showing a substantial level of agreement. Conversely, a few categories showed low agreement rates, including a kappa score of 0.28 for sleep apnea.

Even though the kappa values in this study showed moderate to high levels of agreement, this analysis did not evaluate whether parents were able to report clinically significant information. In contrast, sensitivity provides a direct quantification of true-positive responses and supplies values that can be used in calculating failure-to-report rates (100%-sensitivity). In this study, failure-to-report rates of 40% to 60% were common, with some as high as 80%. This is important because it shows that, in the category of cardiac conditions for example, 32% of respondents are not reporting the patient has a diagnosed problem. This could be severely detrimental to a patient's treatment by failing to alert the dentist to the requirement of appropriate antibiotic prophylaxis before a dental procedure or needing to provide additional monitoring during sedative administration.

Even the category of behavioral conditions, which had a high kappa score (0.75), still had a failure-to-report rate of 27%, making it difficult for the pediatric dentist to anticipate the additional help these patients might need during dental treatment. Global failure-to-report rates for the 3 primary categories (medical conditions, medications, and allergies) are shown in Table 4. It is particularly interesting that the lowest failure-to-report rate is over 25%. Therefore, the dentist can reasonably expect 1 of every 4 patients to have some notable error in his/her health history report.

Given the relatively high failure-to-report rates seen in this study, a further question is: How likely is it for a private practice pediatric dentist to encounter a patient with a significant omission or error on his/her parent-reported medical history form? Dentists operating outside of a hos-

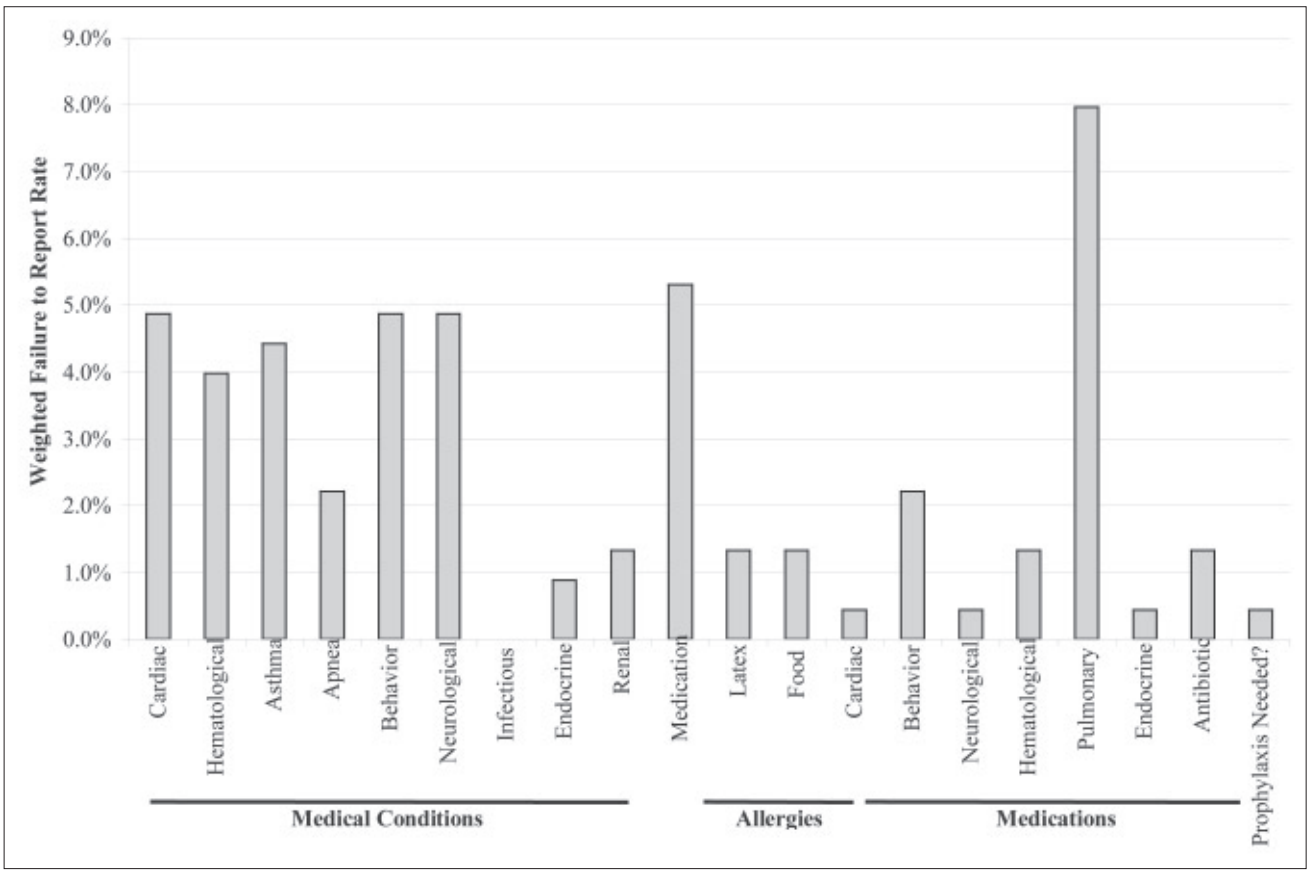

Figure 1. Prevalence-weighted failure-to-report rates (WFRR) for the entire population group studied (healthy and nonhealthy), used as an index of relative frequencies of misreporting in the general population (WFRR=[100%-sensitivity]x prevalence).

pital setting are unlikely to treat as many unhealthy patients as were described in the authors' medically compromised data set (eg, cardiac conditions had a failure-to-report rate of 32%, with a prevalence of 23%).

When the failure-to-report rate is weighed with the prevalence of these conditions for the entire population of children studied, however, the authors calculated an interesting finding: They determined that, in treating a mixed population of healthy and unhealthy children, pediatric dentists could expect up to 5% of patients will fail to report this condition.

Thus, if a private practice has 2,000 patients of record, the pediatric dentist could probably expect as many as 100 parents/guardians to misreport a cardiac condition. Figure 1 illustrates WFRR for all categories in which data were collected. These data show that, for many categories, the WFRR is within this 4% to 5% window. Of particular note, the WFRR for pulmonary medications is the highest in the study at 8%. Because many pediatric dentists use sedation or nitrous oxide analgesia in the office, any note of a respiratory problem could impact treatment decisions.

Two items also examined in this study were: (1) immunization reporting; and (2) signing of the dental health history. Of those reporting immunizations, 22% of the healthy patients were reported not having current immunizations, while 13% of parents/guardians did not answer the question. As children are required to have updated immunizations to be enrolled in school, the authors' values of >20% for "not current in immunizations" are likely to be an indication that the medical history reporters were hurrying through the health history without taking the time necessary to complete it accurately. In contrast, only approximately 10% of the medically compromised group failed to note immunization status, indicating these parents are spending more time with the questionnaire, perhaps because they feel more information needs to be reported.

Of similar interest is the relatively high proportion of reporters not signing the questionnaire: 9% for healthy patients and 7% for medically compromised patients. Because this signature indicates reporters understand their responsibility to provide accurate information, the lack of a signature may mean the form contains questionable information. This should be a red flag that adequate time was not spent reading the questionnaire. The dentist should review the questionnaire carefully before providing any treatment.

In addition, 5% of healthy children and 1% of medically compromised children had their charts completed by an adult who was not his/her parent or legal guardian. These accompanying adults included other family members or foster parents who may not have had a comprehensive knowledge or understanding of the child's medical history. These charts were included in this study

due to the fact they are part of the patient's legal medical history and were used as a reference for medical information when the child was treated.

There are some limitations to broad application of this study's results. First, because many of the healthy patients see a primary care physician outside of the hospital setting, there were more available medical charts for review in the medically compromised patient group vs the healthy group. This difference in availability, which resulted in more medically compromised patients being included in the study, influenced the prevalence of disease to be possibly higher than found in the general pediatric population.

A second limitation was the absence of dates. The data collection form was not designed to record dates of the diagnosis or when medications were administered from the medical record or dental chart. This makes comparison of the 2 sources of information more difficult. A discrepancy might be noted between the collected information, when, in reality, the patient was prescribed a medication or diagnosed with a behavioral disorder after the parent or guardian completed the dental health questionnaire. This could falsely increase the percentage of misreporting in the dental record.

An additional limitation related to parental compliance with their pediatrician's recommendations. Many parents alter the use of medications, such as pulmonary inhalers, based on the perceived benefit of the medication to their child's maintenance of health. If a parent is failing to comply with the recommendations of the child's pediatrician, he/she may accurately omit use of these medications on their child's medical history form. The effect of parent choice would bias this study's data, making it seem parents were forgetting to report medication use instead of accurately reporting that they are not following the recommended protocol.

A final limitation stems from the method of data collection. Comparisons between the 2 health history reports were recorded in categories. For example, if a patient had a heart murmur, this was categorized as a "yes" for a cardiac condition, while if the medical record noted Tetrology of Fallot, this was also marked as a "yes" for cardiac condition. This is actually a misreport. Statistically, they are treated the same, however, creating a higher percentage of agreement. Another problem with categorizing medical information is that some diagnoses do not fit into an available category. This information could have been excluded from the study, again possibly falsely increasing relative agreement between the records.

From this study, it is apparent there is a need for pediatric dentists to examine more closely the dental health questionnaire. Spending more time with the accompanying adult by orally repeating questions on the form could help identify inconsistencies. Having each caregiver bring documents from the primary care physician about the patient's health and medications could also assist the dentist. This would not only save a call by the dentist to the primary care physician, but it would also reinforce the dental health history. It is difficult to know all the patient's medical issues, but pediatric dentists must make every attempt to obtain accurate information to provide appropriate care for each patient.

Conclusions

1. Parents/guardians of child dental patients are not always able to accurately report vital medical history information.
2. Parents of both healthy and medically compromised children have significant rates of misreporting, although medical histories are more likely to be inaccurate for medically compromised patients.
3. To obtain accurate information and provide appropriate care for each patient, pediatric dentists need to more closely review the medical history questionnaire with the parent/guardian.

Acknowledgements

The authors are grateful to Dr. Ryan Monti and Elizabeth Allred for their statistical analysis assistance.

References

1. McCarthy FM. *Essentials of Safe Dentistry for the Medically Compromised Patient.* Philadelphia: Saunders; 1989.
2. LaRocca CD, Jahnigen DW. Medical history and risk assessment.*Dent Clin North Am*. 1997;41:669-679.
3. Smeets EC, de Jong KJM, Abraham-Inpijn L. Detecting the medically compromised patient dentistry by means of the medical risk-related history. *Prev Med.* 1998;27:530-535.
4. Bradford VP, Graham BP. Accuracy of self-reported health histories: A study. *Mil Med.* 1993;158:263-267.
5. Linet MS, Harlow SD, McLaughlin JK, McCaffrey LD. A comparison of interview data and medical records for previous medical conditions and surgery. *J Clin Epidemiol*. 1989;42:1207-1213.
6. Ramsey PG, Curtis JR, Paauw DS, Carline JD, Wenrich MD. History-taking and preventive medicine skills among primary care physicians: An assessment using standardized patients. *Amer J Med*. 1998;104:152-158.
7. Westbrook JI, McIntosh JH, Rushworth RL, Berry G, Dugan JM. Agreement between medical record data and patients' accounts of their medical history and treatment for dyspepsia. *J Clin Epidemiol*. 1998:51:237-244.
8. Metter EJ, Metter EL, Costa PT, Brant LJ, Zonderman A, Fozard JL. Response stability and reliability in longitudinal health evaluations. *Aging Clin Exp Res*. 1992;4:43-52.
9. Neuget AI, Neuget RH. How accurate are patient histories? *J Community Health.* 1984;9:294-301.
10. Cox BG, Iachan R. A comparison of household and provider reports of medical conditions. *J Am Stat Assoc.* 1987;82:1013-1018.

11. Bush TL, Miller SR, Golden AL, Hale WE. Self-report and medical record report agreement of selected medical conditions in the elderly. *Am J Public Health.* 1989;79:1554-1556.
12. Brady WF, Martinoff JT. Validity of health history data collected from dental patients and patient's perception of health status. *J Am Dent Assoc*. 1980;101:642-645.
13. Lutka RW, Threadgill JM. Correlation of dental-record medical histories with outpatient medical records. *Gen Dent*. 1995;43:342-345.
14. Scully C, Boyle P. Reliability of a self-administered questionnaire for screening for medical problems in dentistry. *Community Dent Oral Epidemiol.* 1983;11:14-20.
15. Carracio CL, Dettmer KS, duPont ML, Sacchetti AD. Family member knowledge of children's medical problems: The need for universal application of an emergency data set. *Pediatrics.* 1998;102:367-370.
16. Daly KA, Lindgren B, Giebink GS. Validity of parental report of a child's medical history in otitis media research. *Am J Epidemiol*. 1994;139:1116-1121.
17. Goddard KE, Broder G, Wenar C. Reliability of pediatric histories. A preliminary study. *Pediatrics.* 1961;1011-1018.
18. Kosa J, Alpert JJ, Haggerty RJ. On the reliability of family health information. A comparative study of mothers' reports on illness and related behavior. *Soc Sci Med.* 1967;1:165-181.
19. Flaitz CM, Vojir CP, Bradley KA, Casamassimo PS, Kaplan DW. A comparison of parent and adolescent responses from independent health histories. *Pediatr Dent.* 1991;13:27-31.

Abstract of the Scientific Literature

Prevalence of Traumatic Injuries to the Permanent Incisor before Orthodontic Care

Trauma combined with orthodontic treatment can render teeth more susceptible to complications, but there is little written about the prevalence of dental trauma experience in patients undergoing orthodontic care. A recent study used epidemiologic data to examine the prevalence of previous trauma to candidates for orthodontic care. Also examined was the distribution according to age, type of trauma, etiology, overjet, and lip incompetence. The results showed that 10% of patients reported they had suffered previous trauma prior to orthodontic care. The peak onset of trauma was in the 11- to 15-year-old age group. Patients with increased overjet and lip incompetence also were significantly more likely to have experienced trauma.

Comments: These findings emphasize that preventive orthodontic treatment of patients should be initiated and completed earlier, preferably before age 11. **JYL**

Address correspondence to Dr. Oskar Bauss, Department of Orthodontics, Hannover Medical School, Carl-Neuberg-Strasse 1, 30625 Hannover, Germany.

Bauss O, Rohling J, Schwestka-Polly R. Prevalence of traumatic injuries to the permanent incisors in candidates for orthodontic treatment. *Dent Traumatol.* 2004;20:61-66.

35 references