DENTAL RECORDS: A BELGIUM STUDY

A. Dierickx1, M. Seyler1, E. de Valck1, J. Wijffels1, G. Willems2

1 Department of Forensic Odontology, School of Dentistry, Oral Path and Maxillo-Facial Surgery, Katholieke Universiteit, Leuven, Belgium 2 University Centre for Statistics, Katholieke Universiteit, Leuven, Belgium

ABSTRACT

The aim of this study was to deduce the quality of the average dental record kept by Belgian dentists and to evaluate its potential use for forensic dental casework. The evaluated material originated from 598 Dutch speaking and 124 French speaking Belgian dentists who completed a questionnaire and returned it by mail or through the internet. The age of the participating dentists ranged from 22 to 72 years of age. The results of the inquiry were statistically analysed taking parameters such as language, gender, age, university and ZIP code into account. In general there was a tendency for the young dentists from the age category 22 to 34 years of age, especially those living in larger cities, to perform better on several of the questions asked such as completion of the dental record, storage of x-rays, working with digital x-rays and a digital dental record.

(J Forensic Odontostomatol 2006;24:22-31)

Keywords: Dental record, dental chart, forensic odontology, dental identification

INTRODUCTION

Updated, high-quality dental records are keystones in the dental identification process. The recent seaquake in South-East Asia on December 26th 2004 with more than three hundred thousand killed and wounded persons has highlighted this fact. The successful identification of a victim depends on the availability of accurate and comparable antemortem and postmortem data. Teeth are frequently the last and only remains to identify a victim; for instance in cases of advanced decomposition, mutilation or incineration. However, from a forensic point of view, dentists often do not keep adequate files. Incomplete dental files may obstruct forensic work, delaying identification and prolonging grief and mourning of relatives.

Besides this forensic motivation for keeping adequate and updated files, general practitioners and patients benefit from well-kept dental records. Good files provide the best defence in law suits against dentists.^{3,4} Incomplete files may be harmful to the dentist and to the patient.⁴ Patients are now more aware and litigation is on the increase. The dental file is an official document: based on that file the dentist may be prosecuted or cleared of alleged dental malpractice. A good file also enables the dentist to follow the patient's dental health and makes it easier for another dentist, to whom the patient was referred, to continue treatment.⁵

The dental file may also contain information on evidence of suspected child abuse. Since most reported symptoms of child abuse are located in the head and face region it is not surprising that dentists are often among the first health care workers to spot evidence of child abuse. The dental practitioner should note these findings in the dental file and should discuss the topic with the parents or guardian, or inform the legal authorities.⁶

With the publication in "Het Belgisch Staatsblad" on August 26th, 2004 the text on patients' rights became law in Belgium. Prior to this there was no strict legislation relating to dental files. General practitioners were more or less free to keep whatever record they preferred or even no record. Only deontological and ethical codes could stimulate dentists to keep records of their patients. Now, due to Article 9 of the specified law, every practitioner is legally obliged to keep records of his patients. Each patient has the right to a meticulously kept and safely stored personal file and, on request, the dentist has to provide the patient with a copy of his dental record.

The aim of the present inquiry was to obtain an overall idea of the quality of the average dental record kept by Belgian dentists and to evaluate its potential use for forensic casework.

MATERIALS AND METHODS

A specific questionnaire was designed in order to evaluate the quality of Belgian dental files. This questionnaire was published in the monthly journal of both the Dutch and French speaking national dental societies. This journal is distributed to about 5,000 Dutch and 4,000 French speaking dentists. Both groups of dentists were simultaneously given the opportunity to complete a digital version of the questionnaire which was made available on a national website. In total approximately 9,000 dentists were invited to complete the questionnaire either in digital or in analogue form.

Both the Dutch and the French version of the questionnaire contained the same questions. A total of 133 questions was asked (Appendix 1). The opportunity was provided to complete the questionnaire anonymously, but most responding dentists provided their details on the questionnaires. The answer to each question could be yes or no. Answers that were left open were not taken into account for statistical analysis. Not all respondents answered all questions, therefore the reported numbers may show some fluctuation. Each question was analysed separately. The 'yes' answer scored 1, the 'no' answer scored 0. At the next level of analysis, questions were grouped according to seven themes. All the positive answers for each question separately were summed per theme and an analogue scale was drawn up. The influence of language, gender, age, university training and geographical location of the practice (ZIP code) was evaluated. The seven themes were set up as follows:

1. Type of data

The first group consisted of 30 questions from the questionnaire relating to the patient's identification, such as name, maiden name, date of birth, address, complete medical history, radiological examinations performed, updated dental chart, and detailed personal treatment. The intention was to evaluate whether there was any significant effect noticeable on the type of data that was entered into the dental record based on language, gender, age, university training and ZIP code of the dentist.

The next group consisted of 36 questions from the questionnaire concerning data in the dental record relevant for identification such as alterations in tooth position, oral anatomical characteristics, information on dental materials used in restorations, serial numbers of implants etc. Another group consisted of nine questions relating to extraordinary information useful in insurance or civil litigation cases such as referral letters, prescribed medication, whether x-rays had ever been taken of patients, etc.

Questions relating to medical history were bracketed (18 questions). Statistical analysis was performed to find out whether a significant difference exists among Belgian dentists in the way they keep information concerning these topics.

2. Methodology

Questions relating to whether or not an odontogram or chart was used were grouped. It was asked whether this was completely filled in, whether it was renewed each year for the same patient and whether in the case of a new patient also the existing dental status was recorded. It was also questioned how complete and accurate this recording was.

3. Radiology

The first group contained questions relating to the exposure or production of dental x-rays, both intraoral and extra-oral. Does the dentist consistently take apical radiographs or a full radiographic examination, or has he access to panoramic radiography? Next it was evaluated whether the dentist consistently takes dental radiographs during the first contact with the patient. Finally the mode of storage of dental x-rays was evaluated: are these stored in analogue or digital format?

4. Child abuse

It was questioned whether dentists would notice signs of trauma relating to child abuse such as multiple oral trauma, bruises or trauma in the head and neck region, neglected teeth, and others. Five questions were grouped for this analysis.

5. Record Management

Questions were asked relating to the use of digital dental records, access to the internet and the use of a password for accessing the dental file of a patient. It was the intention to evaluate the number of dentists who have computerised their office and work with digital dental files.

On the other hand it was also checked how detailed and current the record keeping of the dentist is: are serial numbers of implants noted in the file and are prosthetic devices marked with a serial number?

6. Informed Consent

This group of questions examined whether dentists use any kind of informed consent and how well they are aware of the medico-legal value of this principle. Informed consent can be procured orally or in

written form. Also the registering of what is said to the patient is of great importance.

7. Dental Law and Record Keeping

A number of questions was grouped relating to the property rights and the medico-legal value of the dental record. It was also questioned for what duration a dental record should be kept by the practicing dentist in relation to litigation cases, how long radiographs should be stored and whether this was done in an analogue or a digital format.

Statistical analysis

Mantel-Haenzel Chi-square test was used to evaluate the presence of associations between two variables and the strength of these associations. Furthermore the non-parametric Kruskall-Wallis test was used to examine whether at least one of the associations is significantly different from the others. When applicable a Bonferroni correction was applied. Finally, in case of continuous variables that were normally distributed, an analysis of variance with Tuckey comparison was used to point out statistical differences.

RESULTS

Seven hundred and twenty two Dutch or French speaking dentists responded to the questionnaire, either by completing it and returning it by mail or electronically through the use of the website. This is about 8% of the total dentist population in Belgium, 12% of the Dutch speaking and 3% of the French speaking dentists. Table 1 shows the gender and training of the 722 respondants. The number in each age group is shown in Table 2.

Table 1: Number of dentists that participated in this study by returning a completed questionnaire. (M: male; F: Female; NA: not available; KUL: Katholieke Universiteit Leuven; RUG: Riiksuniversiteit Gent; VUB: Vrije Universiteit Brussel; UCL: Université Catholique de Louvain; ULB: Université Libre de Bruxelles; ULG: Université de Liège)

Dutch-speaking Dentists			French-speaking Dentists				
University	Gender	Number	Total	University	Gender	Number	Total
KUL	M	147		UCL	M	35	
	F	152			F	27	
	NA	1	300				62
RUG	M	117		ULB	М	24	
	F	71			F	12	
	NA	1	189				36
VUB	М	51		ULG	М	16	
	F	27			F	10	
	NA	1	79				26
Unspecified			30				
Sub total			598				124
Total							722

Type of data

Statistical analysis showed that the dental records kept by the youngest age group between 22 and 34 years of age (98 dentists out of 698 that answered this question), were reported to be more complete (p=0.01) compared to all other age groups investigated. Also the location of the dental office seemed to have a significant influence: dentists having their offices in larger towns are more complete when registering dental information into the dental records of their patients compared to colleagues practicing in villages and small towns. The difference between the former and the latter was defined based on the ZIP code. Language, gender and university training did not have a significant influence on the amount of data registered into the dental record.

From the comparison of the completeness of the information in dental records relating to forensic identification and litigation, it appears that Belgian dentists keep better track of information relating to litigation cases compared with identification cases (p<0.001).

Relating to information on medical history it was noted that French speaking Belgian dentists tend to be more complete in the information they gather. Differences between age groups were also found and the youngest age group scored somewhat better (p<0.001). Dentists graduated from the Université de Liège (26 dentists out of a total of 694 responding dentists) scored significantly better compared to all other universities (p=0.03). No effect of gender or ZIP code was found.

Methodology

Only one question was examined when trying to find statistical data on the use of dental charts or

odontograms. From the 665 dentists that answered this question, 308 responded not to use any chart at all. For the 357 that responded positively, neither dentist's age,

 Table 2: Age range of participating dentists

Age	Number
22-34 years	98
35-44 years	171
45-54 years	328
>55 years	99
Unknown	26
Total	722

ZIP code, nor gender had any significant influence on the answer to the question. On the other hand it was found that significantly more Dutch speaking dentists systematically make use of odontograms or charts to record dental information in the dental file (p<0.001), and in particular those trained at the Katholieke Universiteit Leuven (51%) complete the dental chart. It is shown that Dutch speaking dentists (p=0.01) and especially those practicing in the cities (p=0.04), work more methodologically, i.e. by using odontograms, compared to their French speaking colleagues.

Radiology

Statistical analysis revealed that French speaking dentists (p<0.001), especially living in larger cities (p=0.01), belonging to the youngest age category between 22 and 34 years of age (p<0.001), and graduated from both the Université Catholique de Louvain and the Université de Liège (p<0.001) take more dental radiographs compared to their Dutch speaking colleagues. The gender of the dentists has no statistical influence on the results.

Most of the French speaking dentists take dental radiographs at the first visit of the patient (90% versus 80% for the Dutch speaking colleagues). Gender, age, and ZIP code have no statistical impact on the results. Dutch speaking dentists store their radiographs significantly more often in digital format compared to their French speaking colleagues (p<0.001). This effect is especially seen with dentists who graduated from the Katholieke Universiteit Leuven and the Rijksuniversiteit Gent. There is no influence noted from age, gender or ZIP code.

Child abuse

No significant effects were observed based on gender, ZIP code, university training or language. The only significant effect that was noted was an age effect: Dutch speaking dentists of the age category between 22 and 34 years of age pay more attention to possible child abuse related findings compared to all other age categories and also compared to their French speaking colleagues of the same age group.

Record Management

The results of the statistical analysis showed the trend that Dutch speaking dentists have kept up with digital evolution more than their French speaking colleagues (p=0.01). Especially the youngest (p=0.004), male (p=0.002) dentists working in the big

cities (p=0.005) have changed to or started a digital dental system. The same number of dentists in both Dutch and French speaking groups note detailed information such as serial numbers of implants and prosthetic devices in their dental files.

Informed consent

Overall, male dentists score a little better compared to female colleagues on the question whether informed consent is practised and what its medicolegal value is. In general, no influence of language, ZIP code, university training or age was noticed. Dutch dentists use informed consent more (p=0.04), but mostly in the form of an oral informed consent, compared to their French speaking colleagues. Written informed consent is mostly used by the youngest dentists (p=0.01).

Dental Law and Record Keeping

Regarding the property rights of the dental records it seems that the oldest group (p=0.01) of the Dutch speaking (p=0.003) dentists are more aware that the dental file is their legal property. Gender, university training or ZIP code has no influence on the results.

Male dentists seem more aware of the medico-legal value of the dental files (p=0.01). While younger (p<0.0001), female (p=0.001) dentists are more aware they have to store the dental file for a certain amount of time. Dental graduates from the Rijksuniversiteit Gent score better on this topic. Related to this it seemed that French speaking dentists are less confidential with patient-related data when speaking to other patients compared to Dutch speaking dentists.

Dutch speaking dentists keep their files longer than French speaking colleagues (p=0.001). Seventy three percent of the Dutch speaking dentists and 58% of the French speaking dentists keep their files permanently, while 10% and 18% respectively store them for less than 10 years. Female dentists in general seem to keep their files for a shorter period than male dentists (p<0.001).

A general trend was also noted for the format in which the dental file is kept. It seems that digital files in general are kept significantly longer compared to analogue files (p<0.001). Digital files are in general also more complete compared to analogue files (p<0.001): i.e. more x-rays are stored with the dental file (p=0.001). Seventy three percent of the dentists keep their files stored in an alphabetical order.

DISCUSSION

The response rate to this questionnaire was relatively low, especially considering that availability of the questionnaire on the national website enabled dentists to participate in this study without cost except for some 10 minutes of their time. Only 12% of the Dutch speaking and 3% of the French speaking colleagues responded to the questionnaires that were set up in their native language. It may reflect the lack of interest Belgian dentists have in this particular topic. Although the results of the questionnaire were rather positive, the reality may well be very different considering the problems forensic odontologists often face in identification cases. Ante mortem records are often incomplete, outdated and sometimes unreadable.

Forensic odontologists use dental files as ante mortem records in order to identify an unknown person. From that perspective, every detail of the dental file matters because it gives additional ante mortem information that might be crucial in the final identification process. However, and this confirms the trend already discussed, apart from the dental files recorded by the youngest dentists, completeness of the dental record seems an unattainable goal in Belgium. On the other hand, information such as reports from colleagues, referral letters, patient's nonattendance rates and personal notes are very well kept. Dentists who have faced a litigation or insurance case are probably more aware of the possibility that something similar might occur again in the practice. Therefore he would be more interested in keeping and safeguarding related documents, rather than being as meticulous as possible when completing the dental chart of a patient thinking that one day he could be asked to produce ante mortem records of one of his patients for identification purposes.

The tendency noted in this study, that the dental records of younger dentists are more complete compared to all other age groups, could be related to the use of digital dental records in which a lot of the information is stored simply or even automatically. It might also be related to the teaching of forensic odontology at universities which in recent years has become part of the dental curriculum in some universities in Belgium or with the publication in Belgium in 2002 of a law on patients' rights, in which among other rights, the right to a meticulously kept and safeguarded dental/medical

record is included. Another reason might be that forensic odontology has attracted a lot of media attention in the last decade through a number of mass disasters and famous murder cases.

Although we realise that only a small sample of the Belgian dentists responded and that we must be careful extrapolating the results to the general dental population, it seems that the digital format of the dental record has some additional impact on the completeness of the record itself. This is important for both litigation and forensic cases. A radiograph may contain unique data not written in the file, so in this way it completes the file. For forensic purposes radiographs add important information such as skeletal and dental anatomy of structures like sinuses or tooth roots, supernumerary teeth, endodontic treatment, etc.

The finding that dental radiographs are taken in up to 90% of the first visits of a patient to a dentist is important as well. It means that, in almost every forensic case, if there is a dental file, there should be some type of dental radiograph available.

CONCLUSION

Response rates for completing the questionnaire were rather low. Nevertheless a total of 722 completed questionnaires were received, either by regular mail or through the website. In view of the absolute number of questionnaires returned, it is reasonable to assume that the actual situation might indeed be worse than the one measured. It is at least possible that there is a self-selection bias in this study. Those who made the effort to complete the questionnaire might arguably be the type that would also be more likely to fully complete their dental charts.

In general, especially young male dentists, practicing in larger cities, keep their dental records updated and store most of their radiographs and dental files indefinitely, especially when working with a digital recording system. They frequently use electronic odontograms or dental charts by means of an overview of dental treatment and update it yearly. A trend for less complete dental records was found with increasing age of the dental practitioner.

REFERENCES

- James H. Thai tsunami victim identification overview to date. J Forensic Odontostomatol 2005;23:1-18.
- de Villiers CJ. Dental record taking what for(ensic)? Forensiccommuniqué. SADJ 2002; 57:150-1.
- 3. Ray AE, Staffa J. The Importance of Maintaining Adequate Dental Records. NYSDJ 1993;59:55-60.
- Ireland RS, Harris RV, Pealing R. Clinical record keeping by general dental practitioners piloting the Denplan 'Excel' Accreditation Programme. Brit Dent J 2001;191:260-3.
- 5. Hand JS, Reynolds WE. Dental Record Documentation in Selected Ambulatory Care Facilities. Public Health Rep. 1984;99:583-9.
- 6. Swaelen K, Willems G. Reporting child abuse in Belgium. J Forensic Odontostomatol 2004;22:13-7.

 Ministerie van Sociale Zaken, Volksgezondheid en Leefmilieu. 22 augustus 2002.- Wet betreffende de rechten van de patiënt. Belgisch Staatsblad 2002-09-26

Address for Correspondence:

Prof. Dr. Guy Willems, Ph.D.
Katholieke Universiteit Leuven
School of Dentistry, Oral Pathology and Maxillo-Facial
Surgery
Department of Forensic Odontology
Kapucijnenvoer 7
B-3000 Leuven
Belgium

Tel: +32 16 332459 Fax: +32 16 337578

Email: guy.willems@med.kuleuven.be

Appendix 1: Questionnaire concerning the dental file

them it's indispent that files are retried naire we try to gau it should be a stin future.	and more dentists get confronted with third party claims. To defend sable to keep an updated and well-documented dental record. More ved from forensic medicine in order to identify unknown bodies. Using uge the lay-out, the content and the accuracy of the files kept by demulation to each colleague in order to pay more attention to this problem. We just ask you to cross a 'yes' or 'no' square. The filled up forms recountry and city -country and city -male(M) or female(F) -age -university -date of certificate	e often it ng this qu tists .Me olem in t	t occurs uestion- anwhile he near
DENTAL FILE		YES	NO
- immediately w - or at the end of 2 Do you work	 non pre-printed forms? with a computer programme? patient, do you note-the full name? for ladies: • girls name? husbands name? date of birth address? telephone number? mobile number? email address? previous dentists name and address? name and address of the treating orthodontist? name and address of the treating periodontologist? name and address of the dental surgeon? name and address of the physician? national health service number? emergency phone number of relatives or acquaintances? in a group practice: • the treating dentist? per treatment? patients profession? 		
	- Medical anamnesis		
Do you make If you do, do y	notes of the general medical data in the file ? ou ask for - the medical past history ? - the medical complaints ? • heart complaints?		

		YES	NO
	blood pressure?		
	blood-curdle-problems?		П
	• diabetes ?		
	• epilepsy ?		
	• asthma ?	Ш	Ц
	• allergy?		Н
	allergy to: antibiotics?	\vdash	Н
	anaesthetics?	\vdash	Н
	latex ?	\vdash	H
	others?		H
	liver complaints ?		П
	radiotherapy ?		
5	• female: pregnant ?	Ш	Ш
	update of the anamnesis after each consultation?		Н
Do you note the	se new data in the file ?	Ш	Ш
- D	Pental anamnesis		
At the	first visit : - do you note the reason of the consultation ?		
	 do you do a complete mouth examination ? 	\vdash	Ш
	- do you make x-ray's : • apical ?	\vdash	Н
	• full status ?	\vdash	Н
	• panoramical ?	Ш	Ш
Examination of			
	e-printed dental chart ?	H	H
•	you fill up completely?	H	H
	you note the pre-existing situation at the first visit?	\Box	Н
	o you note your own treatments ? o you note with detail of treatment ?		
	o you note which materials you used?		
	you note the treated surfaces of the tooth?	\sqcup	Ш
	you note the health service number code?	\vdash	Н
	he dental examination file yearly ?	H	H
Do you use abbi		H	H
	eing taught by university?	H	H
	obreviations of your own?	H	H
	st to explain these abbreviations?		
•	entual abnormalities ?		
•	nerary teeth	\vdash	Щ
- congenital absent teeth/missing teeth		H	H
- microdontia		H	H
- abnormal shape		H	H
- rotations		H	H
- diastema	xillaris/mandibularis	H	\Box
	ic anomaly/ malocclusions		
For children :	- do you fill in the right phase of the mixed dentition ?		
roi cililateit.	- do you adjust it during the next patients visit?	Ц	Щ
	- do you note multiple trauma?	\vdash	Н
	- do you note facial bruises?	Ш	Ш
	- do you note neglected dentition?		
	- do you note broken teeth?		
	- do you note intra-oral lesions?		

		YES	NO
Radiological examination	1		
Do you take for each patie		F	A
Do you work digitally ? If you do	an apical for or blowing .	H	
	net connection on the same PC ?		
- Do you provide Do you work analogously ?	for any safety system to the dental file?		
	this x-ray in the file ?	П	П
- Is every x-ray ac		\vdash	H
	assified separately ?		\Box
- Is every x-ray ide	entified with ?		
• name			
• date • tooth		Щ	Н
Do you write the x-ray prot	ocols in the file?	\Box	
Treatment plan			_
	nent plan on a dental chart ?	Н	Н
	ital works, do you make the patient sign up for a cost	Ш	Ш
quotation ?			
	orks , do you apply an informed consent principle?	H	H
• verba • in writ			
III WIII	9 .		
Treatment		_	_
Do you write down every tr		Н	Н
• in cod		H	H
• fully w		H	H
Do you mention- what kind • mater		H	\Box
• brand			
Do you mention which den			
-	f denture?	Н	Н
• mater	ial?	H	H
	er of teeth?	H	Н
	er of clamps and on which teeth?	H	Н
• colour			
_	of the denture?		
	mity certificate? u make a denture marking?	\vdash	Н
Do you mention the serial	•	Ш	Ш
Miscellany			
Do you mention in the file i	f the patient		
	't show up on the appointment ?		
	or advice by phone ?		
Do you mention treatments		Ц	Н
	rts/referral letters to/ from specialists to the file ?	Н	\vdash
Do you mention prescribed		H	H
Do you mention if the patient si	ent takes away x-rays or mouldings ?	H	H
PO YOU HIGKE THE DATIETT ST	INTERNATION TO THE STATE OF THE		

Do these personal no	onal impressions about the patient (such as mental condition)? otes legally go with the file? to/from colleagues to the file? • in alphabetical order? • in order of date of birth? • otherwise ?	YES	NO
Is a dentist in your co Where you already a Where you already a Do you talk about on Are the dental files of Do you know the	• p a patients file of someone who hasn't consulted you • for many years • < 5 years? • 5-10 years? • 10-15 years? • 15-20 years? • always kept? Duntry legally obliged to keep files? sked in the past to give a certain file for identification? sked in the past to make a dental age estimation? e patients data with other patients? f patients legally your property? edico-legal value of a file? ensurance, identification)		
That's it! Thanks for Please send to:Prof.	•		