Audit of dental reports (II): First Phase-II study in a Spanish Faculty of Dentistry

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Abstract

As a measure for correction of deficiencies registered through an audit of dental records in the Comprehensive Dentistry Clinic of the Dentistry Faculty of the University of Seville, we elaborated a new format for dental records which was used in 70 patients, carrying out a monitoring audit (Phase V) by applying the same quality criteria and criteria for data collection used in the initial audit (Phase III). We calculated the indices of fulfilment of 46 quality criteria, extending fulfilment percentage to 41 criteria, while statistically significant differences were found in 25 criteria. The standard prefixed as appropriate (75 %) was reached in 29 criteria (against the 12 criteria in which such standard was reached in the first dental audit).

It is essential that faculties of dentistry develop systems for dental record revision which may help students achieve the competence of registering dental-care steps appropriately, teachers identify and give response to educational problems, and clinic administration prevent and correct conflicts, at the same time that they all ensure quality in service provision, ease relations with customers and protect users against legal vulnerability.

Key words: *Dental audit, dental records, records criteria, quality control.*

Introduction

In the first section of the present paper (Audit I) we presented the results obtained through an audit of dental records (Phase III) undertaken in the Faculty of Dentistry in the University of Seville. Low fulfilment levels were observed in all quality criteria defined; for that reason, we undertook Phase IV (proposal for correction measures), thus creating a new model of dental record, which was implemented for two years.

The objective of the present study is developing re-evaluation (Phase V) as closure for the medical audit process (1). We consider the present stage to be essential since it will show if the changes recommended have been applied and if they have given rise to the dental-care quality improvements we pursued.

Many audits do not even reach the present stage, and we must insist on the following aspect: without the present re-evaluation stage, we would have forgotten the main objective of quality-control evaluation in dental care —improving those aspects of care practice which are considered inappropriate. Without checking that we have obtained the improvement pursued, our main objective would not have been achieved. Bearing such purpose in mind, we have designed the present work, which attempts to analyse the degree of fulfilment of criteria and quality standards achieved within this new model of clinical record, comparing its results with those obtained in the afore-mentioned paper.

Material and Methods

In order to correct the deficiencies detected in the first part of this paper, we designed a new model of dental record (available at www.personal.us.es/jvrios/pdf/modhist.pdf) for the subject "Comprehensive Dentistry for Adults" taught in our Faculty, which has been used for two years (including a preliminary training seminary at the beginning of each course). Subsequently, 46 defined criteria were subject to analysis (re-evaluation phase, also denominated Post-correction Audit), using as sample:

— 58 complete records: "new models of dental record" from patients who received dental-care in the Comprehensive Dental Clinic;

— 12 incomplete records or "new models of dental records" which only collect data referring to the patient's membership, medical and stomatological record, and examination, but in which neither other diagnostic studies, nor treatment or execution plans for any treatment, were developed due to patient's refusal, which might be related to different reasons (economic, time mismatches, etc.)

The *instrument* used in the *re-evaluation* phase is the same used in the first paper (1). We evaluate 46 criteria in the sample of 58 new models of complete records and we only apply 23 initial criteria to the group of 12 new record models which remained unfinished. These 23 record elements collect the information regarding demographical data, medical and stomatological record, and examination. Data collection was carried out by the same teacher who developed the first phase. The same training period (two days) and identical reliability measurements were also developed at the end and halfway point of the re-evaluation process (95 % of homogeneity was reached in both cases).

We also obtained new *indices*, which indicated us —through comparison with those indices obtained in the Evaluation Phase— if correction measures aimed at improving dental-care were profitable (higher indices) or, on the contrary, the expected and pursued results were not achieved (non-improved or lower indices). The table showing the different criteria was widely put forward in the first part of the present paper.

Statistical Method

The matrix of the obtained data was stored with Microsoft Access 2000 (9.0.3821 SRI) according to the pattern specified in the instrument for revision. Statistical analysis was undertaken with the SPSS software package for MS Windows 13.0.1.

In each record, we identified if record data belonged to the evaluation phase (initial audit) or the re-evaluation phase (monitoring audit). We established data depuration and created variables including different sub-variables: A (A.1, A.2), B (B.1 to B.6), C (C.1 to C.5), D (D.1 to D.10), E (E.1 to E.6) and G (G.1 to G.11), which were correlated with the equally-named criteria.

Next, we undertook simple description putting forward frequency tables and percentages by study phases —Initial Audit (N = 50) and Monitoring Audit (N = 70). In the last group of revised records (Monitoring: N = 70), it should be considered that no diagnostic studies were developed (patient's time problems, system rejection, etc.) in 12 patients, as it was reflected in population description, so that we used their data for statistical analysis of variables A, B, C and D —including their corresponding sub-variables— (N = 70), while variables E, F and G (N = 58) were designated as lost values by the SPSS software.

We calculated within the present statistical study the arithmetic mean (± standard deviation) or the median (±interquartile range) in lack of arithmetic mean according to data symmetry or asymmetry.

We undertook a descriptive study of the number of positive criteria in each dental record by groups of study (Initial Revision vs. Monitoring), grouped into deciles. Subsequently, we undertook comparative analysis, which consisted of the determination of contingency tables (chi-square) among groups of study (Initial Audit vs. Monitoring Audit) for each of the variables and sub-variables. Contingency tables were requested by showing count, expected frequency and percentage, introducing Pearson correlation value, Yates' correction for continuity (in 2×2 tables) and Fisher's exact test (in little populated tables) into the chi-square. Expected frequency percentages below 5 and minimum expected frequency were valued in each contingency table.

Table 1. Decile categorization of the number of positive criteria.

GROUP	1	2	3	4	5	6	7	8	9	10
INITIAL Count	13	11	9	8	4	3	1	0	1	0
% GROUP	26.0 %	22.0 %	18.0 %	16.0 %	8.0 %	6.0 %	2.0 %	0.0 %	2.0 %	0.0 %
MONITORING Count	0	0	1	3	3	10	12	10	10	9
% GROUP	0.0 %	0.0 %	1.7 %	5.2 %	5.2 %	17.2 %	20.7 %	17.2 %	17.2 %	15.5 %

Table 2. Number of positive criteria.

	Beginning		Monitoring		Comparison
Criteria	**Frequency**	**%**	**Frequency**	**%**	***P* Value**
DEMOGRAPHIC DATA (A)					
0	10	20	7	10	
1	38	76	10	14.3	
2	2	4	53	75.7	P < 0.0005
MEDICAL RECORD (B)					
0	3	6	0	0	
1	0	0	0	0	
2	0	0	0	0	
3	1	2	0	0	
4	2	4	2	2.9	
5	26	52	1	1.4	
6	18	36	67	95.7	P < 0.0005
STOMATOLOGICAL RECORD (C)					
0	19	38	2	2.9	
1	18	36	2	2.9	
2	6	12	1	1.4	
3	5	10	10	14.3	
4	2	4	54	77.1	
5	0	0	1	1.4	P < 0.0005
EXAMINATION (D)					
0	0	0	0	0	
1	1	2	0	0	
2	4	8	0	0	
3	5	10	1	1.4	
4	7	14	0	0	
5	6	12	0	0	
6	4	8	7	10	
7	8	16	13	18.6	
8	10	20	23	32.9	
9	4	8	26	37.1	
10	1	2	0	0	P < 0.0005
DIAGNOSIS (E)					
0	8	16	0	0	
1	8	16	4	6.9	
2	13	26	5	8.6	
3	10	20	12	20.7	
4	4	8	10	17.2	
5	4	8	14	24.1	
6	3	6	13	22.4	P < 0.0005
TREATMENT PLAN (F)					
0	25	50	0	0	
1	13	26	4	6.9	
2	9	18	12	20.7	
3	3	6	12	20.7	
4	0	0	14	24.1	
5	0	0	7	12.1	
6	0	0	9	15.5	P < 0.0005
EVOLUTION (G)					
0	0	0	0	0	
1	1	2	0	0	
2	3	6	0	0	
3	10	20	6	10.3	
4	15	30	10	17.2	
5	13	26	17	29.3	
6	5	10	13	22.4	
7	2	4	6	10.3	
8	1	2	1	1.7	
9	0	0	2	3.4	
10	0	0	2	3.4	
11	0	0	1	1.7	P < 0.0005

Results

1) *Positive criteria*: We revised clinical records of 58 patients who received treatment and were applied the "new model of dental record". Like in the first stage, no medical record fulfilled all the 46 quality criteria defined, although one of them was found to be quite close (41 positive criteria against the 36 positive criteria in the initial study). Average fulfilment improved, reaching 32.39 ±4.38 against initial 20.08 ±5.63). The lowest amount of positive criteria found in a record was 21 (against 4 positive criteria in the initial study). Such improvements reach statistical significance ($p < 0.0005$). Categorization into deciles also shows the difference in the fulfilment of quality criteria between the Evaluation (Initial) Phase and the Re-evaluation (Monitoring) Phase (Table 1);

2) *Fulfilment of criteria grouped by clinical-record sections* (Table 2): An obvious and significant improvement can be observed in the monitoring phase; and

3) *Individual fulfilment of criteria* (Table 3): We have improved the percentage of fulfilment of all quality criteria, except in C.5, D.4, D.9, G.5 and G.6 (although the fulfilment index did not diminish in any of them). 75 % was fixed as appropriate level for criterion fulfilment; such figure constitutes our *standard* and is going to help us verify the success of the correction action involved by the use of a new model of dental record. Therefore, correction action will have achieved success in those criteria which exceed such figure: the Standard of Appropriate Fulfilment (75 %) was only reached in 12 criteria in the Initial Phase, while such Standard was reached in 29 criteria in the Monitoring Phase (Table 4).

Table 3. Indices of criterion fulfilment in both audit phases. Results including statistically significant differences appear underlined ($p < 0.05$).

CRITERION	INITIAL	MONITORING	CRITERION	INITIAL	MONITORING
a1	80.0 %	90.0 %	**a2**	4.0 %	75.7 %
b1	94.0 %	100.0 %	**b2**	88.0 %	98.6 %
b3	92.0 %	100.0 %	**b4**	88.0 %	98.6 %
b5	88.0 %	97.1 %	**b6**	48.0 %	98.6 %
c1	26.0 %	94.3 %	**c2**	16.0 %	84.3 %
c3	52.0 %	92.9 %	**c4**	10.0 %	91.4 %
c5	2.0 %	1.4 %	**d1**	80.0 %	98.6 %
d2	54.0 %	75.7 %	**d3**	94.0 %	97.1 %
d4	86.0 %	84.3 %	**d5**	40.0 %	94.3 %
d6	62.0 %	98.6 %	**d7**	66.0 %	80.0 %
d8	44.0 %	95.7 %	**d9**	10.0 %	4.3 %
d10	40.0 %	62.9 %	**e1**	28.0 %	32.8 %
e2	24.0 %	70.7 %	**e3**	62.0 %	93.1 %
e4	54.0 %	72.4 %	**e5**	58.0 %	75.9 %
e6	10.0 %	65.5 %	**f1**	48.0 %	77.6 %
f2	14.0 %	50.0 %	**f3**	0.0 %	22.4 %
f4	0.0 %	87.9 %	**f5**	18.0 %	27.6 %
f6	0.0 %	94.8 %	**g1**	86.0 %	86.2 %
g2	4.0 %	69.0 %	**g3**	44.0 %	58.6 %
g4	84.0 %	87.9 %	**g5**	96.0 %	94.8 %
g6	40.0 %	34.5 %	**g7**	58.0 %	82.8 %
g8	8.0 %	10.3 %	**g9**	4.0 %	10.3 %
g10	2.0 %	6.9 %	**g11**	2.0 %	10.3 %

Table 4. Criteria whose fulfilment exceeded the standard established (75 %). The standard was exceeded in 12 criteria at the beginning of the process, while 29 criteria exceeded the standard in the monitoring phase.

Group of Criteria	Audit Phase	Standard (75%)
A	Initial	A.1
	Monitoring	A.1, A.2
B	Initial	B.1, B.2, B.3, B.4, B.5
	Monitoring	B.1, B.2, B.3, B.4, B.5, B.6
C	Initial	—
	Monitoring	C.1, C.2, C.3, C.4
D	Initial	D.1, D.3, D.4
	Monitoring	D.1, D.2, D.3, D.4, D.5, D.6, D.7, D.8
E	Initial	—
	Monitoring	E.3, E.5
F	Initial	—
	Monitoring	F.1, F.4, F.6
G	Initial	G.1, G.4, G.5
	Monitoring	G.1, G.4, G.5,G.7

Discussion

The present study is aimed at evaluating the scientific-technical component of Comprehensive Dentistry in Adults, since it is the level with the clearest criteria regarding quality dental-care and, at the same time, is also the component in which it turns out to be easier to exert influence aimed at changing action patterns. It is widely agreed that process measurement is equivalent to result determination, and that process measurement is easier and less costly than result determination. Furthermore —as Donabedian (2) states—, it is contrived to attempt to separate process and results.

One of the possible critics to such approach is that —if programs for assuring quality only evaluated and gave priority to technical competence when making up records— healthcare suppliers (both physicians and dentists) would be able to devote higher amounts of time to record writing aimed at pleasing evaluators and lower amounts of time to talk to and treat patients. This way, the net result obtained might be a reduction of healthcare quality (3).

We undertook research on information reported in medical records, which implies that —if such records did not report certain parameter— it was evaluated as not undertaken, although many parameters regularly undertaken are likely not to be systematically reported.

Dentists usually compare quality of dental-care with the technical quality of the work (4), but the aims of quality-control activities should be wide enough to include all factors which influence the result of dental-care regarding the patient (5); that is:

— Evaluation of the patient's health status;
— Diagnosis provided by such evaluation;
— Treatment plan derived from the previous;
— Treatment provision;
— Results obtained as a consequence of the four previous stages of the process.

Satisfactory results in dental-care depend on the service supplier's appropriate execution of each phase of the process. If phases devoted to evaluation, diagnosis, planning and treatment are undertaken adequately, it can be foreseen that the global result will be positive. Any evaluation system which does not take into account all the phases of the dental-care process might make mistakes when judging global quality level.

Appropriately structured and constantly updated patient's records are the only instrument which can display all interesting concepts regarding dental-care (6-8). This way, the information shown by the record would also be useful as a communication means among different care suppliers.

Properly elaborated records contain appropriate sections for reporting the facts which take place during each dental-care phase. Furthermore, since the patient's health status might change, record format should enable periodical incorporation of new findings, which should be clearly distinguishable from previous notes.

Direct patient examination is a costly revision method. Furthermore, it does not inform of some aspects regarding quality such as orderly succession of the treatment or correct indication of some therapies. On the contrary, good records (including radiographies) are an excellent means to document all those parameters and many aspects of short- and long-term results.

It is obvious for many authors (8) that quality evaluation is impossible if records are not appropriate or available, even considering that the elaboration of appropriate record files is a requirement previous to care evaluation. A sufficient amount of records is essential for quality revision, since both validity and security of all quality measures depend on the fact that data —which constitute the base for revision— should be complete and accurate. In order to frustrate quality auditors' efforts when dealing with quality revisions, dentists might keep minimum information within patient records, although, according to the legislation now in-force and in some cases of ju-

risprudence, the responsibility of demonstrating record sufficiency falls on care suppliers.

Due to all the previous arguments, we tend to undertake a revision of dental records aimed at ascertaining if the documentation stored is adequate or, perhaps, there are errors or omissions which might affect the quality of dental-care provided by 5th-year students within the academic subject "Comprehensive Dentistry in Adults".

Numerous authors have used dental records as data source in the valuation and quality-assurance systems they developed (9-11). We want to stand out the study of Hand (7), who developed a retrospective audit in 316 patients coming from 13 different clinics with the objective of evaluating the fulfilment level in clinical records. It was supplemented with a second revision three months after the application of a plan aimed at correcting the deficiencies found.

On the other hand, Faculties of Dentistry play a relevant role in the development of skills for the elaboration of clinical records in their students. We play the double role of being in charge of the students' education and training, and the dental-care provided to patients in the clinical areas under our responsibility.

Some centres begin to apply quality-assurance programs. Some of them include quality concepts in the syllabus design of Dentistry. Some others have aimed their efforts at protecting institutional resources as a consequence of lawsuits related to patient care.

Within a Faculty of Dentistry a system for dental record revision might simultaneously work for academic valuation, risk management and quality assurance functions.

The main steps of the audit system for dental record revision developed by Chasteen et al. (12) in the School of Dentistry (University of Washington, Seattle, US) are the following:

1. Establishment of principles and norms;
2. Identification of measures to evaluate conformity to principles and norms;
3. Selection and gauging of auditors;
4. Selection of a representative sample of dental records from each student;
5. Development of a mechanism for reporting results which provides feedback; and
6. Development of a mechanism for quality assurance, deficiency correction and continuing evaluation keeping.

Other examples of quality programs using record audit in centres of dental training are the following:

— Pollack (13) undertakes revision of dental records in order to evaluate their quality and confidentiality —within a Program of Risk Management developed in the School of Dental Medicine, State University of New York, Stony Brook, US— aimed at reducing the risk of legal claims. Pollack describes its development and the organization of the Faculty for which he works;

— Schoen and Markus (14-16) have developed a system for quality assurance in the School of Dentistry (University of California, Los Angeles, US) which has been developed for four years through visits to different clinics. It examines proceedings, structure and also some results through radiographies. Structure is evaluated through facility examination and personnel interviewing. It uses an audit model for record revision as a part of the evaluation process. A randomly chosen sample composed by 25 dental records is selected in each clinic; then, those records are summarized and subsequently several aspects are evaluated either as sufficient or insufficient; and

— Butler (17) explains that all departments in the Westmead Centre for Oral Health (formerly known as the Westmead Centre Dental Clinical School; Sydney, Australia) are involved in quality-assurance activities. In their case, they have not undertaken a program for Total Quality Control which valuates quality in the different treatments provided and their success or failure rates; it has not been a study on global quality but only an audit of dental records.

If we analyse our results, we will observe, like in other studies (7), that there is a trend towards improvement in almost all parameters. Such fact could be influenced by the so-called 'Hawthorne effect' (18), a phenomenon which might take place in any research in which the observed subject perceives the researcher as potential judge or referee (improvement then depends on the fact that the patient is aware that his/her performance is being observed). It is evident that students modify their behaviour positively, but we consider that far from being a fault, it might entail additional educational advantage. The students who received training on the previous record during the 3rd ("Buccal Medicine") and 5th years were provided with a training seminary on the new model of dental record during the first week of the year, prior to beginning with patient treatment. No sessions were devoted to reinforcement, but only daily clinic follow-up.

In our study, record valuation (by sections) demonstrates that improvements are statistically significant in all sections. Therefore, in general, we can say that the educational measures we developed and implemented, and the corrections we undertook in record format were corresponded with increased record quality.

We can compare us with Hand (7) —who found a significant increase in the fulfilment of 12 criteria out of a total number of 13 criteria in his second audit— in his study on dental record quality, except in demographical data.

We improve fulfilment index in 41 out of 46 criteria, while differences are statistically significant in 25 of them. We have reached optimum fulfilment standard in 29 criteria within the Re-evaluation Phase against the 12 criteria which reached such standard in the Initial Phase.

As causes of the deficiencies found, we can adduce the following ones:

1. We should have developed more seminaries to explain the contents and sections of the new format of dental record aimed at both teachers and students;

2. Teachers' motivation should have been more insistent on the task to be taught to students: how to elaborate appropriate dental records;
3. We included no correction measurements which protected us against possible students' attitudinal problems. We certainly believe that such aspect can be improved through the introduction of 'sanctions' regarding their academic marks or incentives regarding the allotment of interesting clinic cases; another possibility might be developing continuing evaluation of the records handled by each student, which can entail repercussion on the student's final mark in the subject, which will surely lead to improvement in the quality level of the records;
4. No clear incentives were established to stimulate students for the elaboration of dental records; and
5. Finally, we should consider that these static works on quality assurance should be continued with a dynamic and permanent task regarding care quality control, understood as a concept oriented to action and based on Feedback. Thus, we would maintain continuous vigilance and assure that changes and improvements in the analysed situations are not transitory.

Healthcare authorities should be aware of the convenience of implementing this kind of activities for quality assurance and control in Dentistry, overcoming the partial conception of quality assurance as a way to put up the price of dental-care. It should not be forgotten that sometimes —in order to improve quality standards— it is not suffice to elaborate and agree certain criteria or protocol, but periodical interventions are necessary to achieve that care practice adjust itself to those standards acknowledged as optimum; with that purpose, Administration's commitment turns out to be essential through the introduction of structural changes within its action areas. We believe that it is fundamental that Faculties of Dentistry develop systems for dental record revision. This way, students will improve their competence regarding appropriate registration of the steps of the dental-care process and teachers will improve the educational process.

Regarding what the future will bring within the field of quality, value conflicts are likely to arise as a consequence of the progressive globalization and interdependence of different human societies; we will have to live in a century characterized, among other things, by respect towards diversity and count on a common framework, acceptable for all of us, to evaluate the quality of healthcare services. The planning of such services will have to include —unlike it has never before— the participation and opinion of customers, who will demand greater and more reliable information. We will live in a situation of constant change and we will be forced to adapt ourselves by developing greater capacity of innovation.

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