An Audit of Written Instructions Sent to the Laboratory for Fabrication of Fixed Prosthodontic Appliances in a Tertiary Health Institution in Nigeria

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Abstract

Objective: To audit the prescriptions sent by dental practitioners to the dental technicians for fixed dental prostheses.

Methods: This was an audit of all written instructions for fixed dental prostheses sent to the advanced conservative dentistry laboratory of the University of Benin Teaching Hospital, Benin City, Nigeria. Data of interest were status of requesting dental surgeon, type of prosthesis, age of the patient, gender of the patient, next appointment date, disinfection status of the impression, metal alloy requested, design of the margin, number of pontics and design, surfaces to be covered by metal only, occlusal scheme, shade, diagram for illustration and the type of porcelain glaze.

Results: Various types of fixed prostheses were requested with porcelain fused to metal single crowns accounting for more than half. The quality of written instructions was clear only in 2.0% of the prescriptions while 56.8% had no instructions at all. There was no statistically significant relationship between the cadre of the dental practitioner making the request and the quality of written instructions. There was statistically significant association between types of prosthesis requested and provision of diagrammatic illustration on the written instruction.

Discussion: Fixed prostheses are usually fabricated in the dental laboratory by dental laboratory technicians using impressions of the mouth made by dental practitioners. The quality of prosthetic restorations has been shown to be a reflection of the skills of the dentist and dental technicians as well as communication between them.

Conclusion: There is need for improved quality of written communication between the dentists and the laboratory personnel.

Key words: Fixed prosthodontics, quality, written instruction

Introduction

Fixed prostheses are indirect restorations that are cemented on the tooth or teeth after fabrication. These prostheses which include crowns, bridges, on lays, inlays and veneers are usually fabricated in the dental laboratory by dental laboratory technicians, using impressions of the mouth made by dental practitioners. The tooth/teeth involved are usually adequately prepared by the dentist before the impressions are recorded. These impressions made are then sent to the laboratory with detailed prescription of the desired prosthesis.

The quality of prosthetic restorations has been shown to be a reflection of the skills of both the dentist and the dental technician and communication between them.[1,2] Hence, a clear and effective communication between the dentist and the dental laboratory technician has been considered a landmark in fabrication of a satisfactory prosthetic appliance.[3]

Due to the importance attached to the communication between dental practitioner and the dental laboratory technician, ethical obligations have been promulgated in some countries to control and assess the quality of this communication.[4,5] It is the responsibi-

lity of dental practitioners to adequately design, prescribe and deliver good quality prostheses to their patients.[6] There is an ethical obligation on the part of the dental practitioner to provide adequate design instructions to dental laboratories when fabricating any form of prosthesis.[2] Inadequate communication of design information has been suggested to result in a prosthesis that has been fabricated with little reference to important clinical or biological information.[2]

Quality of written communication has been investigated and reported to be unsatisfactory from the dental laboratory technicians' perspective.[1,6-16] However there is a paucity of information about the quality of prescriptions sent to dental laboratory technicians from the dental practitioners' perspective. Hence, this study aimed at auditing prescriptions sent by dental practitioners to the dental technicians for fixed dental prostheses.

Materials and Methods

This was an audit of all written instructions for fixed dental prostheses sent to the advanced conservative dentistry laboratory using the traditional fabrication mechanism of the University of Benin Teaching Hospital, Benin City, Nigeria from June 2012 to July, 2014. Inclusion criteria were all written instructions sent to the laboratory for fabrication of fixed dental prosthesis. Exclusion criteria were written instructions sent to the laboratory that was not intended for fixed dental prostheses. The department of Restorative Dentistry designed a prescription card for writing prescriptions to the laboratory. The advanced conservative laboratory and clinic had three dental laboratory technicians and ten dentists who are involved in fabrication of fixed dental prosthesis. Ethical approval was obtained from the Edo State Ministry of Health, Benin City, Nigeria. Data were collected using a modified questionnaire used in a study by Al-Alsheikh[16]. Data of interest were status of requesting dentist, type of prostheses, age of the patient, gender of the patient, date of next appointment, disinfection status of the impression. Others included metal alloy requested, design of the margin, number of pontics and design, surfaces to be covered by metal only, occlusal scheme, shade, diagram for illustration and the type of porcelain glaze required.

The written instructions were subsequently graded using Al-Alsheikh[16] grading system as follows:

Clear: The design instructions are clear and unambiguous, adequately describes the planned prosthesis

A guide: Most of the design instructions have been communicated however the major decision making on the design is left to the technician.

Poor: Some of the design instructions have been communicated however the major decision making on the design is left to the technician.

None: There are no written instructions, all decision making on the design is left to the technician

The data obtained were analyzed using IBM Statistical Package for Social Sciences (SPSS) version 21.0. The analysis was done using frequency distribution, cross tabulations, test of significance with chi square. $P < 0.05$ was considered statistically significant.

Results

A total of 148 prescriptions by dentists sent to the dental laboratory was audited. Various cadres of dental practitioners sent prescriptions to the dental laboratory with the consultant restorative dentists making up 30.4%. However, less than one-third (29.1%) of the prescriptions did not have the cadre, name or signature of the dental practitioner making the request.

Various types of fixed prostheses were requested with porcelain fused to metal single crowns accounting for more than half (54.7%) while 0.7% did not have the prosthesis to be fabricated designated **(Table 1)**.

Table 1: Distribution of prosthesis requested

Prosthesis	Frequency	Percent
Porcelain fixed to metal crown	81	54.7
All metal crown	28	18.9
Fixed-fixed porcelain fused to metal bridge	23	15.5
Acrylic fixed-fixed bridge	5	3.4
Cantilever porcelain fused to metal bridge	4	2.7
Acrylic crown	4	2.7
All metal fixed bridge	2	1.4
Not indicated	1	0.7
Total	**148**	**100.0**

The patients' age and gender were specified in 52% and 11.5% respectively of the audited prescriptions. However, the next appointment date was not indicated in 99.3% of the prescriptions. The disinfection status of the impression was not specified in 99.3% of the prescriptions.

The quality of written instructions was clear only in 2.0% of the prescriptions while 56.8% had no instructions at all **(Table 2)**.

Table 2: Quality of written instructions

Quality of written instructions	Frequency	Percent
Clear	3	2.0
A guide	22	14.8
Poor	39	26.4
None	84	56.8
Total	**148**	**100.0**

There was no statistically significant relationship between the cadre of the dental practitioner making the request and the quality of written instructions **(Table 3)**.

Table 3: Relationship between quality of written instructions and status of dental practitioner making the request

Status	Quality of written instructions				Total
	Clear N (%)	A guide N (%)	Poor N (%)	None N (%)	N (%)
Dental intern	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)
Junior Resident	0 (0.0)	3 (18.8)	2 (12.5)	11 (68.8)	16 (100.0)
Senior Resident	0 (0.0)	7 (16.7)	7 (16.7)	28 (66.7)	42 (100.0)
Consultant	2 (4.4)	8 (17.8)	16 (35.6)	19 (42.2)	45 (100.0)
Not indicated	1 (2.3)	4 (9.3)	14 (32.6)	24 (55.8)	43 (100.0)
Total	**3 (2.0)**	**22 (14.9)**	**39 (26.4)**	**84 (56.8)**	**148 (100.0)**

P = 0.37

The metal alloy (for prostheses that required its use) was not indicated in all the prescriptions audited. Similarly the designs of the margins were not specified in any of the prescriptions reviewed. For prosthesis that required both porcelain and metal less than half (41.8%) of the written instructions had the surfaces to be covered by metal only stated. For the fixed partial dentures requested only 29.4% of its prescription had the number of pontics specified while none had the design of the pontic indicated. The type of porcelain glaze was not specified in 99.1% of the prescription.

Occlusal scheme was shown on only 1.4% of the written instructions. However 88.1% of the prostheses that required the use of aesthetic restoration (porcelain or acrylic) had the shade indicated while 45.9% had a diagram for illustration provided. There was statistically significant association between type of prosthesis requested and provision of diagrammatic illustration on the written instruction with more restorations requiring the use of tooth coloured materials having diagrammatic illustrations ($p<0.05$) **(Table 4)**

Table 4: Relationship between type of prosthesis requested and diagrammatic illustration as part of the written instructions

Type of prosthesis	Presence of diagrammatic illustration		Total
	Yes N (%)	No N(%)	N(%)
Porcelain fixed to metal crown	46 (56.8)	35 (43.2)	81 (100.0)
All metal crown	3 (10.7)	25 (89.3)	28 (100.0)
Fixed-fixed porcelain fused to metal bridge	12 (52.2)	11 (47.8)	23 (100.0)
Acrylic fixed-fixed bridge	1 (20.0)	4 (80.0)	5 (100.0)
Cantilever porcelain fused to metal bridge	3 (75.0)	1 (25.0)	4 (100.0)
Acrylic crown	2 (50.0)	2 (50.0)	4 (100.0)
All metal fixed bridge	0 (0.0)	2 (100.0)	2 (100.0)
Not indicated	1 (100.0)	0 (0.0)	1 (100.0)
Total	68 (45.9)	80 (54.1)	148 (100.0)

P = 0.001

Discussion

Oral health care often involves the restoration of oral tissues with various types of dental prostheses including fixed prostheses. In order to produce these prostheses, the services of the dental laboratory are usually required for which written communication is usually sent to the dental laboratory by the dental practitioner. In this study, only certified practising dentists sent prescriptions to the dental laboratory, however, less than one third of the prescriptions were unsigned. A written communication has been said to be a signed written order by a dentist to the dental laboratory detailing the job to be performed with the materials to be used specified.[17] This finding lends credence to the assertion that communication between the dentist and laboratory is an often neglected aspect of dental care.[18] There is need to emphasize that the dentist takes the written communication to the dental laboratory seriously with a copy of the written instructions retained by the dentist as they could serve as legal documents.

Various fixed dental prostheses are usually prescribed for different patients. In this study, a few of the audited prescriptions did not indicate the appliance to be fabricated. It is possible that there might have been verbal communication between the dentist and the dental laboratory. The patients' age and gender were not indicated in most of the prescriptions audited in this study. It is important to state the patients' age and gender because they assist the dental laboratory technician to develop a definite surface texture during the selection of chroma and value to match dentinal changes approximating the age and gender of the patient.[19-21]

Most of the prescriptions in this study did not indicate the next appointment. This date is indispensable to both the dentist and the dental laboratory[22]. It will enable both the dentist and the dental laboratory plan their schedule as well as ensure that the patient does not waste valuable time.

Disinfection of dental impression is an essential stage in cross infection control. However, there is great variation in the dental literature concerning disinfection protocol for impressions and type of suitable disinfectants. [3]The disinfection status of most of the impressions was not specified in the written instructions and this is similar to a previous study[15]. Contaminated dental impression has been considered as a potential route of transmission of infection from patient to dental laboratory technician[23]. A study found that 23.8% of examined impression showed evidence of contamination[3]. It is therefore important that dental impressions' disinfection status be indicated as part of written instructions. That there are no obvious contaminants does not mean that an impression has been contaminated and does not guarantee proper disinfection of the impression[3].

Several studies have described the written instructions for laboratory prostheses as the most frequently used and abused form of communication between the dentist and the dental laboratory[2,3,6,12-15]. The findings of this study with regards to the quality of written instruction is consistent with previous findings where the quality of written instructions was either poor or none[2,3,6,12-15,24,25].

A previous study showed that prescription of dentists was slightly clearer than by dental students[3] while another study reported that dental students' prescription were more accurate and clearer[26]. In this study, dental students did not send any written instructions to the dental laboratory for fixed prostheses however, there was no statistically significant relationship between the cadre of the dental practitioner that made request and the quality of written instructions.

Dentists have a legal and ethical responsibility to select the alloys to be used for fabrication of dental prostheses they request[27]. In this study, the metal alloy (for prostheses that required its use) was not indicated in all the prescriptions audited which is consistent with findings in a previous study[15]. This is probably due to the lack of a variety of alloys available for use by the dental laboratory in the place of this study. It may also be that the dentists are not aware of the type of metal alloys used for fabrication of the prescribed fixed prosthesis[15]. However, it is important that the alloy to be used be specified in the written instructions due to allergic properties of alloys and the different mechanical and physical properties of alloys.

In this study, most of the written instructions did not specify the number of pontics to be included in its design which is similar to findings of a previous study[2]. None of the written instructions had the design of the pontic indicated. The number and an accurate description of the pontic design are imperative[28] as they give the various types of pontic designs available.

Designation of the cervical and incisal shade, proper individual characterization and an overall basic shade enhance the fabrication of a prosthesis that closely matches the patients' dentition[27]. A diagram allows specification of the different multiple shades and this is of great assistance to the dental technician especially for prostheses for use in the anterior region[29].

The findings of this study tend to lend credence to the importance of accurate shade selection although less than half had diagrammatic illustrations.

Occlusal scheme was not a common feature of the written instructions audited. It is important that occlusal schemes with delineation of the occlusal contacts be indicated to minimize occlusal adjustments at delivery of the prosthesis.

Conclusion

The findings of this study showed that the quality of written communication between the dentists and the laboratory personnel is poor. Giving the increased awareness among patients, it is desirable that written instructions are properly documented as they can serve as legal documents in cases of litigation as well as allow for easy understanding and translation of what the dentist wants for the overall good of the patient receiving the prosthesis.

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