



Quality and Means of Communication between Dentists and Laboratory Technicians in Fixed Prosthesis: A Study within Prosthetic Dental Technicians in Casablanca, Morocco

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Abstract

Purpose: The aim of the study was to evaluate the quality of communication between dentists and laboratory technicians during the design and production of fixed prosthetic restorations in Casablanca/Morocco and to determine the influence of digital tools on the quality of this communication. **Material and methods:** A descriptive cross-sectional study was conducted using a questionnaire distributed to 94 dental technicians between 25th September 2023 and 28th November 2023. **Results:** The laboratory form was the main means of communication between the dental office and the prosthesis laboratory (98.9%). 25.5% of the laboratory forms received were completed to enable prosthetists to carry out their work, while 31.9% of these forms included a minimum of information. The gender of the patient was always indicated on the laboratory form according to 66% of dental technicians. Age was never mentioned according to 42.6% of laboratory technicians. 51.1% of dental technicians received both physical and digital impressions, while 9.6% of the laboratories surveyed received only digital impressions. 92.6% of the dental laboratories confirmed that the introduction of digital tools in the dental office and laboratory has a significant impact on improving dental team communication. 57.4% of laboratory technicians were very satisfied with their communication with dentists, 35.1% were moderately satisfied and 7.4% reported extreme dissatisfaction with the quality of this communication. **Conclusion:** To ensure long-term collaboration between dentists and laboratory technicians, good communication is essential. This involves both making efforts to effectively use traditional communication tools such as the laboratory form and investing in digital technology.

Subject Areas

Communication, Fixed Dental Prosthesis

Keywords

Dental Technician, Dentist, Communication, Satisfaction, Fixed Prosthodontics

1. Introduction

To successfully carry out the prosthetic treatment, dentists and prosthesis laboratory technicians must work closely together. Each of the two partners has a major role in the creation of a dental prosthesis.

The dentist has to provide written instructions that specify the materials to be used for the prosthesis, and also accurate impressions, opposing casts, and interocclusal records for articulation. [1]

Fixed intraoral prostheses fabrication with acceptable fit, function and aesthetic must include information regarding the prosthesis design and materials. [2]

The dental practitioner must give adequate design instructions to dental laboratories when fabricating any form of prosthesis. [3]

Inadequate communication between dentists and dental technicians was identified more than 30 years ago and has been the subject of numerous studies carried out in different countries including the United States, the United Kingdom, Greece, Ireland, Romania, Saudi Arabia and India. [1]-[8].

The problem of proper communication between the two parties is very important because, in most cases, the dental technicians are remotely located and usually never actually see the patient. [2]

These studies revealed the lack of information concerning many aspects such as the type of material used during the manufacture of fixed prostheses, the disinfection of dental impressions, or even the choice of dental shade.

Due to time constraints, many dentists try to take shortcuts and delegate to the dental laboratory technician steps that are the dentist's responsibility. [9]

Juszczak *et al.* [10] suggested that newly qualified dentists do not have an appropriate understanding of laboratory techniques and dental schools are still preparing new graduates inadequately to communicate effectively with dental technicians.

Thus, control organizations that oversee the link between dentists and laboratory technicians such as: "The American Dental Association" and "British Society for Bridge and Restorative Dentistry" have established guidelines aimed at improving the relationship between the two partners and the quality of prosthetic care provided to patients [1] [7].

In Morocco, there are few studies dealing with the close link between dentists and fixed prosthesis laboratory technicians. The entry of dentistry into the digi-

tal era with the development of CAD/CAM systems has radically impacted the quality of the transmission of clinical data to dental prosthesis laboratories and has strengthened the relationship between members of the dental team. The aim of this article was to evaluate the quality of communication between the dentist and the laboratory technician during the design and production of fixed prosthetic restorations in Morocco and to determine the influence of digital tools on the quality of this communication.

2. Materials and Methods

A descriptive cross-sectional study was conducted. Our study targeted private dental prosthesis laboratories in Casablanca, Morocco. A sample of 94 prosthetists was studied. To collect the data required for the study, a questionnaire was developed on the various aspects of fixed prostheses manufacturing and the quality of communication between dentists and dental technicians.

A pre-survey was conducted among 6 laboratory technicians to validate the questionnaire, both its acceptance and its understanding by the participants. Its response time was approximately 6 minutes. The questionnaire was therefore kept without any modification. The laboratories were selected randomly in the field according to the indications on Google Maps or some sites on the internet (Telecontact, Morocco directory, etc.). Data collection took place between 25th September 2023 and 28th November 2023.

The questionnaires were distributed directly while visiting the dental laboratories.

The questionnaire covered specific areas of fixed prosthetic manufacturing and included questions such as communication methods adopted between dentists and dental technicians, type of prosthesis, choice of metal, the alloy used, type of ceramic chosen by the dentist, the shape and the number of pontics, etc.

Collecting the questionnaires took between 15 to 20 minutes for immediate responses, a week for the cooperating prosthetists and 2 weeks or more for the less cooperating ones. Results were entered and analyzed using SPSS 20.0 software (Statistical Package for the Social Sciences) at the Epidemiology and Biostatistics Laboratory of the Faculty of Dentistry, Casablanca. Analysis was descriptive for all variables.

Inclusion criteria:

Private dental laboratories in Casablanca whose practice includes fixed prostheses.

Qualified prosthetists (state or private diploma).

Laboratories that agreed to participate in the survey.

Exclusion criteria:

Prosthetists practicing illegally.

Exclusive removable prosthesis laboratory.

3. Results

Our study included 94 prosthetists from the private sector, based in Casablanca,

among whom 62.8% of prosthetists were male. 37.2% of them were aged between 35 and 49 years old.

Detailed data on the communication strategies used are summarized in **Tables 1-5**.

4. Discussion

The focus on specific aspects during discussion is justified by the fact that 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 and to choose the materials to use.

Furthermore, the 'Guidelines for Crown and Bridge' published by the British Society for Restorative Dentistry clearly states that the purpose of written instructions is to clearly communicate 'precise details of all aspects of the crown and bridgework required' [11].

4.1. Communication Methods between Dentist and Dental Technician

4.1.1. Means of Communication Used

Our study confirmed that the laboratory form was the main means of communication (98.9%) between the dental office and the prosthesis laboratory. Secondly, the telephone call was used by 92.6% of dental technicians given the speed and efficiency of communicating any additional information, without neglecting the preponderant role of modern communication tools, namely WhatsApp (82.6%) and digital photography (70%) (**Table 1**). These results are similar to those obtained in a study carried out in the United Kingdom which confirmed that the laboratory form (98%) and the telephone call (93%) were the most used means, followed by emails (73%) and digital photography (67%). Similar results were found in Saudi Arabia where 95% of practitioners primarily used the laboratory form to communicate with laboratory technicians. (2, 8) In another study, the laboratory form was qualified as the most used communication tool by the dental team. (1)

4.1.2. General Patient Information (Gender, Age)

In our study, the gender of the patient was always indicated on the laboratory form according to 66% of dental technicians. Age was never mentioned according to 42.6% of laboratory technicians (**Table 2**). These results agree with those of a survey carried out in Romania which showed that gender was transmitted to the laboratory in 69% of cases, while age remained the most neglected element. [5]

In another study carried out by Afsharzand *et al.* in the USA, 67% of laboratories reported a lack of information relating to the gender and age of the patient on the laboratory form. [1]

These results contrast with those found in a study in Saudi Arabia where age was indicated in 69.1% of laboratory forms received and gender in 78.7% of cases.

Table 1. Communication methods.

Variables	%
Communication method adopted:	
Laboratory Form	98.8
Phone call.	92.6
SMS/MMS (telephone messaging)	35.1
WhatsApp messaging	86.2
Photography	70.2
Email	41.5
Visit of dental technician to the dental office	57.4

Table 2. Fixed prosthesis laboratory form received by the laboratory technician.

Variables	%
The laboratory form includes:	
Patient gender:	
Always/Often	66.0/24.5
Rarely/Never	7.4/2.1
Patient age:	
Always/Often	17.0/16.0
Rarely/Never	24.4/ 42.5
Patient expectations of an aesthetic restoration:	
Always/Often	27.7/ 30.8
Rarely/Never	24.5/17.0
Type of metal alloy chosen by the dentist:	
Always/Often	11.7/8.5
Rarely/Never	19.2/ 60.6
Type of ceramic chosen by the dentist:	
Always/Often	9.6/7.4
Rarely/Never	31.9/ 51.1
Shape and number of pontics:	
Always/Often	18.1/10.6
Rarely/Never	33.0/ 38.3
Surface to be covered with metal only:	
Always/Often	14.9/8.5
Rarely/Never	46.8/29.8
Occlusal Scheme:	
Always/Often	13.8/13.8
Rarely/Never	29.8/ 42.6
Dental restoration deadline:	
Always/Often	85.1/11.7
Rarely/Never	2.1/1.1

[6] In another study carried out in Saudi Arabia, 60% of laboratory technicians reported that more than 50% of practitioners indicated them. [8]

Same in India, 47.6% of participants confirmed that age and gender were indicated in almost all the forms received. [7] These parameters (sex, age) should not be ignored since they can help the technician when choosing the dental shade and shape of the crowns.

4.1.3. Materials Used (Type of Metal Alloy and Type of Ceramic Chosen by the Dentist)

Concerning the materials used, the type of metal alloy was never mentioned on the laboratory form in 66.6% of cases and the type of ceramic in 61.1% of cases (**Table 2**). These results are comparable to those obtained in a study carried out in the United States where approximately half of the forms contained neither the type of metal alloy nor the type of ceramic chosen by the dentist. [1]

On the other hand, in Saudi Arabia, 60% of laboratories confirmed that the type of metal alloy was mentioned on more than 75% of the forms received while the type of ceramic was only indicated by a minority of dentists. [8] From these results, we can conclude that most dentists relied mainly on dental technicians to choose the materials necessary for the manufacture of the prosthesis. However, the dentist is the only one with the ethical and legal responsibility to choose the materials to use. [8]

4.1.4. Shape and Number of Pontics

Although the correct design of pontics is very important for good hygiene and for maintaining periodontal health, the shape and number of pontics were only reported in 18.1% of cases on the laboratory forms (**Table 2**). This result is much lower than that found in a study carried out in Saudi Arabia where these data were indicated in 80% of cases. [6]

Our results are like those found in studies carried out in Ireland [3] and Romania [5] where 76% and 85% respectively of the forms received described neither the shape nor the number of pontics. In other studies, in the USA and India [1] [7], 58% and 56% respectively of laboratory technicians confirmed the absence of this parameter.

4.1.5. Surface Covered with Metal Only

The results of our survey revealed that dentists reported the surface to be covered with metal only in 14.9% of cases (**Table 2**). This rate is like that found in a study in Ireland, where 86% of laboratory forms received did not contain this parameter. [3] Same in India, 86% of the forms received did not identify the surface to be covered with metal only. [7] In another study, 24% was the rate of cases where dentists indicated this parameter. [12]

However, a survey carried out among the laboratories of King Saud University showed that in more than 89% of cases, this information was mentioned on the laboratory forms. [6]

Although laboratory technicians are valuable members of the dental team,

only the dentist can collect all the clinical data (biological, mechanical) allowing him to decide on the design of the future prosthesis [13]. It is his duty to communicate this data.

4.1.6. Occlusal Scheme

42.6% of dental technicians stated that the occlusal scheme never appeared in the forms received (Table 2). These results agree with those of a study in India which showed that the occlusal pattern was indicated in 54.04% of cases [12] and is insufficient compared to that found in a study carried out in Saudi Arabia, where in 95% of cases, this parameter was mentioned on the laboratory forms. [6] In Pakistan, 17.2% of dentists did not report it. [14]

4.1.7. Dental Restoration Deadline

85.1% of dentists always specified the dental restoration return date to the dental technicians on the laboratory form (Table 2). Also, in Saudi Arabia, it is indicated in 83% of cases. [6] 74% of laboratory technicians in the United States assert that this parameter was indicated in most forms received. [1] Same in Ireland, 70% of participants reported that most dentists had mentioned the dental restoration return date to them. [3] This signifies the high value that practitioners place on this parameter given its role in maintaining good communication and avoiding possible conflicts in the event of delay in the delivery of work, as well as in the organization patient appointments. However, in the United Kingdom, the dental restoration return date was among the most missing elements in the laboratory form (60%). [2]

4.2. Evaluation of Laboratory Forms and Request for Additional Information

4.2.1. Description of the Forms for Fixed Prosthesis

In our study, 25.5% of the forms received were completed to enable prosthetists to carry out their work, while 31.9% of these forms only included a minimum of information (Table 3).

Similar results were found in a study in the United States, where 26% of the forms were complete compared to 46% of others which only presented a guide to prosthetic making with a minimum of information. [1] In the United Kingdom, the forms received were incomplete in half of the cases, and 13% of dental technicians had to call the dentist to complete the information. [2] Same in Ireland, 14% of dental technicians needed to contact the dental practice for more information. [3] These results contrast with those of a study in Saudi Arabia, where 46% of dental laboratories received more than 75% of clear and complete forms. [8]

4.2.2. Attitude in the Case of Incomplete Information

In the event of a lack of data essential for prosthetic manufacturing, laboratory technicians mainly phone calls (93.1%) (Table 3). However, using the telephone alone has limitations, because, in the absence of a written document, it is difficult

Table 3. Evaluation of laboratory forms and request for additional information.

Variables	%
Evaluation of the laboratory form received by the prosthetists:	
Complete forms	25.5
Incomplete forms	31.9
Forms often require a call to the dentist	42.6
Alternative of incomplete written information:	
Telephone call to the office	93.6
SMS/MMS telephone messaging	6.4
Return of the laboratory form	0.0

to archive work requests and information transmitted by the practitioner on the clinical case. [15]

4.3. Dental Impressions

4.3.1. Types of Dental Impressions Sent to the Dental Laboratory

51.1% of dental technicians received both types of impressions, while 9.6% of the laboratories surveyed received only digital impressions (Table 4).

According to Mc Cracken and Coll (2020), 15% of the impressions received for single crowns were digital. [16]

In Romania, 20% of impressions received in laboratories for the manufacture of implants-supported crowns and fixed partial dentures were digital. [17]

Dental practitioners continue to opt for conventional impression-taking techniques despite advanced technologies and their advantages in terms of precision, speed and patient comfort. Indeed, the fairly high cost of intraoral scanners still puts off practitioners, particularly in practices located in popular districts.

4.3.2. Disinfection of Dental Impressions

83% of dental technicians surveyed stated that the impressions received were not disinfected by dentists, with blood and visible debris or residues in 64.9% of cases. 17% of these laboratories received disinfected impressions at the dental office (Table 4).

According to a study carried out in Iran, 8.3% of impressions received at dental laboratories were disinfected and mentioned on the form, 1% were not disinfected and mentioned on the form, 17.6% presented blood and debris while 73.1% of the impressions, it was not clear whether they had been disinfected or not. [18]

34.4% of dental technicians in Malta found that impressions received from dental practices were properly disinfected. [19]

A study in Greece showed that 73% of dental technicians directly disinfected impressions and work received from dentists. [4]

In contrast to these data, a study carried out in India showed that 100% of laboratory technicians received correctly disinfected impressions. [12]

Table 4. Dental impressions.

Variables	%
Types of impressions received in the laboratory:	
Physical impression	39.4
Digital impression	9.5
Both	51.1
Disinfection of impressions:	
Yes (mentioned in the form)	17.0
No (mentioned in the form)	18.1
No (not mentioned in the form)	64.9
Requesting that the dentist take another impression:	
Yes	94.7
No	5.3
Acceptance by the dentist to take another impression:	
Always	28.7
Often	37.2
Rarely	29.8
Never	4.3

Similarly, in Ireland, 89% of impressions received were adequately disinfected. [3]

The risk of cross-contamination between the dental office and prosthesis laboratory is very real. It is therefore crucial that both partners follow a planned disinfection protocol.

4.3.3. Requesting the Dentist to Take Another Dental Impression

94.7% of the dental technicians requested the dentist to take another impression. 37.2% of the latter often agreed to take them back (Table 4).

A study carried out among dental laboratories in the United States showed that 5% of impressions received had to be retaken. [20]

Inadequate impressions constituted a major problem for the laboratories studied in IOWA in the United States with a rate of 50% to 75% of inadequate impressions, of which 3% were redone by dentists. [21]

4.4. Assessment of the Quality of Communication between Dentist and Laboratory Technician

4.4.1. Introduction of Digital Tools

The introduction of digital tools in the dental office and laboratory has a significant impact on improving dental team communication, as confirmed by 92.6% of the dental laboratories surveyed (Table 5).

A study conducted in the United Kingdom and Ireland on the use of CAD-CAM among dental technicians reported that 14.6% of them communicated better with dental doctors thanks to this tool, others (45.4%) believed that

Table 5. Quality of dentist-dental technician communication.

Variables	%
Impact of digital tools on improving office-laboratory communication in fixed prosthesis:	
Yes	92.6
No	7.4
Reasons for possible conflicts with dentists:	
Insufficient time to complete the work	57.4
Incomplete instructions	60.6
Lack of experience of practitioners	67
Failing communication	38.3
Degree of satisfaction with the quality of dentist-dental technician communication:	
Not satisfied (1 - 4)	
Moderately satisfied (5 - 6)	7.4
Very satisfied (7 - 10)	35.1
	57.5

it provided them with more precision, while 31.7% of technicians declared an improvement in productivity. [22]

4.4.2. Reasons for Possible Conflicts with Dentists

According to 67% of the dental technicians surveyed, the problem of paying fees was the main cause of conflicts with dentists, followed by incomplete instructions (60%) and then insufficient deadlines for completing the work (57%). Other possible reasons for conflicts were the lack of experience of practitioners among 38.3% of dental technicians and poor communication among 23.4% of them (Table 5). A British study carried out in 2014, showed that in 32% of cases, prosthetists did not have enough time to carry out the work. [2]

The deadline specified by practitioners was considered insufficient by 58% of laboratory technicians in Pakistan. Laboratory technicians were unable to complete the manufacturing of dental prostheses to the best of their abilities. [14]

4.4.3. Degree of Satisfaction

57.4% of laboratory technicians were very satisfied with their communication with dentists, 35.1% were moderately satisfied and 7.4% reported extreme dissatisfaction with the quality of this communication (Table 5). A study carried out in Romania showed that 55% of dental technicians felt very good in communication with dentists, 36% moderately well and 9% reported poor communication. [5]

In the United Kingdom, a national survey was conducted and found that 50.4% of the technicians were satisfied with their communication with the practitioners with a score of 8 and above. [23]

4.5. Proposals for Improving the Quality of Communication with the Dentist

To improve the quality of communication, laboratory technicians in Casablanca mainly insisted on mutual respect and professional understanding between members of the dental team, as well as the need for continuing education of both parts: dentists and dental technicians, without neglecting the value of digitalization and the introduction of new technologies in dental laboratories and dental practices for quality work and better patient care.

In the same context, laboratory technicians in the United Kingdom [13] shared their opinions on office-laboratory communication as follows: Good communication between the clinician and dental technician is VITAL to obtain a good result. This must continue to be taught and reinforced to dental students. “New dental graduates appear to have little or no knowledge of even the most basic laboratory procedures.” Do newly qualified dentists visit a commercial laboratory as part of the practical training year? Maybe they should. “All my clients appreciate communication and try to include me. It’s gotten better over the years.” The team leader really doesn’t exist in the real world. Each member of the team has their own specialist skills, and everyone works as a team for the benefit of the patient. “Things are getting better. I feel like the status of the dental technician has improved, but there is still a way to go. All clinics now hold staff training meetings. Maybe the dental technician should be invited every two months.” A lot of talk has been said about the dental team, but I see little evidence in practice.

5. Conclusion

To successfully complete a prosthetic treatment and ensure long-term collaboration between dentists and laboratory technicians, good communication is essential. This involves both making efforts to effectively use traditional communication tools such as the laboratory form and investing in digital technology. The final objective is to guarantee better patient care and the satisfaction of the entire dental medical team.

Conflicts of Interest

The authors declare no conflicts of interest.

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