Dentist Communication with the Dental Laboratory for Prosthodontic Treatment Using Implants

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Purpose: **A questionnaire was sent to U.S. dental laboratories to evaluate the level of communication between dentists and laboratory technicians and to determine trends in procedures and materials used in fixed and removable implant restorations.**

Methods and Materials: **Dental laboratories were randomly chosen from the National Association of Dental Laboratories for each of the 50 states. The questionnaire was mailed to the laboratory directors for 199 dental laboratories. One hundred fourteen dental laboratories returned the survey, yielding a response rate of 57%. Of those laboratories, 37 indicated that they did not participate in the fabrication of fixed implant restorations, yielding a response rate of 39%. Forty-two dental laboratories indicated that they did not participate in the fabrication of implant-retained overdenture prostheses, yielding a response rate of 36%.**

Results: **Results from this survey show inadequate communication by dentists in completing work authorization forms. Custom trays are used more frequently for implant-retained overdenture impressions and stock trays for impressions of fixed implant prostheses. Poly(vinyl siloxane) is the material most commonly used for both fixed and removable implant-supported prostheses. Two implants with stud attachments are used more widely than those with bar attachments for implant-retained overdentures.**

Conclusions: **Most laboratories working on implant prosthodontic cases report inadequate communication between the laboratory and dentists related to materials and techniques used in fabrication of implant restorations.**

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THE OUTCOME of a final prosthesis is determined by the collaborative efforts of the dentist and dental technician. All members of the team should understand their responsibilities to each other to ensure optimal prosthodontic care for the patient.[1] The working relationship of dentists with dental laboratory technicians begins early in dental students' education. Recently, a survey determined that the current trend in the prosthodontic clinical curricula was to delegate more procedures to dental laboratories while students focused more on procedures they must perform on patients.[2]

The interaction between dentists and dental laboratory technicians has been a subject of concern for prosthodontic educators.[3-5] Lack of communication has been cited as a major problem in providing optimum patient services.[6,7] In 1990, Goodacre[8] offered specific recommendations for dental educators to address the ramifications and responsibilities of our future dental practitioners with regard to the dental laboratory. In response to these recommendations, Nimmo[9] described a

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curriculum where students evaluated their work prior to sending it to the dental laboratory and wrote work authorizations in an effort to improve quality of work and to communicate effectively with the dental laboratory. This program was highly effective in educating dental students about the importance of proper work submission and work authorizations to the dental laboratory.

The laboratory's responsibility is to fabricate a prosthesis in compliance with the specific instructions provided by the dentist.[10] Due to time constraints, many dentists try to take shortcuts and delegate to the dental laboratory technician steps that are the dentist's responsibility. In an effort to please the dentist, the laboratory technicians will accept these responsibilities.[6] The dental laboratories are in a position to observe, via the work authorization form and materials sent to them by the dentist, whether the communication provided is effective in allowing them to proceed with the fabrication of the final prosthesis. They are also in a position to observe changes in implant techniques and materials used from their perspective.

The aim of this survey was to determine: (1) adequacy of work authorization forms completed by dentists; (2) whether the dentist delegates procedures to the laboratory technicians that traditionally are the responsibility of the dentist (designing the prosthesis/selection of materials); (3) current trends in materials used by the dentists for procedures leading to the final prosthesis fabrication; and (4) current trends in implant overdenture design.

Materials and Methods

In April 2002, a questionnaire (Tables 1 and 2) requesting information on the level of communication between dentists and their laboratory technicians, materials used, implant overdenture designs used, and other procedures delegated to the dental technician was mailed to the laboratory directors. The questionnaire contained seven multiple-choice questions pertaining to fixed implant restorations and seven questions pertaining to removable implant prostheses. The questions were pilot-tested on site by faculty members and in-house laboratory technicians.

A list of registered laboratories nationwide was requested from the National Association of Dental Laboratories. Five laboratories were selected randomly per state; however, in states with fewer than five laboratories listed, only up to three were selected. Surveys were sent to 199 laboratories. After a second mailing to the laboratories that had not returned the questionnaire within a 3-month period, 114 out of 199 laboratories responded. Of the 114 that replied overall, 37 responded that they did not fabricate fixed implant prosthodontic restorations, and 42 responded that they did not fabricate implant-supported (removable) prostheses.

Results

The results are presented in Tables 1 and 2.

Discussion

The results of this survey show trends in communication, materials used, and procedures requested, pertaining to laboratory work for fixed implant restorations and removable implant overdenture prostheses.

The majority of laboratory work authorizations for both fixed (59%) and removable (66%) prostheses frequently required a call to the dentist for more information or contained only the minimum amount of information necessary to get the job done. Proper and effective communication between dentist and laboratory is essential for successful fabrication of the final product. The responsibility of the laboratory technician is to fabricate the prosthesis specifically prescribed by the work authorization.[7] If these responsibilities are not adhered to, it is not possible for either dentist or laboratory technician to carry out their specific roles. The outcome may be an unacceptable prosthesis.[7]

Although dentists have the exclusive training and knowledge necessary for designing a dental prosthesis,[11] 48% of dental laboratories reported that they usually (76%-100% of the time) assist dentists with the final design of fixed implant restorations. The dentist has the knowledge and authority to delegate laboratory procedures based on the patient's functional and esthetic needs. Therefore, it is the dentist's responsibility to design the final prosthesis without seeking assistance from the laboratory technician.

In a survey by Taylor et al,[6] the authors found that half the removable partial denture frameworks are designed by the dental laboratory at the request of the dentist. Because dental laboratory technicians depend on dentists for their livelihood, it is understandable that technicians will provide

Table 1. Questionnaire Sent to U.S. Dental Laboratory Technicians Pertaining to Fixed Implant Restorations (Single or Multiple Units)

Name of Dental Laboratory_____
City and State_____
Date of Survey Completion_____

Instructions: Please circle the response that best applies to your laboratory's cases which you receive from dentists. You may *not* circle more than one response. All data collected will be kept strictly confidential and will not be identified by individual laboratories in any future publications or presentations. Thank you for your cooperation.

1. Which of the following best describes the average work authorization or prescription coming into your laboratory regarding your fixed implant cases?	Responses (%)
(a) Is complete enough for you to provide your best service	18 (23%)
(b) Is lacking in customization or personalization	13 (17%)
(c) Contains only the minimum amount of information necessary to get the job done	23 (30%)
(d) Frequently requires a call to the dentist to get more information	22 (29%)
(e) Other. Please explain _____ (all of the above)	1 (1%)
2. Do you provide the dentist with the necessary implant components (e.g., impression copings, abutments)?	Responses (%)*
(a) Less than 25%	22 (29%)
(b) 25% to 50%	12 (16%)
(c) 51% to 75%	23 (30%)
(d) 76% to 100%	20 (26%)
3. Do you assist the dentist with the design of the final implant restoration?	Responses (%)
(a) Less than 25%	16 (21%)
(b) 25% to 50%	9 (12%)
(c) 51% to 75%	15 (19%)
(d) 76% to 100%	37 (48%)
4. Are the implant-supported provisionals fabricated by the lab?	Responses (%)
(a) Less than 25%	43 (56%)
(b) 25% to 50%	7 (9%)
(c) 51% to 75%	14 (18%)
(d) 76% to 100%	13 (17%)
5. Are custom trays used for final impressions?	Responses (%)
(a) Less than 25%	34 (44%)
(b) 25% to 50%	12 (16%)
(c) 51% to 75%	11 (14%)
(d) 76% to 100%	20 (26%)
6. The majority of the final impressions you receive by your laboratory are made with:	Responses (%)*
(a) Irreversible hyrdrocolloid (e.g., Jeltrate™, Dentsply International, Milford, DE)	1 (1%)
(b) Poly(vinyl siloxane) [e.g. Aquasil™ (Dentsply International, Milford, DE), Reprosil™ (Dentsply International, Milford, DE) Extrude™ (Kerr, Orange, CA)]	42 (62%)
(c) Polyether [e.g., Impregum™ (3M ESPE, St. Paul, MN)]	24 (31%)
(d) Polysulfide	0 (0%)
(e) Other. Please explain _____ (1-all of the above, 2- b, c, d, 1- b, c)	4 (5%)
7. The majority of the final impressions you receive by your laboratory are made with:	Responses (%)*
(a) A custom tray	20 (27%)
(b) A stock tray	43 (58%)
(c) A quadrant tray	7 (9%)
(d) Other. Please explain_____ (1-modified stock tray, 2-all of the above, 1-a, b)	4 (5%)

*Rounding error, does not equal 100%.

Table 2. The Following Questions Pertain to Implant-Retained Overdenture Cases (Removable)

1. Which of the following best describes the average work authorization or prescription coming into your laboratory regarding your removable implant cases?	Responses (%)*
(a) Is complete enough for you to provide your best service	16 (22%)
(b) Is lacking in customization or personalization	9 (13%)
(c) Contains only the minimum amount of information necessary to get the job done	25 (35%)
(d) Frequently requires a call to the doctor to get enough information	22 (31%)
(e) Other. Please explain _____	0 (0%)
2. The majority of the final impressions you receive by your laboratory are made with:	Responses (%)
(a) Irreversible hydrocolloid (e.g., Jeltrate™)	1 (1%)
(b) Poly(vinyl siloxane) (e.g., Aquasil™, Reprosil™, Extrude™)	44 (61%)
(c) Polyether (e.g., Impregum™)	23 (32%)
(d) Polysulfide	0 (0%)
(e) Other. Please explain_____ (2-b, c, d, 1-b, c, 1-all)	4 (6%)
3. Are custom trays used for final impressions?	Responses (%)*
(a) Less than 25%	20 (28%)
(b) 25% to 50%	9 (13%)
(c) 51% to 75%	12 (17%)
(d) 76% to 100%	31 (43%)
4. Is the bar design [with distal extension ERA's™ (Sterngold, Attleboro, MA)] used for mandibular overdenture cases when two implants are used?	Responses (%)
(a) Less than 25%	33 (46%)
(b) 25% to 50%	19 (26%)
(c) 51% to 75%	13 (18%)
(d) 76% to 100%	7 (10%)
5. In cases where there are *two implants*, are stud attachments [ERA's™, Balls, Zest Anchors ™ etc. (Zest Anchors Inc., Escondido, CA)] used for the overdenture (tissue supported) more often than the bar attachment?	Responses (%)
(a) Yes	48 (67%)
(b) No	24 (33%)
6. In cases where there are *more than two implants*, are stud attachments (ERA's™, Balls, Zest Anchors ™, etc.) used for the overdenture (tissue supported) more often than the bar attachment?	Responses (%)*
(a) Yes	25 (35%)
(b) No	24 (64%)
7. In what % of cases is the maxillary overdenture (tissue-supported) designed with an open palate when there are four implants with attachments?	Responses (%)
(a) Less than 25%	28 (39%)
(b) 25% to 50%	17 (24%)
(c) 51% to 75%	13 (18%)
(d) 76% to 100%	14 (19%)

*Rounding error, does not equal 100%.

services that have traditionally been the responsibility of the dentist.[6]

The majority (56%) of dental laboratories reported that they fabricate less than 25% of fixed implant provisional restorations. This is likely due to cost considerations for the dentist.

Forty-four percent of dental laboratories reported that less than 25% of the dentists were using custom trays for final impression of fixed implant restorations. Fifty-eight percent reported the use of stock impression trays for fixed implant prostheses even though a recent study[12] has demonstrated that custom trays produce significantly more accurate implant impressions. Furthermore, impressions made using custom trays result in more accurate casts which leads to more accuracy in fit of the final restoration.[13] In addition, reports indicate that use of a custom

impression tray results in less error in both interabutment distance and cross-arch distortion, compared with stock impression trays.[14,15]

This is in contrast to removable implant-retained overdentures where 43% of dental laboratories reported that dentists usually (76% to 100% of the time) use custom trays for final impressions. Greater use of custom impression trays for removable implant prostheses reflects the need for proper recording of edentulous areas.

Sixty-two percent of dental laboratories reported dentists' use of poly(vinyl siloxane) for final impressions for fixed implant restorations. The vast majority of studies conclude that the least amount of dimensional change occurs with addition silicones and polyethers.[16-18] One recent study[19] compared polyethers and poly(vinyl siloxane) impression materials for direct multi-implant impressions. The use of either material was recommended. For implant-retained overdentures, poly(vinyl siloxane) was also the most popular impression material (61%).

Prosthetic treatment of edentulous mandibles using two implants include incorporation of individual attachments such as the stud attachment or fabrication of a bar splinting the implants. Stud attachments have both advantages and disadvantages, one disadvantage being inadequate prosthesis retention and the need for frequent repairs.[20] Disadvantages of bar-type retention include possible encroachment on tongue space and difficulties with oral hygiene.[20] Forty-six percent of laboratory technicians reported that less than 25% of dentists use the bar design with distal extension ERA's™ (Sterngold, Attleboro, MA) for mandibular overdentures with two implants. Sixty-seven percent reported that dentists use stud attachment such as ERA's™, Ball, and Zest Anchors™ (Zest Anchors Inc, Escondido, CA). The low percentage using the bar design could indicate that this design is not as economical, and is a more challenging treatment option clinically as compared with two free-standing stud attachments.

In fabrication of maxillary overdentures using four implants, the palatal area of the denture may be shortened to a limited extent since loss of dorsal support will increase loading of implants in the anterior region.[20] More than half of the laboratory technicians reported that they did not fabricate overdentures with open palatal extension.

Conclusions

A survey of dental laboratories was conducted to determine adequacy of dentist–dental laboratory communication as well as trends in procedures and materials used in fixed and removable implant restorations. The results from the current survey, which are consistent with a previous study,[21] show that work authorization forms are lacking in customization, contain only the minimum amount of information, and frequently require a call back to the dentist. Therefore, a recommendation could be made that during dental school, students should be educated early in the preclinical courses and later in the clinical years so that they graduate with the ability to communicate effectively and to consistently provide what is needed to the dental technician.

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