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Dental Laboratory Communication Regarding Removable Dental Prosthesis Design in the UAE

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Abstract

Purpose: The purpose of this study was to determine the methods dental practitioners in the United Arab Emirates (UAE) use to communicate cast removable dental prosthesis (RDP) design to dental laboratories; identify common practices taken by dentists/dental technicians prior to fabrication of RDP framework; and seek out dental technicians' attitudes toward their role in RDP design decisions.
Materials and Methods: All dental laboratories (n = 28) listed in a local telephone directory were invited to complete a questionnaire through a face-to-face interview. They were also requested to examine RDP cases fabricated in the past 2 months and identify steps taken by dentists/dental technicians prior to fabrication of the framework. Descriptive statistics were used to report frequencies and percentages.
Results: Twenty-one (75%) dental laboratories agreed to participate, out of which 19 had the facilities to fabricate chrome-cobalt RDPs. Cast RDPs comprised approximately 4.04% (±2.67) of services provided. A reported 84.2% of dentists frequently communicate through generic lab script, with 89.5% rarely/never giving details regarding RDP design. While 52.6% of labs agree/strongly agree that it is the dentist's responsibility to decide the final RDP design, 94.7% agree/strongly agree that dentists should depend on dental technicians for design-making decisions. A total of 19 RDP cases were reviewed. All 19 were surveyed and designed by dental technicians but received dentist approval of design prior to fabrication. Thirteen (68.4%) had rest-seat preparations done by dentists after approval, and new impressions sent to the lab. No other tooth modifications were noted.
Conclusion: The responsibility of RDP design appeared to be largely delegated to dental technicians. Importance of tooth modifications seemed to be undervalued and not completed prior to framework fabrication.

Dental health surveys show that the partially edentulous older population is increasing and is an important challenge for dentists to provide proper dental healthcare.[1] Cast chrome-cobalt alloy removable dental prostheses (RDP) continue to be a simple treatment option for partially edentulous patients. In the last three decades the number of RDP wearers in the 55 to 65 year age group almost doubled.[1] Therefore, there is an increased responsibility for dentists to provide high-quality RDPs for those patients.

RDP design plays an important role in the state of the periodontium. A well-designed RDP can decrease the incidence of periodontal diseases.[2] On the other hand, there is consistent evidence in the dental literature showing the harmful effects of inappropriately designed RDPs.[2-6] Because of this concern, and as an ethical obligation toward patients, there is a general consensus that dental practitioners should provide a detailed prescription for cast RDP design to dental laboratories when providing this dental service. The European Union introduced the 'Medical Devices Directive,' which places legal and ethical guidelines on dental practitioners when a prosthesis is to be manufactured.[7] The British Society for the Study of Prosthetic Dentistry has similar guidelines, which clearly state that the design of the RDP is the duty and responsibility of the clinician.[8]

Many studies in different parts of the world, including Europe and the United States, found poor-quality

communication between dental clinicians and dental laboratories regarding cast RDP construction.[9-14] The studies demonstrated that the quality of prescription and fabrication of cast RDP by general dental practitioners frequently failed to comply with ethical and legal requirements. One study conducted in the Kingdom of Bahrain showed that 57% of the cast RDP instructions requested the dental technician to design the prosthesis, and only 1% mentioned all design variables.[10] Basker and Davenport did a survey of partial denture design in general dental practice. The results of the survey showed that the responsibility for cast RDP design appeared to be largely delegated to the dental technician.[11]

To date, no studies have evaluated cast RDP design communication in the United Arab Emirates (UAE). Therefore, the aims of this investigation were the following: to uncover the methods by which dental practitioners in the UAE communicate cast RDP design to dental laboratories; to identify common practices taken by dentists/dental technicians prior to fabrication of RDP framework; and to seek out dental technicians' attitudes toward their role in RDP design decisions.

Materials and methods

All dental laboratories (n = 28) listed in the local telephone directory were invited to participate in a face-to-face interview based on a questionnaire consisting of 12 items, designed to elicit information from dental technicians regarding their dental lab characteristics; the dental technicians' level of training and continuing education (CE) attendance; the type of dental services provided by the dental laboratories; observed current methods used by dentists to communicate cast RDP design; as well as dental technicians' attitudes toward their role in design decisions. In addition to their participation in the interview, dental technicians were requested to examine cast RDP cases fabricated in the past 2 months and to identify steps taken by dentist/dental technicians prior to fabrication of the framework. Ethical approval to conduct the study was sought from and granted by the University of Sharjah (UAE) Ethics and Research Committee. Obtained data were entered into statistical software (SPSS v.19, Chicago, IL). Descriptive statistics were used to report frequencies and percentages.

Results

Dental laboratory characteristics

A total of 21 (75.0%) dental laboratories agreed to participate in this investigation. The respondents represented six of the seven emirates of the UAE, with the majority being in the three largest emirates; Abu Dhabi (31.6%), Dubai (15.8%), and Sharjah (36.8%). Of the respondents, 52.6% were involved in small dental laboratories (2 to 5 lab technicians), while the rest were in medium (6 to 12 dental technicians) and large labs (>12 dental technicians), 21.1% and 26.3%, respectively. All dental technicians were certified by the Ministry of Health, and participated in continuing education (CE) courses; however, only one dental laboratory reported participating in CE courses pertaining to CAD/CAM use in RDP design.

Table 1 Mean percentage of services provided by the dental laboratories surveyed

Services provided	Mean (%)	SD
Fixed prosthesis	58.74	9.58
Acrylic complete dentures	3.53	1.41
Acrylic RDP	7.69	3.39
Cast RDP	4.04	2.67
Implant	15.25	10.82
Ortho appliances/night guards	10.00	6.07

Of the 21 responding labs, only 19 had the facilities to fabricate chrome-cobalt RDPs. Table 1 shows the distribution of reported services provided by the dental laboratories. From the reported results, removable prosthodontic dental services seems to be less demanded by dental practitioners, out of which cast RDPs comprised only a reported 4.04% (±2.67) of services provided.

Cast RDP design communication methods and dental technicians' attitudes

Communication methods used by dentists regarding RDP design, with the frequency of their use, are shown in Table 2. Impressions and generic lab scripts seem to be the most common methods for cast RDP design communication. A reported 84.2% of dentists frequently communicate through generic lab script with 89.5% rarely/never giving details regarding RDP design, and 63.2% never/rarely providing a drawing of the design. All reported that dentists frequently sent final impressions but rarely/never sent surveyed go-by diagnostic casts or surveyed working casts.

Table 3 shows reported responses pertaining to the dental technicians' attitudes toward their role in RDP design. While 52.6% of labs agree/strongly agree that it is the dentist's responsibility to decide the final RDP design, 94.7% agree/strongly agree that dentists should depend on dental technicians for design-making decisions. They felt that dentists generally lack the adequate knowledge to allow them to properly design RDP frameworks; however, their approval is needed, as they are responsible for delivering the prostheses to the patients.

Steps taken by dentists/dental technicians prior to cast RDP fabrication

A total of 19 RDP cases were reviewed. All had been communicated through an impression and a generic lab script to fabricate an RDP. None of the lab scripts had details on the cast RDP design, and three were specific in requesting the lab technician to design the RDP. All 19 were surveyed and designed by dental technicians and communicated back to the dentist through phone conversation to get approval of design prior to fabrication. Thirteen (68.4%) had rest-seat preparations done by dentists after approval, and new impressions were resent. Four (21.1%) had an existing rest seat already prepared, upon which the design was based, and two (10.5%) had no rest seats prepared. No other tooth modifications were noted.

Table 2 Frequency of use of different communication methods used by dentists to communicate RDP design

Communication method	Frequently used % (n)	Sometimes used % (n)	Rarely/never used % (n)
Impressions	100% (n = 19)	0% (n = 0)	0% (n = 0)
Working casts	10.5% (n = 2)	31.6% (n = 6)	57.9% (n = 11)
Surveyed working casts	0% (n = 0)	0% (n = 0)	100% (n = 19)
Surveyed design casts	0% (n = 0)	0% (n = 0)	100% (n = 19)
Generic lab script	84.2% (n = 16)	10.5% (n = 2)	5.3% (n = 1)
Detailed lab script	0% (n = 0)	10.5% (n = 2)	89.5% (n = 17)
Drawing	0% (n = 0)	36.8(n = 7)	63.2% (n = 12)
Phone call	0% (n = 0)	52.6% (n = 10)	47.4% (n = 9)

Table 3 Percentage agreement with statements pertaining to dental technicians' attitudes toward their role in RDP design

Statement	Strongly agree	Agree	Disagree	Strongly disagree
It's the dentist's responsibility to design the cast RDP*	10.5% n = 2	42.1% n = 8	36.8% n = 7	5.3% n = 1
It's the dental technician's responsibility to design the cast RDP*	36.8% n = 7	42.1% n = 8	15.8% n = 3	0% n = 0
Dentists should depend on dental technicians regarding RDP design	52.6% n = 10	42.1% n = 8	5.3% n = 1	0% n = 0

*Only 18 of 19 labs responded.

Discussion

The UAE is one of the fastest growing and developing countries in the world. This has attracted workers and investors from all over the world. Among those are dental healthcare providers, so that in addition to local dentists, the UAE boasts dental practitioners with different educational backgrounds from all over the world, including Europe, the United States, Canada, Asia, and the Middle East.

Of the 21 (75%) dental laboratories participating in this study, only 19 had the facilities to fabricate cast RDPs. It seems from the results of this study that removable prosthodontics in general comprise a small proportion of services provided, as compared to fixed prosthodontic services. Cast RDP comprises one of the least-reported services provided by dental laboratories. This might be attributed to the level of dental healthcare awareness and the presence of other treatment options such as dental implants, the second highest service provided by laboratories involved in the study.

Unfortunately, despite great progress in dental health services in the UAE, the quality of written prescriptions is found to be very poor. Although dentists frequently communicate through generic lab script, 89.5% rarely or never gave details regarding cast RDP design. All 19 laboratories agreed that 100% of the dentists rarely or never sent surveyed go-by diagnostic casts. It seems that dental technicians (94.7%) participating in this study also believe that dentists should depend on dental technicians for design-making decisions, and dental practitioners are complying with this. This poor communication and understanding ignores the ethical and legal obligations of dental practitioners to construct cast RDPs based on mechanical and biological principles. In the 19 RDP cases reviewed in this study, all were surveyed and designed by a dental technician but received dentist approval of design prior to fabrication by the dentist. As design approval was found to be usually done through phone conversation, this may lead to increased incidence of negligence to the periodontal status of abutment teeth, inter-arch space considerations, and esthetic considerations, in addition to poor communication of proper tooth modifications needed prior to fabrication of framework. This was noted, as only 13 cases had rest-seat preparations done by dentists after approval without any other tooth modifications, such as creating guide planes, establishing proper path of insertion, changing the amount and position of undercuts, or creating proper reciprocation, which were all totally neglected by the designing technician or the approving dentist. This reflects the level of dental practitioners' awareness and their lack of confidence in writing an adequate prescription.

The importance of selective tooth modifications prior to fabrication of the cast RDP framework has been very well documented and taught in almost all dental schools.[15] If the proper guidelines for cast RDP fabrication are not followed accurately, this may lead to deleterious effects on the heath of the masticatory apparatus and periodontal health.[2-6] In addition, the likelihood that the RDP will function as intended is unlikely.

Results of this study show similarity to the results found in most studies carried out in different parts of the world.[9-14] Lynch and Allen have addressed this issue in the UK in more than one study.[9,16-18] They tried to determine the effect of financial and educational factors, which were identified by previous studies as major factors for poor communication between dentists and technicians[4,11,15,19] on the quality of cast RDP design and fabrication by general dental practitioners. They found that financial factors did not have as significant an effect on the quality of prescription and fabrication of cast RDPs as did educational factors.[18] Furthermore, they identified serious deficiencies in the teaching of cast RDPs during professional training of dental practitioners. Lynch and Allen took this subject further and investigated the methods employed for teaching RDP in dental schools in Ireland and the UK.[20] They found variations between dental schools in both amount and content of teaching programs and limited experiences gained at the undergraduate

level. They also found that the average duration of a preclinical course in RDP was 67 hours, ranging from 24 hours in some schools to 200 hours in other schools. The great increase in the number of dental students accompanied by a faculty shortage resulting in poor faculty-to-student ratios imposed another educational challenge. Other authors considered that poor communication might be attributed to the amount of fees being paid.[19] A common pattern noted was a discrepancy between what is taught in the dental schools regarding RDP design and what is used in dental practice.[21] Some dental practitioners prefer to do procedures that require minimum time, consequently transferring responsibilities to dental technicians.[21] Lack of confidence due to insufficient clinical exposure to RDPs has also been highlighted.[19]

The risk that such poor communication and inadequate RDP prescriptions impose on the health of oral tissues cannot be underestimated. Therefore, future investigations to identify the reasons for such poor communication in this region are needed, as it is not entirely apparent. Additionally identifying educational needs for both dentists and dental technicians and addressing of those needs could lead to significant improvement. Postgraduate and CE courses in RDP design have been highlighted as a way of coping with such challenges.[11,21] Finally, new guidelines for RDP practice in the UAE need to be drawn to delegate the responsibility of RDP design to the dental practitioner.

Conclusions

Cast RDP seems to comprise a small proportion of services provided by dental laboratories in the UAE. The responsibility of RDP design appeared to be largely delegated to dental technicians. Dentists usually communicated through generic lab scripts with no details on the RDP design to be fabricated. The importance of tooth modifications prior to framework fabrication seemed to be undervalued and not completed. Further investigation into the educational needs and regulation standards of dental practitioners in the UAE in respect to RDP design is warranted.

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