Int. J. Odontostomat.,
9(3):519-524, 2015.

Applicability of Knowledge of Graduates in Dentistry: Use of Irreversible Hydrocolloid

Aplicabilidad del Conocimiento de Licenciados en Odontología: El Uso de Hidrocoloide Irreversible

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AMARAL, F. R.; ASSUNÇÃO, E. L. F.; VIDIGAL, B. C. L.; SÁ, T. M.; OLIVEIRA, B. C.; DE FARIA, A. A.; AKAKI, A. & DE CAMPOS, E. A. Applicability of knowledge of graduates in dentistry: use of hydrocolloid Irreversible. ***Int. J. Odontostomat., 9(3)***:519-524, 2015.

ABSTRACT: The objective of this study was to evaluate the knowledge applied by dental students on the procedures of disinfection, tempering and pouring of irreversible hydrocolloid impressions. This study was conducted through a questionnaire to 86 undergraduate students, of both genders, of the eighth and ninth period of the School of Dentistry, Pontifical Catholic University, Belo Horizonte, MG. The questionnaire contained 12 multiple choice questions about clinical and laboratory procedures for dental impression. Analyzed data were descriptively and qualitatively. Most subjects (70%) stated they did disinfection of dental impression with 1% sodium hypochlorite spray. However, they did it in open containers (75.4%) and with time control (68.6%). The ratio water / powder is randomly conducted by most students (60.5%), and tap water is the one most commonly used (95.3%). The mixing of the calcium sulfate is done manually by nearly all students (97.7%), and use vibrator during the pouring of the calcium sulfate is common among undergraduates (60.5%). The setting of the calcium sulfate takes place predominantly exposed to air (93%) and the removal of the model is made ??between 30 and 60 min after pouring by 84.9% of students. These results point to the need for awareness of students of adopting practices transmitted during the undergraduate degree. It is also necessary to investigate the possible causes of knowledge transmission problems and how to effectively adopt good clinical practices.

KEY WORDS: learning, disinfection, alginate.

INTRODUCTION

In recent decades, with the high risk of transmission of infectious diseases with high morbidity and mortality, incorporating preventive measures of individual protection and infection control has become an imperative issue in clinical dental practice (American Dental Council on Scientific Affairs and ADA Council on Dental Practice, 1996). First, the risk of infections transmitted by saliva, blood and biofilm is considered an occupational hazard potential because they contain pathogenic micro-organisms that can transmit disease resulting from a simple cold to pneumonia, tuberculosis, viral hepatitis, herpes and acquired Immunodeficiency syndrome – AIDS (Emphasis, 1986; Powell *et al*., 1990), an example, in hepatitis B virus for more than one billion virus particles per ml of blood and AIDS virus are up to 100 per ml of blood (Crawford, 1985). Fourth, studies show that the micro-organisms of tuberculosis and hepatitis B can survive up to 7 days or more at room temperature. Thus, awareness of this context becomes extremely necessary and important measures taken to prevent cross contamination in clinics and dental laboratories (Powell *et al*.; Crawford). However, even with an increase of information about biosafety and disinfection and sterilization procedures transmitted in post-graduate courses, and professional, this knowledge has not been transformed into learning nor has it been incorporated into clinical practice. This can be even more critical for non-invasive procedures

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such as moldings study (Bastos & Sousa, 2003).

Among the existing molding materials on the market, alginate (irreversible hydrocolloid) are the most used by undergraduate students and dentists to obtain models of studies as an aid to diagnosis, planning and treatment in Prosthodontics Dentária (Bastos & Sousa). The preference for alginate is because its cost is low, easy to use, is compatible with synthetic gypsum, has elasticity, as well as being easy to clean and allow time control (Bastos & Sousa; Souza *et al*., 2004; Craig & Powers, 2004).

Regarding biosafety, alginate molds are subject to contamination by micro-organisms present in saliva, blood and exudate in the oral cavity, thus being an environment conducive to the spread of infectious diseases, as mentioned above, for the dental team and for patients (Craig & Powers; Mathias *et al*., 1998; Samra & Bhide, 2010). Thus, there is consensus in the literature about the need for disinfecting molds as an indispensable procedure in dental offices and clinics. It is presumed that all mold should be washed in running water to remove the debris, saliva and blood, disinfected and poured with plaster soon after (Craig & Powers; Mathias *et al*., 1998). This procedure results in eliminating or reducing the distortion and a substantial reduction in the risk of cross infection. Furthermore, it is important that the disinfectant, as well as having a potential antimicrobial satisfactory, does not degrade the physical properties of the media and the resulting plaster models (Bergman, 1989; Osório *et al*., 1998).

Whereas the models must accurately replicate the molded fabrics dimensional accuracy and present, performing the entire procedure, from the choice of alginate as the impression material to the casting of the plaster, after going through the handling, storage and disinfection of the mold, are of paramount importance for the success of the work (Osório *et al*.; Fonseca *et al*., 1998). Therefore, this study aimed to assess the level of knowledge applied by scholars of Dentistry, PUC-MG on the disinfection procedures, packaging and casting molds alginate in order to optimize its use in clinical practice.

MATERIAL AND METHOD

This work was conducted through a questionnaire (available on request) to 86 undergraduates of both genders, the eighth and ninth of the School of Dentistry, Pontifical Catholic University, PUC-MG, who underwent the procedure with alginate molding in their care to patients in the Integrated Clinic respective institution.

The questionnaire containing 12 multiple choice questions, asked important clinical and laboratory information, such as trademarks used for molding and casting plaster, achievement, type and time of disinfecting mold, water mix / powder type of water used, beyond the knowledge of tooling, casting and setting of the plaster. The questionnaire, without identification of the participant, was applied to academics. The data were submitted to descriptive statistical analysis.

RESULTS

The results obtained from the questionnaire were analyzed and represented in the form of tables (Tables I to XI) in numerical and percentage values.

Table I. Disinfection of molds for undergraduates.

Trademark	n	%
Perfom	61	70.9
Not Perform	25	29.1
Total	86	100

Table II. Type container for disinfection by spraying the molds of sodium hypochlorite 1% by graduating.

Container Type	n	%
Open	46	75.4
Closed	15	24.6
Total	61	100

Table III. Schoolchildren use disinfection time controlled.

Controlled times	n	%
Yes*	27	31.4
No	59	68.6
Total	86	100

* Students use 10 minutes for controlled disinfection.

Table IV. Trademark alginate used by most undergraduates.

Trademark	n	%
Jeltrate	60	69.7
Jeltrate Plus	14	16.3
Avangel	12	14.0
Total	86	100

Table V. Trademark gypsum used by most undergraduates.

Trademark	n	%
Durone	47	54.7
Herostone	39	45.3
Velmix	0	0
Total	86	100

Table VI. Ratio water / plaster.

Proportion	n	%
Random	52	60.5
Weight/volume	34	39.5
Total	86	100

Table VII. Type of water used.

Water	n	%
Tap	82	95.3
Destilled	4	4.7
Bidistilled	0	0
Total	86	100

Table VIII. Tooling plaster.

		n	%
Water	Manual	84	97.7
	Mechanics	2	2.3
	Total	86	100
Time	30 Seconds	23	26.8
	1 minutes	31	36.0
	5 minutes	0	0
	Without Controlling	32	37.2
	Total	86	100

Table IX. Leak plaster.

Leak	n	%
Aid vibrator	52	60.5
Manuel	34	39.5
Total	86	100

Table X. Presa plaster.

Presa	n	%
Outdoor	80	93.0
In humidifier	6	7.0
Total	86	100

Table XI. Removal of the model.

Removal of the model	n	%
30 minutes	15	17.5
45 minutes	50	58.1
60 minutes	8	9.3
Not controlled	13	15.1
Total	86	100

DISCUSSION

The present study had the participation of 100% of the students who attended the last sentence of Dentistry course at PUC-MG. Therefore, the responses obtained allowed an assessment of the knowledge acquired about the procedures for disinfection of irreversible hydrocolloid and conducts clinical molding using this material. Although academics have already received relevant to the topic discussed in this work in previous semester information, 29,1% (n= 25) of students reported not to disinfect the mold (Table I). However, common sense is emphasized in the literature that any irreversible hydrocolloid mold can spread infectious diseases if not sanitized and that only by the use of disinfectant solutions can you prevent cross contamination in clinics and dental laboratories during such procedures (American Dental Council on Scientific Affairs and ADA Council on Dental Practice; Craig & Powers; Bergman;Fonseca *et al*.; Silva *et al*., 2004; Muller-Bolla *et al*., 2004). In addition, disinfection of molds, when properly conducted, does not cause change in moldagem (Craig & Powers; Osório *et al*.; Nascimento *et al*., 1999). It is worrying that almost 30% of respondents have not incorporated this basic procedure to correct disinfecting molds, showing that the information conveyed by teachers not involved in the adoption of preventive measures by students. Comparing our results with the findings of Souza *et al*., identified that approximately ~15% of undergraduate students from UNESP / CSJCAMPOS also not performing the disinfection of alginate molds in clinical practice. Interestingly, studies conducted with dentists also show that, in general, a significant portion is far from systematically applying disinfecting molds (Scaranelo *et al*., 2004; Panza *et al*., 2006; Moreira & Cruz, 2005; Santos *et al*., 2005).

Whereas most studies have demonstrated that 1% sodium hypochlorite in the form of spray for 10 minutes, is one of methods most suitable for the disinfection of alginate mold, since this substance has its mechanism of action via disinfecting power of chlorine, which inhibits intracellular enzymatic reactions, denatures proteins and inactivates nucleic acids, in addition to having antimicrobial broad-spectrum activity, low cost and fast, action (American Dental Council on Scientific Affairs and ADA Council on Dental Practice; Craig & Powers; Silva *et al*.; Nascimento *et al*.; Vazillotta *et al*., 2002), students were oriented along the going to use, by default, this substance for disinfecting molds. However, our results showed that only 24.6% (n= 15) of the academics left the molds with sodium hypochlorite 1% in spray closed with 100% humidity (Table II) container, as recommended in depending on the environmental changes that molds alginate suffer from high sensitivity 4.15 and still not adequately controlled time of 10 minutes (68.8%, n= 59) (Table III) for disinfection. According to Barbosa *et al*. (2003), the molds alginate exposed to ambient conditions for

15 min undergo dimensional changes, but maintain their stability when stored in the humidifier during the same period.

The Jeltrate alginate and plaster Durone brand were the most used by scholars of Dentistry, PUC-MG (Table IV), perhaps these results show clearly that these brands are of greater disclosure or acceptance by the scholars and teachers of the area. Similar results were found in the work of Bastos & Souza.

Regarding the ratio water / gypsum was observed that only 39.5% (n= 34) of the pupils evaluated gypsum weighed and measured water to the procedure of the mix, and most 60.5% (n= 52) randomly manipulated plaster (Table VI). Such results are disturbing because the wrong practice of adding water and dust randomly to achieve the proper consistency of the plaster should be advised against, because it causes hygroscopic expansion and disturbances in the setting of the plaster, causing, respectively, reduced resistance to compression and distortion model (Vazillotta *et al*.; Rios *et al*., 1996). An alternative to remedy this deficiency would be to purchase scales and sufficient to meet the needs of graduate students in clinical practice and/or the provision of packages previously weighed plasters (100 g) by clinic staff beakers, leaving the student only measuring the water to be used in the tooling (Souza *et al*.).

Regarding the type of water used in the manipulation of plaster, tap water (95.3%, n= 82) was the most used by students (Table VII), probably due to the ease of obtaining (convenience). However, it is noteworthy that distilled water should be a choice, because tap water has large amounts of chemical elements, mainly salts-based sulfides and fluorides can interfere with the quality of the plaster (Miller & Grasso, 1990).

With respect to the tooling of the cast, the manual type with mortar and spatula (97.7%, n= 84) was the most commonly used by academic (Table VII), controlled time of one minute for tooling (36 %, n= 31) as practiced. However, a considerable proportion (37.2%, n= 32) of the participants is not control this. This condition is worrying, since the time for tooling is directly related to the ultimate strength of the plaster, as both a sub tooling as a super tooling decrease resistance model. When the manual manipulation of gypsum is recommended that water and dust should be spatulated vigorously for 1 min (Craig & Powers; Bergman; Fonseca *et al*.). Another important to the integrity of the plaster model is the appearance of the mold casting. Among the participants of this research academics, 60.5% (n= 52) made use of the vibrator as a helper for casting of plaster casts (Table IX). The literature shows that the vibrators assist in facilitating the resistance of the models, indicating about six to eight percent tougher and stronger 40% (Kimball, 1934), being that greater resistance is explained by the fact that the vibration reducing the incorporation of air bubbles inside the plaster, which in turn generate porosity in the model by minimizing resistance and excellent accommodation for generating the plaster into the mold (Rios *et al*.). Thus, it is necessary to emphasize the awareness of students regarding the use of this resource, and the availability of vibrators to undergraduates in order to improve the outcome of the work in the dental clinic.

In this work it was found that most students (93%, n= 80) leave the setting of gypsum (poured alginate mold with plaster) occur outdoors (Table X). However, studies show the importance of prey gypsum always happen in an atmosphere with 100% humidity, both as a humidifier inside a sealed plastic bag containing moist gauze (Scaranelo *et al*.; Anderson, 1976). This care less dimensional change in the model and prevents the models become rigid and inflexible, thus increasing the risk of tooth fracture upon removal from the mold (Craig & Powers; Scaranelo *et al*.).

Finally, with respect to time of mold separation / model, the results showed that most learners (84.9%, n= 73) remove the template model between 30 min and 1 h after pouring of the plaster (Table XI). The literature shows that this interval of time (minimum 40 min) is enough to reach the surface of the model density maxima. Should avoid the delay of separation (many hours) to minimize the probability of fracture of teeth in the model, since the model cast begins to absorb water from the alginate, making it difficult to remove.

CONCLUSION

Students' awareness of the need for adoption of practices transmitted during the undergraduate degree is considered. It also becomes necessary to investigate the possible causes of the problems of knowledge transmission and effective adoption of good clinical practice.

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RESUMEN: El objetivo fue evaluar el conocimiento aplicado por estudiantes de odontología en los procedimientos de desinfección, templado y vaciado de las impresiones de hidrocoloides irreversibles. Este estudio se llevó a cabo a través de un cuestionario a 86 estudiantes de pregrado, de ambos sexos, del octavo y noveno período de la Escuela de Odontología de la Pontificia Universidad Católica, Belo Horizonte, MG. El cuestionario contenía 12 preguntas de opción múltiple acerca de los procedimientos clínicos y de laboratorio para impresión dental. Los datos fueron analizados de manera descriptiva y cualitativa. La mayoría de los sujetos (70%) declararon que hicieron desinfección de la impresión dental con pulverización de hipoclorito de sodio al 1%. Sin embargo, lo hicieron en recipientes abiertos (75,4%) y con un control de tiempo (68,6%). La relación agua/polvo se realizó de manera aleatoria por la mayoría de los estudiantes (60,5%), utilizando principalmente agua del grifo (95,3%). La mezcla del sulfato de calcio se realiza manualmente por casi todos los estudiantes (97,7%) y el uso del vibrador durante el vertido del sulfato de calcio es común (60,5%). El ajuste del sulfato de calcio tiene lugar predominantemente en exposición al aire (93%), la remoción del modelo se hace entre 30 y 60 min después del vaciado por un 84,9% de los estudiantes. Estos resultados apuntan a la necesidad de que los estudiantes tomen conciencia de las prácticas transmitidas durante la licenciatura. También es necesario investigar las posibles causas de los problemas de transmisión de conocimiento y cómo aplicar efectivamente las buenas prácticas clínicas.

PALABRAS CLAVE: aprendizaje, desinfección, alginato.

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Received: 26-07-2014
Accepted: 08-10-2015