

Legal and Forensic Dentistry in the formation of dental students: an experience report of a multidisciplinary learning project

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ABSTRACT

It is the purpose of this paper to report the experience of a multidisciplinary teaching project of Legal Dentistry and Forensic Sciences, aimed at university students and the academic community in general. The project, through biweekly meetings with short courses, a group of textbook studies and scientific articles as well as other activities, stimulated the discussion and learning of these thematic areas that are increasingly in focus. For didactic purposes, a sequence of subjects of Legal Dentistry and Forensic Sciences was set up, allowing students to experience criminal expertise, through contact with simple essays, whose legal and forensic concepts involved are present in the curriculum experienced in different university courses. The biweekly lectures enabled the public (undergraduates and teachers) to exchange knowledge about the different areas that comprise the project. The subjects covered in the lectures are especially important in the areas that encompass Forensic Sciences, especially Forensic Chemistry and Dentistry. The teaching project entitled “Legal and Forensic Dentistry” can play a fundamental role in the academic formation, both for future dental surgeons and future experts, enabling vast knowledge in different areas of Forensic Sciences.

Descriptors: Forensic Dentistry. Forensic Sciences. Teaching Project. Interdisciplinary Communication.

1 INTRODUCTION

Forensic Dentistry is the branch of Forensic Medicine that, in the interest of justice, is responsible for examining dental evidence, with the proper evaluation and presentation of dental findings¹.

The specialists in Legal Dentistry, through their specific skills and scientific knowledge, are able to obtain accurate information, generating reliable conclusions for human identification, especially when there is antemortem documentation, such as dental records². The dentist, a dental surgeon specialized in expertise, must dedicate himself to the legal system and adhere to ethics³. He applies his knowledge to clarify the truth in the administrative, judicial, and legislative environment⁴. The dental expert has an extremely important role because, in case there is a failure to complete the dental reports, this will result in inaccurate assessments, delay in the processes and possible increase in costs. Therefore, the relevance of the dental expert should be emphasized, especially in the process of filling and keeping medical records⁵.

Thus, the performance of the expert dentist is extremely important in mass disasters, especially when there are charred and / or mutilated bodies, as in these cases the DNA examination has limitations and, as an alternative, the examination of the dental arches and of the oral cavity, since the teeth are highly resistant structures, even at high temperatures and provide individual information that can assist in investigations⁶.

Legal dentistry is a specialty that has, among its areas of activity, human identification. It is essential in legal medical institutes, as it completes the multiprofessional team of Forensic Sciences.

In cases of charred, mutilated, skeletonized, and putrefied bodies, in which papilloscopic identification is not possible,

dental information is able to provide data that assist in the identification⁷.

In addition, restorative materials have resistance to extreme conditions, such as cremation, being the dental expert important in the uniqueness of the restoration work of identification⁸. In addition to these aspects covered, experts must also consider postmortem data, which may, for example, demonstrate a tooth loss during the skeletonization process or damage caused by the inadequate recovery, transport and storage of the skull³.

Even in cases of forensic medico-legal / forensic autopsy, in which it is necessary to examine the teeth, the cases are being treated by Forensic Medicine and Forensic Pathology, as well as by conventional routine methods. Therefore, it is necessary to establish consensus on some forensic procedures carried out during the postmortem, such as collecting, preserving, and analyzing evidence, and on the most appropriate identification technique based on the disaster situation⁹.

In this sense, Legal Dentistry, the curricular component of most undergraduate courses in Dentistry in Brazil, is commonly seen as being bureaucratic and time-consuming, as it deals with supposedly theoretical subjects that are far from traditional dental practice. However, the range of subjects it has to offer is very wide, bringing content from the interfaces with other forensic areas¹⁰.

Legal Dentistry is based on aiding the dental professionals in their field of expertise, whether in automobile accidents, recklessness and negligence by professionals, unrequited treatments, among others. The literature shows that the dental professional interferes in a legal and beneficial way, significantly improving the expert results¹¹. The dentist, due to his / her fundamental specialized technical-scientific knowledge, is the professional with the most

adequate competence to perform expert examinations in the head and neck region or related traces¹².

Forensic dentistry is the forensic science that is concerned with dental evidence. It is a relatively new science that uses the knowledge of the dental surgeon to serve the judicial system. Human identification depends a lot on the quality of dental records^{1,13}.

The objective of Forensic Dentistry is the research of psychic, physical, chemical and biological phenomena that may affect or have already affected people, living, dead or their bones and even fragments or traces, resulting in partial or total injuries, reversible or irreversible¹⁴.

This article reports the experience of a teaching project entitled “Legal and Forensic Dentistry”, which aimed to insert the undergraduate student in the universe of forensic sciences and their attributions in this sphere, providing contact with different areas of knowledge and the development of thought critical about your future professional responsibilities.

2 EXPERIENCE REPORT

The teaching project was developed between May and November 2018 and, subsequently, the mini courses returned from March to July 2019. The lectures were held fortnightly, in 10 meetings, consisting of 9 lectures and 1 hands-on presented in an expository manner, with the aid of multimedia and duration of two hours each, making 20 hours in person. The public was made up of an average of 20 to 25 graduates and professors from the courses of Dentistry, Forensic Chemistry, Chemistry (Bachelor's and Bachelor's Degree), Materials Science and Engineering, Biological Sciences, Biology, Biotechnology, Pharmacy, Visual Arts, Archeology and Anthropology. The

teaching project made it possible for the undergraduate student to have contact with different areas of legal knowledge and forensic sciences, thus making him gain experience in collecting and interpreting data, both criminal and civil, from the various expert areas. In addition, the project helped the student to develop critical thinking about his professional responsibility and the relationship with the patient. This was seen in the dialogues held after the lectures, when a space was opened for discussion and questioning. In this way, it was possible to verify the importance of the project in the construction of the student's reflection during the lectures, since as the meetings took place, the students were increasingly instigated to think about their responsibility as a professional, and asked questions about of the themes. In addition, the project expanded the student's network of contacts in Forensic Sciences, as it brought them closer to professionals and students from other areas, such as Law, Biology, Forensic Chemistry, and related courses.

During the project, initial concepts, definitions, and information related to Legal Dentistry were discussed, as well as its relationship with other areas of knowledge. The subjects discussed at the meetings were taught by collaborating professors, a specialist in Legal Dentistry and by the coordinating professor of the teaching project, and included: definition of the crime scene, analysis of the crime scene, introduction to Forensic Sciences, professional profile, identification of victims of disasters, Forensic Thanatology, civilian expertise in dentistry, identification by the dental record, Forensic Asphyxiology, Forensic Traumatology, presentation of techniques for identifying dental restorations for forensic purposes: dye technique and fluorescence technique (theoretical-practical mini-courses), Forensic Chemistry, Art and Anatomy Expertise, Forensic Anthropology,

Forensic Ballistics, Fingerprint Developers, Investigation and Authentication of Cultural Assets and Forensic Entomology in Rio Grande do Sul. These subjects were addressed in an expository manner, with several images of real cases, the victim's identity being preserved.

Then, at the end of each lecture, there was a session of 15 to 30 minutes of debates between the speaker and the academic public, regarding the subjects covered, this time being very useful for the exchange of knowledge and clarification of doubts on the topic. At this time, the student was also showing his interest in the area and yearning to learn more about the subjects covered. The teachers also exchanged knowledge with the lecturer, thus enabling a greater and more profitable interaction of the contents covered during the lecture, making it of greater value in the students' academic education.

Each selected content was carefully analyzed for its availability in the sequence of short courses, to effect learning. The short course chosen to have a practical part was "*Presentation of techniques for identifying dental restorations for forensic purposes: technique with dyes and fluorescence technique*", being taught by a postdoctoral student, in the format of two hands-on, for better assimilation of content by academics, presenting two different techniques for identifying dental restorative materials for expert purposes. During the discussions on the identification of dental restorations in the forensic area, techniques with methylene blue dye and fluorescence were demonstrated, whose objectives were to perform the recognition and detection of aesthetic restorations, made with composite resins, through a dye or ultraviolet light.

The theoretical-practical course lasted two hours. In the theoretical part, through multimedia resources, students understood the principle of the techniques and received information

regarding the materials to be used, reagents (dyes) and analysis methodology. In practice, the topic of identification of composite resin restorations of different brands was approached, using the technique with methylene blue dye and the fluorescence technique. The dye method aimed to detect the aesthetic restorative material, improving its visualization during the forensic dentistry examination. The proposed protocols and dyes improved visual inspection of teeth to detect the presence of aesthetic composite resin restorations. Therefore, they could be proposed as non-invasive adjunct methods in the victim identification process. Darker dyes, such as methylene blue, provide an additional improvement in visual detection⁸. With the same objective, the fluorescence technique still allowed the classification of composite resins on a fluorescence scale, making it possible to know the mark of the materials that had been used during this practical activity with the students.

Different restored teeth with different brands of composite resin were taken for the experimental procedure. Along with the samples, there was some equipment that would be used during the process. For the dyeing methodology, restored teeth, applicator pen with methylene blue dye, applicators with 10% hydrofluoric acid and 37% phosphoric acid, gauze, procedure gloves, bench protector, 70% ethyl alcohol were used. For the fluorescence methodology, a Reflex camera (Nikon D7000 DLS-R, Nikon Corporation, Tokyo, Japan) was used, envelopes identified with the composite resin samples, metallic tweezers, procedure glove, darkroom (figure 1), UV light flashlight (UltraFire WF-501B, Arizona Tactical Gear, Phoenix, AZ) and notebook for analyzing samples in Photoshop (Photoshop CS6 - Adobe Systems Inc., San Jose, CA). After the demonstrations, there was a brief discussion regarding the material to be investigated and the analysis pertinent to the beginning of the fictitious investigation.

Finishing this practical part, in which the student had contact with two dental techniques, and together with the application of the concepts previously seen in the biweekly lectures, the undergraduates lived the experience of being a dental expert for a day. The theoretical-practical mini-course taught by the postdoctoral student of the project showed that the majority of students coming from the most different university courses that participated in the project, including some less interested and excited by the fortnightly lectures, proved to be instigated in the study of Forensic Sciences, which also made it

easier to discuss the issues. In addition to the contextualized approach that the display of some short courses made possible, students aroused interest in knowing how it was possible to bring chemistry and dentistry to the expert environment.

These methods of human identification are extremely important for the advancement of Forensic Sciences, because in addition to facilitating the work of criminal experts, especially in cases of mass disasters, they can also be used in the field, as they are fast, simple and inexpensive⁸.

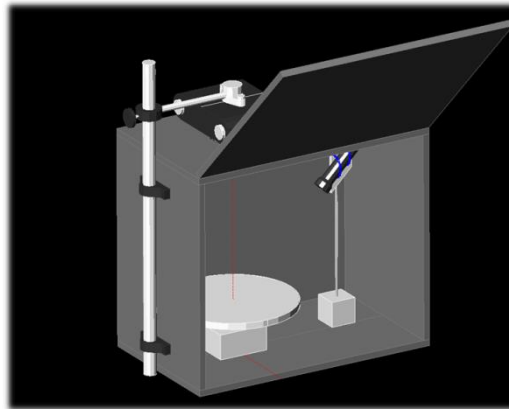


Figure 1. 3D Scheme (box in MDF, measures: 45cm height x 45cm depth x 45cm width)

The team of professors and graduate students who made up the teaching project also guided scientific articles and research on Legal and Forensic Dentistry, aiming at the progress and improvement of the area in the regional, national and international context, thus seeking to increasingly expand knowledge acquired by students in the field of Forensic Sciences. Throughout the project, some scientific publications were developed by the group, all focused on the field of Forensic Dentistry, some of which are mentioned in this work^{8,16}.

The project started in 2017, and had a

Facebook page, an Instagram account and a group in the WhatsApp messaging application, so that, in this way, a greater number of people could have contact with the project, being the largest number of followers in the area of Dentistry, followed by the area of Forensic Chemistry. The posts were linked to the teaching project, dissemination of information from lectures, news, curiosities and articles related to the forensic area, legal and ethical aspects surrounding dental practice, in addition to sharing forensic science events from other academic groups and partner projects .

As forensic dentists are playing an important role in the process of identifying victims of mass disasters: DVI (Disaster Victim Identification), and in other medico-legal cases, it is urgent to promote the specialty of Legal and Forensic Dentistry. Initiatives to sensitize undergraduate students to forensic areas and to give dentists experience in cases related to forensics, encouraging them to be part of research teams and human identification, can help to establish Forensic Dentistry as a separate specialty in Forensic Sciences or Dental Sciences¹⁷.

In 2019, until the month of July, 687 likes and 703 followers were reached on the Facebook page of this teaching project and 457 followers on Instagram, with some publications reaching more than 980 people. The WhatsApp group had 27 participants.

The Legal and Forensic Dentistry Teaching Project was intended to promote integration between the various forensic areas, promotion of specific activities for the academic public, production of works and research, enabling project members to have greater knowledge and information about this theme.

3 FINAL CONSIDERATIONS

After the activities related to the project in question were closed, it can be said that differentiated teaching, whether through practical classes or predominantly with the insertion of fortnightly theoretical mini-courses in multimedia, proved to be very effective and dynamic, both for students. students and teachers. This could be evidenced by the expressive number of students and teachers who reported, through discussions after short courses and practical classes, or even through social networks, their positive assessment of the activities developed in this project. In addition, it was observed that it was not common to have a

large public with interest and engagement in extracurricular activities carried out at night at that university, as had occurred with the realization of this teaching project in Legal and Forensic Dentistry.

In addition, the use of audiovisual resources was also an important didactic tool that facilitated the teaching-learning process, along with the syllabus and complementary materials, such as scientific articles and updated news published on the project's communication channels (social networks and WhatsApp), observing that this set of resources contributed a lot during the proposed activities.

Therefore, it is concluded that the Legal and Forensic Dentistry Teaching Project can play a fundamental role in the academic training of future dentists, as well as other professionals, enabling vast knowledge in different areas of Forensic Sciences.

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RESUMO

Odontologia Legal e Forense na formação de estudantes de Odontologia: relato de experiência de projeto de ensino multidisciplinar

Este artigo objetivou relatar a experiência de um projeto de ensino multidisciplinar de Odontologia Legal e Ciências Forenses, voltado aos estudantes universitários e à comunidade acadêmica em geral. O projeto, por meio de encontros quinzenais com minicursos, grupo de estudos de livros didáticos e artigos científicos, além de outras atividades, estimulou a discussão e o aprendizado dessas áreas temáticas que estão

cada vez mais em foco. Com fins didáticos, foi montada uma sequência de assuntos de Odontologia Legal e Ciências Forenses, possibilitando aos estudantes a experiência da perícia criminal, a partir do contato com ensaios simples, cujos conceitos jurídicos e forenses envolvidos estão presentes no currículo vivenciado em diferentes cursos universitários. As palestras realizadas quinzenalmente possibilitaram ao público (graduandos e professores) a troca de conhecimento sobre as diferentes áreas que abrangiam o projeto. Os assuntos abordados nas palestras foram especialmente importantes nas áreas que englobam as Ciências Forenses, principalmente a Química Forense e a Odontologia. O projeto de ensino intitulado: “Odontologia Legal e Forense” pode exercer um papel fundamental na formação acadêmica, tanto de futuros cirurgiões-dentistas quanto de futuros peritos, possibilitando vasto conhecimento em diferentes áreas das Ciências Forenses.

Descritores: Odontologia Legal. Ciências Forenses. Projeto de Ensino. Comunicação Interdisciplinar.

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