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Perception of resident doctors on postgraduate education during the COVID-19 pandemic: a preliminary assessment

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ABSTRACT

Introduction. The aim of this study was to assess the results of the impact of the first year of the COVID-19 (coronavirus disease 19) pandemic on the postgraduate hybrid educational process (virtual / e-learning and traditional) from a resident-centred perspective, in a group of general dentistry resident doctors.
Materials and methods. A questionnaire with 32 items (Q1-Q32) was configured using Google Forms and filled online, anonymously. In the first section, demographic information was collected. The other sections collected data about: 1) technical support), 2) the impact of traffic restriction and self-isolation, 3) the impact of preclinical/clinical online training compared to the on-site one, 4) attendance of online theoretical courses, 5) the effect of preclinical training in laboratories, 6) the degree of online interactivity and 7) general satisfaction. Excepting demographics and Q1-Q3 items, all other parts used multi-choice responses based on a five-degree Likert scale.
Results. Most resident doctors did not report any problem in connection to online courses, increased anxiety, troubled concentration, or decreased learning efficiency.
Conclusions. Resident doctors considered part-time e-learning process as a viable approach capable of providing a qualitative education and that the reorganization of the preclinical activity allowed them to carry out more precise and efficient procedures in the clinic.

Keywords: learning, postgraduate education, questionnaire, COVID-19

INTRODUCTION

The COVID-19 disease (coronavirus disease 2019) pandemic onset in March 2020 required an immediate, globally coordinated decision to limit the transmission of the SARS-CoV-2 virus (severe acute respiratory syndrome coronavirus 2). Medical universities adopted the promoted safety measures. Therefore, higher medical education institutions interrupted traditional teaching activities, such as lectures in amphitheatres and medical practice in hospitals and ambulatory wards and transferred them almost entirely to e-learning "virtual platforms" [1]. These measures were also implemented by the Faculties of Dental Medicine due to the major SARS-CoV-2 virus transmission risk caused by the specific medical procedures, which expose both medical staff and patients to aerosols potential carriers of the SARS-CoV-2 [2].

A variety of virtual academic education platforms, such as Learning Management System Schoology (©Schoology, New York, NY, USA), Zoom (Zoom Video Communications, Inc., San Jose, CA, USA), Microsoft Teams Platform (Microsoft Corporation, Redmont, Washington, USA) or Cisco Webex

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(Cisco Systems Inc. ,San Jose, Ca, USA) have been made available for teaching purposes. Academics reported using a wide range of online educational software tools (live or streamed videos, links to virtual repositories of teaching materials, virtual meetings – courses, seminars or working groups) [3].

A great challenge that had to be managed by the Faculties of Dental Medicine during the lockdown period was the postgraduate education training of resident doctors. Thus, Faculties of Dental Medicine have adapted their curricular activity to fit distance learning strategies. This change also included the clinical activity component, which meant limiting to the maximum the medical treatments performed by resident doctors on dental specialties, except for providing emergency medical care [3,4].

After lockdown, a hybrid educational activity based on online teaching, preclinical and clinical activities has been maintained as a preventive measure. The e-learning approach has employed enormous human and technical resources that have most certainly provided an added value to the educational process. Thus, it is essential to reconsider the post-graduate educational strategies used during the pandemic in order to identify those innovative teaching approaches of residency programs that have increased the efficiency of the educational process and can be employed in the future.

At the beginning of the current research study, no other studies evaluating the perception of oral medicine resident doctors on postgraduate educational activity during the COVID-19 pandemic were identified. There was only scarce information regarding the influence of the SARS-CoV-2 infections on clinical activities [3,4,5,6,7].

Self-report is considered an effective tool used to obtain insights related to the performance of the educational process and the use of virtual technology in the teaching activity [8,9].

The first aim of the study was to evaluate the opinions of a group of general dentistry resident doctors regarding the impact of the first year of the COVID-19 pandemic on the postgraduate hybrid education (virtual / e-learning and traditional / on-site) through a self-reported questionnaire. The other aims of the study were to improve the comprehensibility of the questions and to provide a final form of the questionnaire to be further implemented in a multicentric study.

MATERIALS AND METHODS

Study design and study population

A questionnaire generated for students to assess the teaching activity during the COVID-19 pandemic (Lucaciu et al. unpublished data) was subsequently adapted by periodontists to be applied to resident doctors. Five questions from the original draft were replaced in order to specifically target the activity of resident doctors. The first version of the resulted questionnaire was tested for comprehension in a group of resident doctors from UMF *Iuliu Hatieganu* Cluj-Napoca specializing in general dentistry. Resident doctors completed the online questionnaire, and the results were then analysed. Data reported in the open section of the questionnaire were eventually used to obtain the final version of the questionnaire.

The study was conducted in June 2021 and received approval from the Ethics Commission of the *Iuliu Hatieganu* University of Medicine and Pharmacy (203 / 03.06.2021).

Only resident doctors of the postgraduate residency program in the specialty of general dentistry were included in this study. Participants were invited to anonymously complete an online self-report questionnaire. The invitation and a link to the questionnaire were distributed via e-mail. All resident doctors were voluntarily involved in the study, agreed to complete the survey anonymously and provided informed consent prior to the initiation of the survey.

Questionnaire regarding the didactic activity

The questionnaire was set up using Google Forms. The first part of the questionnaire collected demographic information (gender, age, year of study) used to describe the studied population.

The questionnaire on the didactic activity during the COVID-19 pandemic comprised 32 questions (Q), grouped into 7 sections that focused on: 1) technical support (Q1-Q3), 2) the impact of traffic restriction and self-isolation (Q4-Q7), 3) the impact of online / on-site preclinical / clinical training (Q8-Q10), 4) attendance at online theoretical courses (Q11-Q16), 5) the influence of preclinical training in laboratories (Q17-Q20), 6) the degree of online interactivity (Q21-Q26) and 7) general satisfaction (Q27-Q32). All parts of the questionnaire except for demographics and Q1-Q3 items used answers for multiple-choice questions based on a five-degree Likert scale: “1 = No, I completely disagree,” “2 = Disagree”, “3 = Neutral/undecided”, “4 = Agree”, and “5 = Strongly Agree”). An open-ended answer section asking for suggestions was also included at the end of the questionnaire. A synthesis of the questionnaire is provided in Table 1.

Statistical analysis

Raw data and results were stored in a Microsoft Excel Spreadsheet database (Microsoft 365, Microsoft Corporation, Redmont, Washington, USA). Recorded data were reviewed for accuracy. Descriptive statistical analysis was performed using

TABLE 1. Summary of the statements corresponding to the questions of the questionnaire regarding the teaching activity

No.	Part	Shortened stament
1.	Technical support	1) Sufficient technical means 2) Common technical problems encountered online 3) The most commonly used logging device
2.	Impact of traffic restrictions and self-isolation	4) Concentration at courses influenced by restrictions 5) The same level of online participation regardless of restrictions 6) Self-isolation has increased the efficiency of learning 7) Self-isolation increased anxiety by decreased concentration
3.	Preclinical / clinical online training vs. on-site training	8) Useful online exercise for understanding the topic 9)The efficiency of the online version of the courses identical to the on-site attendance 10) The effectiveness of the online version of clinical activities 50% compared to the on-site one
4.	Online courses attendance	11) Courses attendance better online 12) The wish to maintain online courses 13) Online courses - a good alternative to the classic ones 14) A better focus in online courses 15) They are more easily distracted by other activities in online courses 16) A better access to information through online courses
5.	Preclinical formation in laboratories	17) Teaching medical procedures online were helpful to preclinical execution 18) Repeating the medical procedure on the study model increased learning 19) Repeating the medical procedure on the study model increased the speed of execution 20) The repetition of preclinical activity increased the confidence of achievement of the clinical activity
6.	Level of online interactivity	21) The convenience of online questions 22) Increased online freedom to interact 23) Online opinion is better understood by colleagues 24) Increased comfort in online courses 25) The lack of physical encounter with colleagues is disturbing 26) Online audio interaction is more comfortable
7.	Overall satisfaction	27) The clinical practice during the pandemic has been satisfactory 28) The online courses were satisfactory 29) Conducting the clinical / preclinical activity online was satisfactory 30) Online education is preferable 31) The teaching staff has adapted well to the online environment 32) The preclinical on-site activities were satisfactory

Microsoft Excel Spreadsheet software. Mean values and standard deviation (SD) were calculated for age and answers to multiple-choice questions (Likert scale values). Frequency was provided for other data (eg. gender, technical support). Statistical analysis was performed by one of the team members (Professor Lucaciu O.).

RESULTS

Demographic data of the study group (excluding age) and the results of items Q1-Q3 are expressed as percentages. The results corresponding to items Q4-Q32 expressed as mean values and SD are presented in Figure 1.

A. Demographic data of resident doctors included in the study

Of the 25 general dentistry resident doctors who completed the survey 19 (76%) were female and 9 men (24%). The mean age was 27.1 ± 3.536.

B. Technical support and technical problems encountered in online learning

Technical means were considered sufficient (Q1). More than half of the resident doctors did not report any problems in connecting to online courses (Q2) [N = 13 (52%)]. During the pandemic, some problems were reported in relation with the connection [N = 6 (24%)], the use of phones [N = 4 (16%)], laptops [N = 4 (16%)] or other technical problems [N = 2 (8%)].

The laptop was identified as the most commonly used device for connecting to virtual courses (Q3) [N = 15 (8%)]. Other devices used for online courses were the phone [N = 9 (36%)] and the tablet [N = 1 (4%)].

C. Impact of traffic restrictions and self-isolation

The mean values of this survey indicated that traffic restrictions during the lockdown period did not specifically influence the concentration of resident doctors during the online course schedule (Q4) but had some influence on course attendance (Q5).

Self-isolation did not appear to particularly influence the overall learning process (Q6) of resident doctors, nor did it induce increased anxiety or concentration difficulties in this group (Q7).

D. Perception on online preclinical activity

According to the resident doctors' perception, the online preclinical/clinical training of various clinical protocols compared to the on-site activity (Q8) was, to some extent, more useful in understanding the studied subject. Online training was reported to have an almost similar impact as the tra-

ditional, on-site approach (Q9) without significantly decreasing the educational process efficiency (Q10).

E. Online lecture attendance

The mean values of the answers show that resident doctors did not perceive any significant change in their lecture attendance determined by the virtual approach (Q11) and even considered maintaining this educational approach at the end of the pandemic (Q12) as it is a relatively good option compared to on-site education (Q13). Moreover, resident doctors reported a relatively equal level of concentration in virtual education (Q14) without being particularly distracted by other concerns (Q15) as compared to the on-site education. Some benefit to accessing information (improved audio and visualization) was also recognized (Q16).

F. Perception of preclinical on-site training

Resident doctors appreciated that prior teaching and discussions related to therapeutic procedures during the online sessions were quite useful to further exercise them on study models (Q17). Repeated executions of these procedures positively contributed to an increased learning level (Q18) as well as an increased speed of execution (Q19). Resident doctors considered that exercising medical procedures on study models during the preclinical laboratory activity also increased their confidence with respect to the application of the procedures in clinic (Q20).

G. Online interactivity

The chance of asking questions more comfortably during online courses (Q21) and the additional freedom of interaction with others (Q22) were perceived as relatively identically to the on-site activity. Moreover, understanding the opinions expressed by colleagues (Q23) and the feeling of comfort during online classes (Q24) were relatively identically perceived as during on-site traditional activity. Resident doctors were relatively affected by the lack of direct social interaction (Q25). There were no positive or negative perceptions regarding the audio interaction during online classes (Q26).

H. General satisfaction of residents related to the teaching activity

A negative perception tendency of the clinical practical activity during the COVID-19 pandemic year (Q27) was recognized. At the same time a positive appreciation of online theoretical courses was reported (Q28).

Resident doctors were relatively satisfied with the online explanatory sessions during the preclinical and clinical activities (Q29). Resident doctors were unsure if they preferred online training over traditional on-site training (Q30). At the same time, they appreciated the good adaptation of the teaching staff to the online teaching conditions (Q31) and were satisfied with the way preclinical activity in the laboratories was carried out (Q32).

DISCUSSIONS

Due to the COVID-19 pandemic, the postgraduate educational process in dental specialties required implementing major changes, which included both a virtual and traditional on-site approaches. E-learning methods were adopted to maintain the continuity of postgraduate training in these specialties during lockdown, therefore replacing traditional courses and reducing the proportion of clinical activity.

As in other medical fields during the COVID-19 pandemic, various pedagogical methods and resources have been introduced in the postgraduate residency education in dental specialties by the faculty from Cluj based on information provided by the literature [10,11] in order to fulfil the curriculum and compensate for the sudden medical activity reduction of resident doctors.

The virtual survey indicated only occasional technical problems associated with the e-learning activity as reported by resident doctors, by virtue of the institutional involvement that provided technical facilities to support this educational approach. The rapid introduction of various strategies to promote virtual education in our faculty has been essential for maintaining curriculum continuity, knowing that any infrastructural and technological deficiencies or the internet can affect both students and teachers [12, 13].

E-learning has been recognized as an effective educational mean ensuring a proactive attitude among learners when virtual information (books or articles) has been implemented in the educational

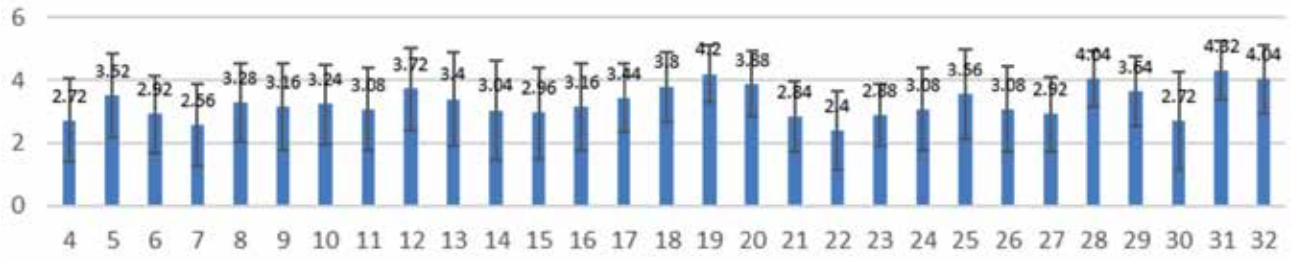

FIGURE 1. Mean values (± standard deviation) of the answers of resident doctors to the virtual questionnaire

process [14]. A change of the traditional medical teaching approach (face-to-face or on-site) and a partial transfer towards online activities such as distance learning or e-learning [6] have long been reported, mainly due to the busy medical activity and limited time resource.

The e-learning process facilitates the informational update and a faster distribution compared to the printed information, which ensures greater flexibility within the limits of scarce temporal resources [12]. At the same time, online courses are more convenient and the concentration of the audience can be increased [12].

The e-learning activities of our faculty have promoted mostly live interactions, which are considered by other schools also as more engaging than the recorded ones [15].

During COVID-19, scientific literature highlighted student aspiration to participate in more interactive online educational sessions such as online question-and-answer sessions, as synchronous learning proved to have a positive impact on students' engagement level in the teaching-learning process [16]. Synchronous learning refers to a social learning environment associated with a live virtual question-and-answer process [17]. The active communication between teachers and students allows immediate clarification of ambiguous concepts, increasing students' involvement and creating a more efficient educational environment [16].

In the present study, resident doctors did not perceive negative consequences of online courses on the attention level. Major constraints of online education such as family distraction, internet connection problems and strict scheduling of activities, have been reported by other authors. These shortcomings may disadvantage students with large families or those with limited internet access [16].

Resident doctors did not report an increased anxiety level, although other studies indicated a negative impact of the COVID-19 pandemic on students' mental health [18]. Resident doctors included in our study group valued the e-learning activity that prepared medical procedures and supported the transfer to preclinical activity in particular, as highlighted by the answers to items Q17-Q19 and Q32. From the perspective of resident doctors, teaching, discussing, and repeating medical procedures increased the efficiency of the learning process as demonstrated by the reduction of working times. This was to be expected given the role of repetition in memorization and long-term retention of information [19] and of active learning in the educational process [10]. Valuing the e-learning activity was indirectly positively rated also by the general assessments of resident doctors of the teaching activity during the COVID-19 pandemic (Q28, Q29).

Virtual, internet-based education requires the adjustment of different educational styles in order to ensure effectiveness and meaningfulness. After one year of hybrid-education, it is obvious that the benefits of the e-learning approach in medical education cannot be ignored. Although some restrictions are persisting, students and residents have mostly returned to traditional medical education. Still, maintaining various virtual approaches in the clinical education such as video-consultations or virtual platforms could represent safe and effective informational and training alternatives to the traditional face-to-face clinical approach while also limiting exposure to the virus [20].

However, the generalisation of the virtual approach is impossible. If the benefits of hybrid education have been reported for the small academic years of study, for example learning anatomy [21], there are considerable limitations on our knowledge on the impact of virtual education on the final study years involved predominantly in clinical activity [16]. From this perspective, e-learning and telemedicine could never replace the traditional, on-site teaching [20]. This is also true for postgraduate education in dental specialties, which have mainly practical characteristics. Therefore, the e-learning process cannot overcome the clinical activity. Moreover, inconveniences associated with the virtual educational process such as possible connection problems, difficult interactivity, and the lack of social interactions emphasized by the literature [22] and also by the resident doctors of this study must be considered.

CONCLUSIONS

The e-learning process was associated with some advantages, as reported by the resident doctors.

Resident doctors considered the part-time e-learning process as a viable approach, able to provide quality education.

Resident doctors considered that reorganizing and emphasizing the preclinical activity would allow them to perform more accurate and effective therapeutic procedures in the clinical activity.

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