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Productivity of dental students in integrated clinics at two universities in Southern Brazil

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Abstract This study assessed and compared the clinical productivity of dental students in two private teaching institutions, with different lengths of experience in the integrated clinical model, recommended by the National Curriculum Guidelines (DCN). The universities have used the integrated clinical model since 2001 [A] and 2009 [B], with 5-year and 4-year undergraduate courses, respectively. The study was carried out from February to December 2019. Data were included for 205 students (56 from [A] and 149 from [B]) enrolled in low/medium (n=99) and high complexity clinics (n=106). The number of procedures performed by level of complexity in both institutions was assessed. Data were submitted to Mann-Whitney and chi-square tests (α=0.05). The number of procedures analyzed was 9706, 4693 in institution [A] and 5013 in [B]. In both institutions, the number of curative procedures (54.8%) was significantly higher than that of diagnostic and health care procedures (45.2%) (p<0.001). In low/medium complexity clinics, statistical differences were observed in the number of procedures and/or in the number of students who did not perform certain clinical procedures. In high-complexity clinics, statistical differences were observed between the institutions in terms of the number of procedures and/or the number of students who did not perform certain specific procedures in restorative dentistry, surgery, periodontics and prostheses. The institution with the longer experience in the integrated clinic model presented better results in the specialties of restorative dentistry, endodontics and prosthesis.
Descriptors: Education, Dental. Dental Clinics. Productivity.

Productividad de los estudiantes de Odontología en la clínica integrada en dos universidades del sur de Brasil

Resumen Este estudio evaluó y comparó la productividad clínica de estudiantes de odontología de dos instituciones de enseñanza privadas, con diferentes tiempos de experiencia en el modelo clínico integrado, recomendado por las Directrices Curriculares Nacionales (DCN). Las universidades han utilizado el modelo clínico integrado desde 2001 [A] y 2009 [B], con carreras de grado de 5 y 4 años, respectivamente. El estudio se realizó de febrero a diciembre de 2019. Se incluyeron datos de 205 estudiantes (56 de la universidad [A] y 149 de la [B]) matriculados en clínicas de baja/media (n=99) y alta complejidad (n=99) n=106). Se evaluó el número de procedimientos realizados por nivel de complejidad en ambas instituciones. Los datos fueron sometidos a las pruebas de Mann-Whitney y chi-cuadrado (α=0,05). El número de procedimientos analizados fue de 9706, 4693 en la institución [A] y 5013 en la [B]. En ambas instituciones, el número de procedimientos curativos (54,8%) fue significativamente superior al de procedimientos diagnósticos y asistenciales (45,2%) (p<0,001). En las clínicas de baja/media complejidad se observaron diferencias estadísticas en el número de procedimientos y/o en el número de alumnos que no se sometieron a determinados procedimientos clínicos. En las clínicas de alta complejidad se observaron diferencias estadísticas entre las instituciones en cuanto al número de procedimientos y/o el número de alumnos que no se sometieron a determinados procedimientos en dentística operatória, cirugía, periodoncia y prótesis. La institución con mayor experiencia en el modelo de clínica integrada presentó mejores resultados en las especialidades de Odontología, Endodoncia y Prótesis.
Descriptores: Educación en Odontología. Clínicas Odontológicas. Productividad.

Produtividade dos estudantes de Odontologia na clínica integrada em duas universidades do Sul do Brasil

Resumo Este estudo avaliou e comparou a produtividade clínica dos estudantes de Odontologia em duas instituições de ensino privadas, com diferentes tempos de experiência no modelo de clínica integrada, preconizado pelas Diretrizes Curriculares Nacionais (DCN). As universidades utilizam o modelo de clínica integrada desde 2001 [A] e 2009 [B], com cursos de graduação de 5 anos e 4 anos, respectivamente. O estudo foi realizado no período de fevereiro a dezembro de 2019. Foram incluídos dados relativos a 205 estudantes (56 da universidade [A] e 149 da [B]) matriculados nas clínicas de baixa/média (n=99) e alta complexidades (n=106). Avaliou-se a quantidade de procedimentos realizados por nível de complexidade nas duas instituições. Os dados foram submetidos aos testes de Mann-Whitney e qui-quadrado (α=0,05). O número de procedimentos analisados foi de 9706, sendo 4693 na instituição [A] e 5013 na [B]. Nas duas instituições a quantidade de procedimentos curativos (54,8%) foi significativamente maior que a de procedimentos de diagnóstico e atenção à saúde (45,2%) (p<0,001). Nas clínicas de baixa/média complexidade foram observadas diferenças estatísticas na quantidade de procedimentos e/ou na quantidade de estudantes que não realizaram determinados procedimentos clínicos. Nas clínicas de alta complexidade foram observadas diferenças estatísticas entre as instituições na quantidade de procedimentos e/ou na quantidade de alunos que não realizaram determinados procedimentos específicos de Dentística, Cirurgia, Periodontia e Prótese. A instituição com maior tempo de experiência no modelo de clínica integrada apresentou melhores resultados nas especialidades de Dentística, Endodontia e Prótese.

Descritores: Educação em Odontologia. Clínicas Odontológicas. Produtividade.

INTRODUCTION

The National Curriculum Guidelines (DCN) for Undergraduate Courses in Dentistry, which were implemented in 2002 (CNE/CES3/2002)[1] and updated in 2021 (CNE/CES3/2021)[2], represent a major milestone for the profile of clinical activities of undergraduate courses in dentistry. This is especially due to a break with the mechanistic conception of care, which is detrimental to a generalist and humanist approach with comprehensive care of the patient, respecting him/her in his/her entirety as a biopsychosocial and somatic human being[3].

In the traditional model, the clinical disciplines by specialty had a minimum clinical productivity as a prerequisite that conditioned student approval. Within the current clinical teaching model, it is difficult for a student to achieve the minimum productivity by specialty. This is because patients are screened based on complexity of the required treatments to refer them to the different classes of students - more or less advanced in the dental school. For a student to identify potential patients to fulfill their specialty minimum productivity, patients should be screened by specialty needs[3,4]. Thus, within the philosophy of health promotion that prioritizes diagnosis, prevention, and clinical planning, the student's productivity can be compromised by exhibiting a multidisciplinary approach to patients[1], not in the general but in the specialized scope. This can affect theoretical-practical learning and the student's graduation[4, 5].

Previous studies have assessed the development of an integrated clinical model based on the implementation of the DCN[4-7]. Ferreira et al. (2012)[5] demonstrated greater productivity within specialties in the traditional model compared to that in the current curricular structure. Additionally, Ferreti et al. (2012)[4] found that students completed their training without performing numerous specialized procedures. The current pedagogical proposal, in which the student's individual productivity ceases to be the main focus of the teaching-learning process and techniques constitute a new educational vision, ensuring a more qualitative assessment of the student[4]. Within this proposal, the factors that affect the clinical performance, as identified by the scholars interviewed in the study by Ferreira et al. (2012)[5], were the lack of a basis for performing the procedures, lack of elaboration of a complete treatment plan, lack of interdisciplinary teams, operational problems in the clinic, and other factors related to the lack of interest or didactic preparation of the teacher.

The literature on this topic is scarce[4,6-9]. Given the proposed prevention and health promotion philosophy, concern with the productivity and practical teaching of students has become a taboo, even though there is a great demand from patients with the most diverse treatment needs. Consequently, numerous questions remain regarding the development of integrated clinics. The actual productivity of undergraduate students in this integrated clinical model is unclear. It needs to be ascertained whether the level of experience and development of clinics in the current model interfere with productivity, and whether clinical productivity can be reconciled with promotion of health. Moreover, it is important to understand the perceptions of students and professors regarding the integrated clinical model[4-7].

Therefore, the objective of this study was to assess and compare the clinical productivity of odontology students in an integrated clinic at two teaching institutions with different experience levels using the model recommended by the DCN.

METHODS

This study was approved by the institutional research ethics committee (CAAE 15227719.0.0000.0093; approval no. 3.439.061). The universities included in this study were private institutions with 19 years [A] and 10 years [B] of experience in integrated clinical models suited to the DCN. The duration of the undergraduate courses at these institutions were five and four years, respectively.

The productivity data of students in integrated clinical activities in the last 2 years of the course were collected from February to December, 2019. In this study, 205 students (56 from university [A] and 149 from university [B]), who enrolled in the last two years and completed the disciplines of integrated clinic and supervised internship, were included. The workload of the assessed disciplines was 12 h per week in each institution.

The fourth-year students at institution A (4[A]) and the third-year students at institution B (3[B]) performed low/medium-complexity procedures in the clinic, whereas the fifth-year students at institution A (5[A]) and the fourth-year students at institution B (4[B]) performed highly complex clinical procedures. Figure 1 shows the division of classes and number of students in the low/medium- (n=99) and high-complexity (n=106) clinics of each. For [A], data were collected using specialized software (Prodent Software Odontológico, Hartsystem Sistemas, Blumenau, SC, Brazil), and for [B], data were collected from individual student records.

Complexity	Classes	Disciplines / Institution	n
Low/Medium	4[A]	4th year clinical activities / UNIVILLE [A]	28
	3[B]	Supervised Internship at Integrated Clinic III / UP [B]	71
High	5[A]	Integrated Clinic Adult 5th year / UNIVILLE [A]	28
	4[B]	Supervised Internship at Integrated Clinic IV / UP [B]	78

UNIVILLE: Universidade da Região de Joinville, Joinville, Santa Catarina, Brasil. UP: Universidade Positivo, Curitiba, Paraná, Brasil.

Figure 1. Class division according to the complexity of the procedures performed in each clinic.

Figure 2 shows the clinical procedures quantified during data collection. All procedures completed by the students were collected and divided by area of approach and/or specialty as follows: clinical examination and diagnosis, health promotion, periodontics, endodontics, restorative dentistry, surgery, and prostheses.

The procedures were categorized by levels of complexity as adopted by 3[B] and 4[A] clinics, which undertook low- and medium-complexity procedures, and 4[B] and 5[A] clinics, which undertook high-complexity procedures in the last year of the undergraduate course at both institutions.

After collection, data were tabulated in an electronic spreadsheet and assessed by descriptive and inferential statistical analyses using the Jamovi software, version 1.2.5 (Jamovi.org). Mann–Whitney tests were conducted to compare the number of procedures performed at each level of complexity in the two institutions (3[B] × 4[A] and 4[B] × 5[A]), and the chi-square test was used to study the association between universities and the performance of clinical procedures by students at each level of complexity. All analyses were performed at a significance level of 0.05.

Area	Procedures*	Complexity
Clinical examination and diagnosis	Consultation	Low/medium and high
	Planning	Low/medium and high
	Anamnesis	Low/medium and high
	Diagnosis	Low/medium and high
	Missed appointment	Low/medium and high
Health Promotion	Fluorotherapy	Low/medium and high
	Prophylaxis	Low/medium and high
	Health education: oral hygiene, diet and oral diseases	Low/medium and high
	Cavity sealing	Low/medium and high
	Temporary Restoration	Low/medium and high
Endodontics	Endodontic emergencies	Low/medium and high
	Endodontic treatment (incisor and canine/premolar)	Low/medium and high
	Endodontic treatment (molar)	High
	Endodontic retreatment	High
	Intraradicular retainer removal	High
Restorative Dentistry	Direct restoration in composite resin: class I, II, III, IV and V	Low/medium and high
	Direct veneers	Low/medium and high
	Inlay/ Onlay	Low/medium and high
	Dental whitening	Low/medium and high
Periodontics	Supragingival scaling	Low/medium and high
	Subgingival scaling	Low/medium and high
	Periodontal surgery	Low/medium and high
Surgery	Permanent teeth extraction	Low/medium and high
	Third molar extraction	Low/medium and high
Prostheses	Single fixed prostheses	Low/medium and high
	Complete prostheses	High
	Removable partial prostheses	High
	Intraradicular retainer	Low/medium and high
	Myorelaxing plate	Low/medium and high

* Only the clinical procedures listed in the table in each specialty were quantified, as they are common to both institutions.

Figure 2. Clinical procedures by area and/or dental specialty.

RESULTS

In total, 9706 procedures were recorded (Table 1), of which 5321 (54.8%) were curative and 4385 (45.2%) were diagnostic and healthcare procedures. At both institutions, the number of curative procedures performed was significantly higher than that of diagnostic and healthcare procedures ($p<0.001$). At university [A], 41.2% of the procedures performed were related to clinical examination and treatment plan and/or healthcare, such as periodontal scaling and health promotion, whereas at institution [B], these procedures represented 48.9% of the total. On comparing these data between low/medium- and high-complexity clinics at the same institution, a statistically significant difference was observed only in [B] ($p<0.001$).

A total of 5321 curative procedures were tabulated according to their corresponding specialties, including periodontics, surgery, restorative dentistry, endodontics, and prostheses; however, only those listed in Figure 2 were quantified and analyzed. Therefore, the total number of procedures is inconsistent with the number of curative procedures.

Table 1. Total record of curative, diagnostic and health care procedures.

Procedures	Instituitions				Total
	[A]		[B]		
	4[A]	5[A]	3[B]	4[B]	
Total procedures	1908	2785	983	4030	9706
Curative procedures	1010	1750	426	2135	5321
Diagnostic and health care procedures	898	1035	557	1895	4385
Missed appointments	80	32	36	166	314

Low/medium complexity class: 4[A] and 3[B]; high complexity class: 5[A] and 4[B].

Endodontic procedures are shown in Table 2. In the low/medium-complexity clinics 3[B] and 4[A], statistically significant differences were observed between the number of endodontic procedures performed among students from both institutions (95.8%; p<0.001) and among those who did not complete any endodontic procedures (10.7%; p<0.001). In high-complexity clinics 4[B] and 5[A], the average endodontic procedures performed were 1.7 [A] and 1.2 [B], with 28.6% and 35.9% of students, respectively, who did not perform the procedure, with no statistically significant difference in this comparison (p=0.170). In the field of endodontics, the removal of intraradicular retainers, a highly complex procedure, was not performed by any student in clinic 5[A], whereas it was performed by six students (7.8%) clinic 4[B], indicating no significant difference between institutions (p=0.135).

Table 2. Endodontic procedures by institution and levels of complexity.

Institution	Class	Endodontic procedures	Number of procedures	Number of students that didn't perform the procedure (n - %)
[A]	4[A]	Endodontic treatment of incisors, canines and premolars	52	3 - 10.7
	5[A]	Endodontic treatment of incisors, canines and premolars	26	-
		Endodontic retreatment	10	8 - 28.6
		Endodontic treatment of molars	11	-
		Intraradicular retainer removal	0	28 - 100
[B]	3[B]	Endodontic treatment of incisors, canines and premolars	4	68 - 95.8
	4[B]	Endodontic treatment of incisors, canines and premolars	65	-
		Endodontic retreatment	15	28 - 35.9
		Endodontic treatment of molars	14	-
		Intraradicular retainer removal	6	72 - 92.3

Low/medium complexity class: 4[A] and 3[B]; high complexity class: 5[A] and 4[B].

In restorative dentistry, the collected data and procedures were grouped and analyzed according to the complexity of the clinics (Table 3). The average numbers of direct restorative procedures were 2.4 (3[B]) and 12.7 (4[A]) per student, with statistically significant differences between institutions in the number of students who did not perform these procedures among low/medium-complexity clinics (p<0.001); whereas, no statistically significant differences were observed among high-complexity clinics. The number of these procedures was significantly higher in 5[A] than in 4[B] (p=0.003).

Esthetic procedures, such as direct veneering with composite resin and indirect restorations, were performed less frequently than other procedures at both (Table 3). Regarding the number of these treatments, as well as the number of students who carried out these procedures, no significant differences were observed between institutions in clinics of the same complexity (p=0.155 and p=0.064 for low/medium- and high-complexity clinics, respectively). In restorative dentistry, dental whitening techniques supervised at-home or in-office and devitalized whitening techniques were also performed in small numbers in both institutions (Table 3). Statistically significant differences were observed between institutions in the number of whitening procedures performed in low/medium-complexity clinics (p=0.030), but not in high- complexity clinics.

Although both institutions had a specific surgical clinic in their curriculum, the surgical procedures performed in low/medium- and high-complexity clinics were recorded (Table 4). Differences between institutions in clinics with both levels of complexity were statistically significant in the number of procedures performed (p=0.008) and in the number of students who did not perform these procedures (p<0.001). A total of 105 procedures were registered for periodontal surgeries, including clinical crown lengthening, interproximal wedge, distal wedge, and open-field scaling. The difference between the number of procedures was significantly greater for [B] at both levels of complexity (p<0.001 and p=0.010). Regarding the number of students who did not perform these procedures, the difference between institutions was not statistically significant (p>0.05).

Table 3. Restorative dentistry procedures by institution and levels of complexity.

Institution	Class	Restorative dentistry procedures	Number of procedures	Number of students that didn't perform the procedure (n - %)
[A]	4[A]	Class I, II, III, IV and V	357	-
		Direct veneer	0	28 - 100
		Inlay/onlay	3	25 - 89.3
		Whitening	13	24 - 85.7
	5[A]	Class I, II, III, IV and V	413	-
		Direct veneer	4	26 - 92.9
		Inlay/onlay	11	22 - 78.6
		Whitening	12	19 - 67.9
[B]	3[B]	Class I, II, III, IV and V	175	13 - 18.3
		Direct veneer	7	66 - 93.0
		Inlay/onlay	3	68 - 95.8
		Whitening	4	69 - 97.2
	4[B]	Class I, II, III, IV and V	948	3 - 3.9
		Direct veneer	41	59 - 75.6
		Inlay/onlay	6	73 - 93.6
		Whitening	84	37 - 47.4

Low/medium complexity class: 4[A] and 3[B]; high complexity class: 5[A] and 4[B].

Regarding prosthetic procedures, the data were grouped and analyzed according to the complexity of the clinics (Table 5). Analysis of the fabrication of intraradicular retainers, provisional crowns, and single fixed prostheses showed that the differences between institutions in both clinics (4[A]/5[A] × 3[B]/4[B]) were statistically significant, both in the number of procedures performed ($p<0.001$) and in the number of students who did not perform these procedures ($p<0.001$). Regarding single fixed prostheses, in the low/medium-complexity clinics, 46.4% students did not perform this procedure in 4[A] and 100% in 3[B], while in the high-complexity clinics, 50% students did not perform in 5[A] and 91% in 4[B], with averages of 1.8 and 0.1 clinical procedures performed per student, respectively.

Removable partial and complete prostheses procedures were assessed only in high-complexity clinics, where such procedures were performed in both institutions (Table 5). The average number of complete prostheses fabricated per student was 2.2 (5[A]) and 0.2 (4[B]), with the percentage of students who did not perform the procedure being 0% and 83.3%, respectively. Fabrication of removable partial prostheses resulted in mean values of 1.3 (5[A]) and 0.12 (4[B]), with 35.7% and 88.4% of students, respectively, who did not perform this procedure at the clinic. The differences between institutions were statistically significant, both in the number of procedures performed ($p<0.001$) and the percentage of students who did not perform these procedures ($p<0.001$).

Table 4. Surgical procedures by institution and levels of complexity.

Institution	Class	Surgical procedures	Number of procedures	Number of students that didn't perform the procedure (n - %)
[A]	4[A]	Permanent teeth extraction	65	7 - 25.0
		Third molar extraction	21	18 - 64.3
		Periodontal surgery	-	28 - 100
	5[A]	Permanent teeth extraction	106	3 - 10.7
		Third molar extraction	26	15 - 53.6
		Periodontal surgery	6	22 - 78.6
[B]	3[B]	Permanent teeth extraction	19	60 - 84.5
		Third molar extraction	14	63 - 88.7
		Periodontal surgery	61	36 - 50.7
	4[B]	Permanent teeth extraction	153	24 - 30.8
		Third molar extraction	114	56 - 71.8
		Periodontal surgery	38	52 - 66.7

Low/medium complexity class: 4[A] and 3[B]; high complexity class: 5[A] and 4[B].

Table 5. Prosthetic procedures by institution and levels of complexity.

Institution	Class	Prosthetic procedures	Number of procedures	Number of students that didn't perform the procedure (n - %)
[A]	4[A]	Single fixed prostheses	26	13 - 46.4
		Intraradicular retainer	16	17 - 60.7
		Provisional crown	40	18 - 64.3
		Myorelaxing plate	7	21 -75.0
		Provisional removable partial prostheses	4	25 -89.3
	5[A]	Single fixed prostheses	52	14 -50.0
		Intraradicular retainer	30	13- 46.4
		Provisional crown	63	19 - 67.9
		Myorelaxing plate	4	24 - 85.7
		Provisional removable partial prostheses	15	18 - 64.3
		Removable partial prostheses	37	10 - 35.7
		Complete prostheses	62	-
[B]	3[B]	Single fixed prostheses	0	71 - 100
		Intraradicular retainer	0	71 - 100
		Provisional crown	1	70 - 98.6
		Myorelaxing plate	4	67 - 94.4
		Provisional removable partial prostheses	1	70 - 98.6
	4[B]	Single fixed prostheses	10	71 - 91.0
		Intraradicular retainer	36	53 - 68.0
		Provisional crown	45	55 - 70.5
		Myorelaxing plate	5	74 - 94.9
		Provisional removable partial prostheses	9	70 - 89.7
		Removable partial prostheses	10	69 - 88.5
		Complete prostheses	15	65 - 83.3

Low/medium complexity class: 4[A] and 3[B]; high complexity class: 5[A] and 4[B].

DISCUSSION

The results of this study reflected the pedagogical practice in the integrated clinical discipline of the two undergraduate odontology courses. In the odontology course at university [A], where the discipline had been structured in line with the 2002 DCN[1] since its conception (1998), it had already been subjected to a productivity assessment in a previous study[4] allowing for a series of adaptations of the pedagogical strategy. In the odontology course at university [B], the change from fragmented clinics to integrated clinics was implemented in 2009, and this study represents the first assessment of the discipline's pedagogical practice during this period.

During data collection, the difficulty in recording students' productivity at both institutions was highlighted, and this has not been elucidated in the literature yet. The entire collection process was based on the students' notes; they often did not understand their importance and did not register them correctly. The main difficulties encountered during data collection were 1) operational software problems, 2) lack of homogeneity in the nomenclature of procedures, 3) incomplete records, 4) lack of records, and 5) the need for verification in student folders and/or patient records.

We speculate whether understanding the implications of this study would allow the development of teaching-learning strategies for clinical activities, which would improve deficiencies in specialized learning without mischaracterizing the proposal of the DCN. In addition, we aim to understand how institution [A], which has already undergone an assessment at a much smaller scale[4], managed to implement pedagogical strategies that promoted improvements in these results.

Since the implementation of the integrated clinic in odontology undergraduate courses during the Brazilian Association of Dental Education (ABENO) meeting in 1978, the teaching-learning process has been discussed by numerous authors from the perspective of teaching quality, educator and graduate profiles in relation to the discipline's objectives, and the degree of excellence, variety, and even the number of procedures performed[3,10-13]. In this context, the DCN[1] established

a professional profile that is "generalist, humanist, critical and reflective, and technically and scientifically competent" and, according to Lombardo (2011)[12], the greatest changes should occur in dental care clinics, ensuring complete and comprehensive care for the patient. This is different from the flexnerian model, in which care for the individual involves a predominantly mechanistic conception, with a tendency towards clientele selectivity and exclusion of alternative forms of practice[3].

Although the results of the present study are specific to the two institutions and cannot be extrapolated and/or generalized, some observations corroborate the lack of understanding related to the teaching-learning process. This includes the lack of an adequate data collection system and lack of homogenization of the nomenclature procedure, among other problems that make it difficult to issue reports and opinions about the clinical practice of students.

In the institutions participating in this study, 45.2% of the procedures performed by the students were in the areas of diagnosis and planning, healthcare, and periodontics, which was significantly lower than the specialized curative procedures. The results of the study by Almeida and Padilha (2000)[11], which might not currently be reproducible after almost 20 years of DCN implementation, demonstrated that the integrated clinic of the assessed institution was not capable of producing an impact on users' oral health, especially with regard to caries and periodontal diseases, suggesting a need for the development of preventative and health promotion activities.

According to Ferreti et al. (2012)[4], since DCN implementation, a student's individual productivity is no longer the main focus in the teaching-learning process, and diagnosis, prevention, planning and integral treatment of the patient are prioritized. However, without accurate data analysis, it would not have been possible to establish a qualitative assessment of the teaching-learning process. This has already been discussed by Almeida and Padilha (2000)[11], who stated that promotion of oral health in a dental teaching clinic would only be possible after an accurate situational diagnosis and assessment of the care provided.

Based on the present results, we highlighted that low/medium-complexity procedures of the specialties defined in the scope of the study were well developed in low/medium- and high-complexity clinics, especially in the fields of restorative dentistry, periodontics, and health promotion, with no significant difference in the number of students who performed certain procedures. However, for high-complexity procedures, the quantitative deficit is more pronounced, particularly in high-complexity prostheses, endodontics, and restorative dentistry procedures.

The number of students who completed the school year without performing procedures in these specialties was significant and could not be ignored against the background of the pedagogical aims of the courses or the DCN. The results of this study showed that 83.3% of the students graduated without fabricating a total or partially removable prostheses (35.7% and 88.5% in institutions [A] and [B], respectively), a single fixed prostheses (50% and 91.1% in institutions [A] and [B], respectively), or a low/medium-complexity endodontic procedure (10.7% and 95.7% in institutions [A] and [B], respectively), which could not be disregarded. Although "quality" involves the variety and degree of the work's clinical excellence and not the number of procedures performed by the student[6], identifying the problem is the first step in seeking solutions that reconcile the philosophy of the curricular guidelines with the practical development of the student in the teaching-learning process.

This was observed in university [A], where a productivity assessment[4] allowed development of pedagogical strategies whose results regarding the number of students who did not perform certain endodontic and prostheses procedures, especially considering the appropriate proportions in the sample sizes of each study, was decisive for the results. This was verified by the results in which the institution with more experience in odontology clinics in the current DNC[1] model showed significant increases in the number of procedures in restorative dentistry, endodontics and prostheses specialties.

The literature included the series of problems identified by the authors in relation to the integrated clinical discipline since its introduction in the curricula of odontology undergraduate courses, advocated for at an ABENO meeting in 1978[14], starting from the DCN[1], especially in relation to the faculty. Araújo *et al.* (2002)[3] stated that disciplines normally consist

of a faculty improvised by specialists, who often do not practice in general clinics, promote specialist practice in the clinic, and do not have an integrated clinical approach.

Reis *et al.* (2003)[13] considered it essential to integrate professors into the interdisciplinary practice of common and different specialties because they observed, in their data collection, that the divergence among professors regarding the treatment plan demonstrated such a lack of integration/calibration. From the professor's perspective, these divergences were sporadic and were seen as a strength factor in teaching. However, from the students' perspectives, they could be related to the professor's lack of knowledge[13], among other factors. Both interviewees considered the need for all professors to master all specialties.

Despite the study by Rodrigues (2004)[15] in which the integrated clinic failed in the objectives of the discipline, the study by Poi *et al.* (2003)[16] assessed the opinion of professionals trained in different institutions in Brazil and reported results in which interviewees considered the contribution of the integrated clinic in professional training to be "very significant or significant" (87.5%), being able to reproduce the dental and health care procedures provided during professional clinical (94.5%), as well as training a generalist adapted to the job market (92.3%). Therefore, the significance of this study can be understood by the quantity and diversity of the variables assessed and the results obtained. Other implications that would allow a more precise data collection and analysis include monitoring students' productivity throughout their course, evolution of clinical cases from planning to patient discharge, qualitative assessment of procedures, pedagogical strategies of courses facing this problem, and, especially, the perception of the development of clinical practices by students, professors, and graduates.

CONCLUSION

The number of specialized curative procedures in both institutions was significantly higher than those aimed at diagnosis, health promotion, and periodontics. Regarding the number of procedures and/or the number of students who did not perform certain clinical procedures in restorative dentistry, endodontics, surgery and prostheses specialties, significant differences were observed between institutions in both low/medium- and high-complexity clinics. The institution with more experience in the integrated clinical model presented better results in the specialties of restorative dentistry, endodontics, and prostheses. Furthermore, the importance of quantitative analysis was highlighted in the context of developing strategies for the teaching process of an integrated clinical discipline that allows for integration of the DCN with qualitative pedagogical objectives of the discipline.

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