Evaluation of an in-hospital dental internship.

Valoración de un Internado odontológico intrahospitalario.

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Summary: Introduction: This research aims to determine the positive informal perception of in-hospital internships among final semester students of the Dentistry degree by applying a mid-semester survey. **Methods:** A descriptive longitudinal quantitative study was carried out by means of a voluntary and anonymous survey via the Canvas® platform to final-year dental students in 2023 and 2024 after 8 and 12 morning internships, respectively, comprehensively examining hospitalized patients at the university's teaching clinic. Descriptive statistics such as mean, standard deviation, median, and percentiles were used to describe the sample for data analysis. The proportions test was used to determine differences in responses between the years 2023 and 2024. The unpaired *Student* 's t-test was used to determine differences in clinical record grades and final grade between the 2023 and 2024 cohorts. The normality of continuous variables was assessed using the *Shapiro-Wilk test* . P <0.05 was considered statistically significant. **Results:** Respondents self-reported a median of "Agree" on all questions, except for question 1, where the median was "Strongly Agree." Regarding the final internship grade, statistically significant differences were observed between the two cohorts (unpaired *Student 's t-test, p < 0.0001).* **Conclusion:** Interns expressed agreement regarding the contribution of examining hospitalized patients to their communication, diagnostic, and integration skills within the healthcare team. This perception is supported by the results of the assessments and by their participation in the survey.

Keywords: Dental Health Education, Dental Students, Systematized Medical Nomenclature, Anamnesis, Physical Examination, Internships, Serial Learning, Concept Formation.

Resumen: Introducción: Esta investigación tiene por objetivo determinar en los alumnos del último semestre de la carrera de Odontología la percepción informal positiva de las pasantías de un internado intrahospitalario mediante la aplicación de una encuesta de mitad de semestre. **Métodos:** Estudio cuantitativo longitudinal descriptivo mediante la aplicación de una encuesta voluntaria y anónima vía plataforma Canvas® a estudiantes de Odontología de último año en 2023 y 2024 después de pasantías de 8 y 12 mañanas respectivamente examinando integralmente a pacientes hospitalizados en la clínica docente asistencial de la universidad. Para el análisis de datos se utilizó estadística descriptiva como promedio, desviación standard, mediana y percentiles para describir la muestra. El test de proporciones fue utilizado para determinar diferencias de las respuestas entre los años 2023 y 2024. Para determinar diferencias en las calificaciones de ficha clínica y nota final entre las cohortes 2023 y 2024, se utilizó el Test de *Student* no pareado. La normalidad de las variables continua fue evaluada con el test de *Shapiro-Wilk*. Se consideró estadísticamente significativo p<0.05. **Resultados:** Los encuestados autoreportaron una mediana de "De acuerdo" en todas las preguntas, excepto en la pregunta 1 en que la mediana estuvo en la opción "Totalmente de acuerdo". En cuanto a la nota final del internado se observan diferencias estadísticamente significativas entre ambas cohortes (Test de *Student* no pareado, p<0,0001). **Conclusión:** Los internos manifestaron acuerdo en cuanto al aporte de la examinación de pacientes hospitalizados en sus habilidades de comunicación, diagnósticas e integración al equipo de salud. Esta percepción está respaldada por los resultados de las evaluaciones y por la participación en la encuesta.

1. Introduction

Since 2007, the School of Dentistry at this Chilean university has offered an in-hospital internship, exclusively for students in the sixth year of their studies. Its objective is to help interns integrate the relationship between general and oral health, and vice versa. This integration is highly relevant due to the well-known relationship between oral infection and glycemic imbalance, increased cardiovascular risk, or premature birth, among other clinical situations (1-2). The theoretical pedagogical methodology used in this internship has been based on interactive classes taught by physicians on the most prevalent pathologies of the cardiovascular, respiratory, digestive, renal, endocrine, psychiatric, and hematological systems. The pathologies have been grouped by similarity to reduce the so-called intrinsic memory burden (3-4).

Once the theoretical phase is completed, the interns begin their hospital practice. There is no literature on this topic, only articles on outpatient care in a dental unit located within a hospital. It may be useful to mention that the university finances the teaching staff (two general practitioners and two dentists, and six interns per morning, four mornings a week) in a close student-teacher relationship (5), as well as the disposable examination instruments, thus representing a lower expense for the university clinic (6). Clinical internships to interview and perform physical examinations on hospitalized patients have been conducted at a hospital in a peripheral commune (2007-2019) and at our university clinic since 2021 in the Emergency, Obstetrics, and Medical-Surgical departments. A medical or dental instructor reviews the electronic medical records of the department and offers selected patients a free dental checkup. Patients appreciate this opportunity: they often haven't had a dental exam for a while and have a consultation to make. Many brush less than twice a day, using an inadequate toothbrush and technique. They also need guidance regarding their diet. Since 2024, the Adult Critical Care Unit has collaborated on patient oral hygiene to reduce the aspiration of oral microorganisms in intubated patients or those restarting swallowing. The intern takes a complete medical and dental history based on the medical history, general inspection, and dental examination to present a comprehensive diagnosis (systemic, craniofacial, temporomandibular, occlusal, dental, periodontal, and soft tissue) and treatment plan, which is then evaluated by a physician and a dentist based on a *specially prepared rubric* (Appendixes 1 and 2).

Patients and healthcare professionals from clinical settings have expressed their gratitude for the presence of dental interns in their units. The learning process has been bidirectional, highlighting the importance of interprofessional care and education (7). We have also received positive informal *feedback from many patients and alumni* . Dental students arriving in their sixth year are routinely evaluated based on multiple-choice tests in the context of a whole *-case clinical case* , in which the heading describes a dental situation in a systemically compromised patient. This is a way to introduce students early to the general health reality of patients. However, they are not accustomed to taking a general descriptive history, nor do they handle the systematized medical nomenclature learned by third-year medical students. In contrast, during the clinical internships of this internship, they interview and inspect hospitalized patients and obtain information based on the *serial cue method* , in which students develop mental structures that can be described as causal networks, which explain the causes and consequences of diseases in terms of biological and pathophysiological processes. At first, they have in mind many signs and symptoms in relation to what they have learned in basic sciences. To advance, they must create in their minds capsules of knowledge of the different diseases that become sufficiently robust to make faster and more accurate diagnoses. After encapsulation, the pathophysiology is not explained as much, but rather it is knowledge rich in relevant clinical information about each disease to facilitate differential diagnosis. Clinical experience is very important in this method (8).

Based on the above, this research aims to determine the positive informal perception of final-semester dentistry students toward internships through the application of a mid-semester survey.

Interns were surveyed for two consecutive years regarding their perception of the contribution of examining hospitalized patients to their communication, diagnostic, and healthcare team integration skills, thereby engaging students in the teaching-learning process (9-10).

2. Methods

A longitudinal, descriptive, quantitative study was conducted using a voluntary, anonymous survey. The inclusion criteria were sixth-year Dentistry students in 2023 and 2024, who had completed their 8- and 12-morning internships, respectively, examining patients in the university's teaching clinic. Exclusion criteria included students who were not registered on the platform and course to submit this information.

For the methodological development of the research, the Learning Outcomes (LOs) of this internship were considered. First, to adequately communicate in medical and dental language with the multidisciplinary team, among peers, and with patients and their families. Then, in "Theoretical Medical Learning," to review basic sciences and general medicine concepts necessary to integrate the stomatognathic system with the rest of the body, thus obtaining a comprehensive view of the patient. Regarding "Organization of Clinical Thinking," the goal is to generate diagnostic hypotheses and comprehensive diagnoses, linking medical and dental history, general and segmental physical examination, and complementary examinations. Based on these LOs, a seven-question survey was developed on the acquisition of clinical terms to better communicate with healthcare personnel, and on whether the theoretical activities, history taking, and clinical examination helped them become familiar with the clinical features of prevalent pathologies and their differential diagnoses. The interns were contacted three times by institutional *email* and *WhatsApp* to respond voluntarily and anonymously via the Canvas® platform. This survey presented responses in 2023 based on a five-point Likert scale: "Strongly disagree", "Disagree", "Indifferent", "Agree", "Strongly agree" (11).

The survey was validated by a committee of experts: the internship's physicians and dentists, and the six interns from the last rotation in 2023. Dentists from the Diploma in Health Sciences Education also validated the survey, considering it relevant based on the course's RAs and suggesting structuring the responses based on a Likert scale. In 2024, the survey only corrected the way responses were presented, starting with the most positive alternative: "Strongly agree."

The curricular differences between cohorts were as follows. To help students internalize the *feedback they received* when presenting their clinical records orally, in 2024 they submitted their written records the day after presenting them to a doctor and a dentist. In 2024, due to the increase in the number of students, it was necessary for some interns to tour the units while others worked as a group to create written and video educational materials for the general public to be received in the university clinic waiting rooms. They also gave brief presentations for healthcare personnel from the various departments.

For data analysis, descriptive statistics (5) were used, such as mean, standard deviation, median, and percentiles to describe the sample. The proportions test was used to determine differences in responses between the years 2023 and 2024. To determine differences in the medical record scores and final grade between the 2023 and 2024 cohorts, the unpaired *Student* 's test was used. The normality of the continuous variables was evaluated with the *Shapiro-Wilk test. P <0.05 was considered statistically significant. Stata version 19 software* was used for analysis (12).

3. Results

In 2023, 52 of 77 interns (67.53%) completed the survey; the total number of students obtained an average score of 5.7 ± 0.52 on their clinical record and a final grade of 5.8 ± 0.2 on the course average. In 2024, 42 of 70 interns (60%) completed the survey; they obtained an average score of 5.7 ± 0.70 on their clinical record and a final grade of 6.1 ± 0.30 on the course. When comparing the grades obtained on the clinical record between 2023 and 2024, no statistically significant differences were observed

(unpaired *Student 's test* , p = 0.711). Regarding the final internship grade, statistically significant differences were observed between both cohorts (unpaired *Student 's test, p < 0.0001).*

In the analysis of the survey conducted in 2023 and 2024, inmates self-reported a median of "Agree" on all questions, except for question 1, where the median was "Strongly Agree." The percentages for the sum of both responses are high across both years of measurement (Table 1).

In question 1, inmates valued the importance of knowing and more confidently using the semiological language of signs and symptoms to communicate with healthcare personnel . There were no statistically significant differences between the two cohorts (Table 1, section 1).

Questions 2 and 7 dealt with theoretical medical learning (Table 1, Block 2). Regarding question 2, they responded that the most prevalent pathologies selected for theoretical classes helped them organize knowledge capsules, which they then reinforced when examining hospitalized patients. However, in 2024, there was a significant decrease in "Agree" (p=0.03). For question 7, in 2024, they indicated a significant increase in "Strongly agree" (p<0.02) that patient assessment helped them understand the pathophysiology of their illnesses. There was a significant decrease (p<0.0002) in the "Agree" alternative.

Questions 3 to 6 addressed the RA Organization of Clinical Thinking (Table 1, Section 3). Question 3 presented no statistically significant differences in responses between the two cohorts. Regarding question 4, which asks about strengthening these knowledge capsules by taking anamnesis, there was a statistically significant decrease in the "Agree" (p=0.04) and an increase in the "Disagree" option (p=0.01). In question 5, there were no statistically significant differences between the two cohorts. In question 6, which referred to the help provided by performing a physical examination on hospitalized patients to maintain mental order when creating charts and medical records, statistically significant differences were detected between one year and the next, with an increase in the "Strongly agree" (p=0.02) and "Indifferent" (p=0.001) options, and a decrease in the "Agree" (p<0.001). It is the only question in which the sum of "Strongly agree" and "Agree" shows a statistically significant downward trend (p=0.001).

Table 1. Block 1

Learning outcome Communication (question 1)	Answer	2023 (n=52)	2024 (n=42)	Test*
When examining hospitalized patients, did you consider the importance of knowing the semiological language of signs and symptoms to communicate with physicians? p50 "Totally agree" both years	Totally agree	31 (59.62%)	26 (61.90%)	0.82
	OK	18 (34.62%)	13 (30.95%)	0.71
	Indifferent	2 (3.85%)	2 (4.77%)	0.83
	Disagree	1 (1.92%)	1 (2.38%)	0.88
	Totally agree + Agree	49 (94.24%)	39 (92.85%)	0.68

Values express frequency and percentage n (%). *: Test of proportions; †: only categories with responses > 0 are included.

Table 1. Block 2

Theoretical medical learning outcome (questions 2 and 7)	Answer	2023 (n=52)	2024 (n=42)	Test*
2. When examining hospitalized patients, did the most prevalent pathologies selected for the theoretical classes make sense to you, organizing that knowledge in your mind? p50 "Okay" both years	Totally agree	20 (38.46%)	21 (50%)	0.26
	OK	30 (57.69%)	15 (35.71%)	0.03
	Indifferent	1 (1.92%)	3 (7.14%)	0.21
	Disagree	1 (1.92%)	2 (4.76%)	0.44
	Totally disagree	0 (0%)	1 (2.38%)	0.26
	Totally agree + Agree	50 (96.15%)	36 (85.71%)	0.08
7. Did the clinical internship help you	Totally agree	13 (25%)	20 (47.62%)	0.02

integrate the pathophysiology of your patients' diseases? p50 "Okay" both years	OK	27 (51.92)%	9 (21.14%)	0.002
	Indifferent	5 (9.62%)	6 (14.29%)	0.48
	Disagree	5 (9.62%)	5 (11.90%)	0.72
	Totally disagree	1 (1.92%)	2 (2.38%)	0.88
	Totally agree + Agree	40 (76.92%)	29 (68.76%)	0.38

Values express frequency and percentage n(%). *: Proportion test; †: only categories with responses > 0 are included.

Table 1. Block 3

Learning Outcome: Organization of Clinical Thinking (questions 3 to 6)	Answer	2023 (n=52)	2024 (n=42)	Test*
3. Did knowing the "scripts" of the most prevalent diseases help you better manage the diagnosis of more complex pathologies in hospitalized patients? p50 "Okay" both years	Totally agree	19 (36.54)%	16 (38.10%)	0.88
	OK	22 (42.31%)	14 (33.33%)	0.37
	Indifferent	7 (13.46)%	7 (16.67%)	0.66
	Disagree	3 (5.77%)	4 (9.52%)	0.49
	Totally disagree	1 (1.92%)	1 (2.38%)	0.88
	Totally agree + Agree	41 (78.85%)	30 (71.43%)	0.37
4. Did taking anamnesis from hospitalized patients help you to have a mental order to take the medical history? p50 "Okay" both years	Totally agree	17 (32.69%)	19 (45.24%)	0.21
	OK	23 (44.23%)	10 (23.81%)	0.04
	Indifferent	8 (15.38%)	9 (21.14%)	0.47
	Disagree	3 (5.77%)	10 (23.81%)	0.01
	Totally disagree	1(1.92%)	0 (0%)	0.26
	Totally agree + Agree	40 (77.92%)	29 (69.05%)	0.38
5. Did guiding the history-taking of hospitalized patients help you relate signs and symptoms to one pathology as opposed to another? p50 "Okay" both years	Totally agree	17 (32.69%)	16 (38.10%)	0.58
	OK	27 (51.92%)	17 (40.48%)	0.27
	Indifferent	6 (11.54)%	6 (14.29%)	0.69
	Disagree	1 (1.92%)	2 (4.76%)	0.44
	Totally disagree	1 (1.92%)	1 (2.38%)	0.88
	Totally agree + Agree	44 (84.61%)	33 (78.58%)	0.38
6. Did performing a general physical examination on hospitalized patients help you maintain a mental order for making the medical record and history? p50 "Okay" both years	Totally agree	10 (19.23%)	17 (40.48%)	0.02
	OK	36 (69.23%)	8 (19.05%)	<0.001
	Indifferent	3 (5.77%)	13 (30.95%)	0.001
	Disagree	3 (5.77%)	4 (9.52%)	0.49
	Totally agree + Agree	46 (88.46)%	25 (59.53%)	0.001

Values express frequency and percentage n(%). *: Proportion test; †: only categories with responses > 0 are included.

4. Discussion

The interns self-reported agreement on all questions, thus supporting the need for this internship in terms of its objectives of Communication, Theoretical Medical Learning and especially Organization of Clinical Thought according to the *serial cue method* (8). The final grades of the internship are obtained by averaging all evaluations, both theoretical and practical. The fact that they were better in the second cohort may be due to the fact that they deepened their knowledge of medical-dental integration through group educational work. Also, due to presenting the descriptive sheet in written form the day after their presentation, as a way of concretizing the *feedback* received orally. This feedback could be consulted in the survey to see if it is considered effective. Everything was evaluated with the help of teaching rubrics that the interns have been familiar with since the course was presented (Appendix 2). Students have structured objective exams throughout their degree and have had them at some point at the end of the internship. A migration from a multiple-

choice written degree exam to a structured objective exam for primary care, specialty, and in-hospital internships is being considered. Although responses were positive regarding internships, it was difficult to reach 60% of the course completion rate over the two years. This difficulty occurs with faculty evaluation surveys since they are no longer a prerequisite for enrollment in the courses. The majority of the course completion rate was achieved thanks to the closeness with faculty members and the contact maintained through the thesis guidance and in-person preclinical assistantships. According to the literature, it would be advisable to add closeness and other positive characteristics that students expect in a good clinical instructor (5).

Regarding the outcome "Theoretical Medical Learning," the results encourage continued improvement in the teaching of the most prevalent pathologies and their pathophysiology. It is important to find ways to increase intrinsic motivation to be a global health professional. To this end, efforts are being made to conduct interactive classes and rehearse patient histories with simulated patients from videos.

Regarding the result "Organization of clinical thought", it is striking that the intermediate alternative "Indifferent" has increased, taking into consideration that the respondents understood what the statement is about (11). Based on the principles of reflective pedagogy (13), it was concluded that it is appropriate to make a greater motivational effort when presenting the course regarding the opportunity that means making anamnesis and general physical examination in hospitalized patients, so that dentists acquire a mental order according to the *serial cue method* , which allows them to develop diagnostic criteria (8).

It is suggested that other ways be found to evaluate the acquisition and transfer of diagnostic skills from faculty to intern; for example, triangulating observation, self-reflection, and student evaluations (5). To achieve a 360° evaluation, receiving this medical-dental evaluation could be incorporated into the satisfaction survey emailed *to* university clinic users upon discharge.

Limitations of the study.

Selection bias could exist due to the moderate response rates of the surveys. Curricular changes could have impacted more than the internship itself. A survey was administered to two cohorts of students who took the Epidemiology course in 2020 or 2021, with the limitations of examining patients in person due to pandemic restrictions. Post-pandemic adaptations to gradually increasing the number of internship weeks could also be a bias.

5. Conclusions

- The inmates expressed agreement regarding the contribution of examining hospitalized patients to their communication, diagnostic, and integration skills within the healthcare team.
- The students noted that the most prevalent pathologies selected for the theoretical classes facilitated their understanding of the concepts, which they were able to reinforce later by conducting history-taking and physical examinations of hospitalized patients.
- This perception is supported by the results of the evaluations and by participation in the survey.

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