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Original Article

Educational effects of dental hygiene student intervention in dental student clinical practicum

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Abstract *Background/purpose:* Given that dental and dental hygiene undergraduate programs, including clinical practicums, are typically housed within their respective departments, education on forming effective dental teams is often limited for undergraduate dental and dental hygiene (D-DH) students. We have established an interprofessional clinical practice program where dental hygiene students participate in the clinical practice of dental students,

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Interprofessional Education

facilitating collaboration. However, research on its educational effects remains limited. This study aimed to evaluate whether the D-DH Collaborative Clinical Practicum (D-DH Practicum) improves dental students' readiness for interprofessional learning.

Materials and methods: Data were collected over three years from 143 sixth-year dental students, 54 fourth-year dental hygiene students, and 134 cooperating patients who participated in the D-DH practicum. We evaluated changes between the pre- and post-practicum Readiness for Interprofessional Learning Scale (RIPLS) scores.

Results: Dental students' RIPLS scores significantly increased throughout the program ($P < 0.05$), and they felt that this practicum changed their perception of dental hygiene.

Conclusion: The study demonstrated that readiness for interprofessional learning is significantly enhanced when dental students collaborate with dental hygiene students in clinical practicum.

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Introduction

Interprofessional collaborative practice (IPCP) occurs when multiple health professionals from diverse backgrounds work with patients to deliver the highest quality of care.^{1,2} As emphasized by the World Health Organization, Interprofessional Education (IPE), which is when students from different professions learn together to improve teamwork and health outcomes, is an essential part of IPCP preparation for healthcare students.^{1–3} Various IPE programs have been developed worldwide, and their effectiveness has been widely reported.^{4–9} However, students should be exposed to IPCP in early clinical experiences to see interprofessional communication and teamwork modeled.¹⁰ Some reports indicate that students find it difficult to apply skills obtained from IPE activities when transitioning to direct patient care.^{8,11} While IPE is often associated with collaboration in the medical setting,¹² education regarding collaboration among dental care professionals is also important.^{13–19} As of 2015, few IPCP programs existed for dental and dental hygiene (D-DH) students;^{20,21} however, in recent years, several programs specifically for D-DH students have been developed and reported worldwide.^{22–25} Accordingly, we developed a new IPCP program as a clinical practicum for D-DH students in their final year. Following a trial in 2015, the D-DH Collaborative Clinical Practicum (D-DH practicum) has been implemented since the 2016 academic year. The D-DH practicum is a prerequisite module in which dental and dental hygiene students collaborate to treat patients. In consultation with their faculty advisor, the dental student selects one patient from their regular clinical practice that they then treat collaboratively with a dental hygiene student, focusing on oral hygiene conditions. The results showed a significant improvement in patients' oral hygiene status and students' positive valuation in 2016.²⁶ Compared to other licensing programs offered by individual faculties, this program, in which students learn together in a clinical setting, was suggested to be beneficial to students in both fields. Except for the 2020 academic year when clinical training had to be drastically reduced because of the COVID-19 pandemic, this practicum has continued to this day.

In developing educational programs, quantitative evaluation of outcomes is essential for content enrichment and should be done using more objective measures. To evaluate of the readiness of the program for IPE, the Readiness for Interprofessional Learning Scale (RIPLS),²⁷ Interdisciplinary Education Perception Scale (IEPS),²⁸ and Canadian Interprofessional Health Collaborative (CHIC) Framework²⁹ may be applied. The RIPLS, developed by Parsell and Bligh,²⁷ is used internationally to assess readiness for learning and orientation to IPE in undergraduate education.^{16,18,19,30} Just as many language versions have been developed, including Chinese and Italian,^{31,32} a Japanese version of the RIPLS has also been developed.³³ Accordingly, we have had participating students respond to the RIPLS before and after their practicum training since FY2021.

This study aimed to evaluate the educational impact of dental students' interactions with dental hygiene student interventions on their patients during clinical practicums.

Materials and methods

This study was approved by the ethics committee of the Faculty of Dentistry at our University (No. D2015-569-04).

Intervention

Both sixth-year dental students and fourth-year dental hygiene students are required to practice independent patient treatment in the student clinic for 1 year at the University Hospital. We established a prerequisite module referred to as the "D-DH practicum," which requires students from both programs to treat patients collaboratively.

The D-DH practicum is comprised of 1) a preparation phase, 2) a patient treatment phase, and 3) a reflection phase. Briefly, in the preparation phase of the D-DH practicum, the dental student selects several potential patients to receive treatment, focusing on their oral hygiene status (e.g., lack of success with tooth brushing interaction [TBI]). After consulting with their faculty supervisors, the dental student selects one patient to be treated.

In the patient treatment phase, after obtaining informed consent from the patient, the dental hygiene student's supervisor assigns one dental hygiene student to lead the treatment alongside the dental student. The dental student and dental hygiene student then collaborate to discuss treatment options, share information, and develop a comprehensive treatment plan to enhance the patient's oral hygiene. The patients received treatment during two sessions in which the D-DH pair provided continued collaborative treatment. All treatments were administered by the dental student and dental hygiene student following their supervisors' instructions and approval of treatment plans.

At the first appointment, the dental student assessed the patient's condition and introduced the dental hygiene student to the patient. The dental hygiene student then conducted a medical interview, evaluated the presence and distribution of plaque using the O'Leary Plaque Control Record (PCR),³⁴ and provided oral hygiene instructions. Subsequently, the dental student reassessed the patient's oral condition. Afterward, the students debriefed with the faculty at the clinic.

The second appointment was scheduled 4–6 weeks later. After assessing the patient's condition, including a review of the O'Leary PCR, the dental hygiene student provided additional oral hygiene instructions based on the results.

In the reflection phase, web-based assignments were given to both groups of students to reflect on their practice. These assignments included reflecting on changes in their perception of their profession and their counterpart's profession ('Has your perception of dentists/dental hygienists changed after experiencing D-DH practicum?'), as well as their satisfaction with and impression of the practicum.

The validated Japanese version of RIPLS consists of 19 items that measure respondents' readiness for interprofessional learning; each item is rated on a 5-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5). It was completed by both students before and after the program (pre- and post-test). Some reverse-scored items are included in this scale. Higher scores indicate better readiness for IPE.

Statistical analyses

All data were analyzed after anonymizing participant information. Changes in pre- and post-practicum RIPLS scores were tested using the Wilcoxon signed-rank test. The effect size r was calculated with $r = Z/\sqrt{n}$, using the Z test statistic.³⁵ The Cronbach's alpha value was computed for RIPLS to confirm internal consistency. A chi-square test was performed to determine the potential changes in the perception of one's profession and that of the other profession with which one collaborated. Paired t-tests were performed for the O'Leary PCR scores obtained within the first and second treatment sessions. The significance level was set at 5% for each statistical test. All statistical analyses were performed using IBM SPSS Statistics 29 (IBM Corporation, Armonk, NY, USA).

Results

A total of 42, 59, and 49 dental students (150 total) and 21, 21, and 20 dental hygiene students (62 total) completed the D-DH practicum in 2021, 2022, and 2023, respectively. Additionally, 42, 59, and 49 (150 total) patients from the dental student clinic participated in the D-DH practicum in 2021, 2022, and 2023, respectively. We analyzed data from 143 dental students, 54 dental hygiene students, and 134 patients. The collection rates were 95.3% for dental students, 87.1% for dental hygiene students, and 89.3% for patients.

The RIPLS scores for dental students significantly increased before and after the practicum, from 82.7 to 84.9 ($P < 0.001$, Table 1). The effect size r was 0.28, between small (0.1) and medium (0.3). However, the RIPLS scores for dental hygiene students did not significantly change before and after the practicum (79.1 to 80.0; Table 1). Cronbach's alpha was 0.89, indicating sufficient internal consistency.

The Chi-square test results showed a significant difference between dental students and dental hygiene students in the change in perception of their counterparts' profession ($P < 0.001$). This indicates that more dental students than dental hygiene students changed their perceptions of their counterparts' profession after the practicum. However, there was no significant difference in the change in perception of their own profession (Table 2).

The O'Leary PCR scores of patients who participated in the practicum decreased significantly from 42.3% in the first session to 36.7% in the second session ($P < 0.001$).

Discussion

Based on the results of this study, the D-DH practicum proved effective in teaching interprofessional collaboration,

Table 1 Pre- and post-test total RIPLS scores.

	Mean (SE)			
	pre-test	post-test	<i>P</i> -value	<i>r</i>
DS (<i>n</i> = 143)	82.7 (0.62)	84.9 (0.63)	0.0005	0.28
DHS (<i>n</i> = 54)	79.1 (0.99)	80 (1.05)	0.333	—

Abbreviations: RIPLS, readiness for interprofessional learning. DS, Dental student. DHS, Dental hygiene student. SE, standard error. *r*, effect size.

Table 2 Change in perception of the professions by the practicum.

	DS	DHS	<i>P</i> -value
Counterparts' profession			
Changed	113 (79.0%)	29 (53.7%)	0.0001
Not changed	30 (21.0%)	25 (46.3%)	
One's own profession			
Changed	70 (46.7%)	21 (36.2%)	0.173
Not changed	80 (53.3%)	58 (63.8%)	

DS, Dental student. DHS, Dental hygiene student.

with the involvement of dental hygiene students in clinical treatment significantly improving the oral health status of patients. Additionally, the implementation of this program resulted in a significant increase in dental students' readiness for interprofessional collaboration and a significant change in dental students' perception of the dental hygienist profession. However, there was no observed improvement in dental hygiene students' readiness for interprofessional collaboration, and their perception of the dental profession did not significantly change. From the beginning of the practicum, we frequently received positive feedback from both groups of students and observed positive clinical effects on patients. By using the objective measure of RIPLS, we were able to analyze the effectiveness of the program as an IPE education tool in greater detail.

The effects of IPE programs will vary depending on the professions involved and the content developed. Dentists do not always perceive dental hygienists as equal partners in oral healthcare, as reported in prior research.^{24,36,37} Mutual respect and a deeper understanding of roles and responsibilities are essential for effective collaboration and true teamwork.^{19,24} Hence, in developing this program, the goal was for dental students to deepen their awareness of the dental hygienist profession by experiencing the effectiveness of their interventions in a clinical setting. In addition, coordinating time for the program across departments was difficult, and even securing two days posed a challenge. For this reason, we focused on TBI as practiced by both dental and dental hygiene students in clinical practice. Dental students typically perform TBI on their patients in their clinical practice. In this program, dental hygiene students experienced an additional reduction in patient O'Leary PCR scores when oral hygiene professionals intervened with patients who had previously performed TBI on their own. Similar results were reported by McComas et al.,³⁸ who found that when asked whether dental hygienists could perform 14 dental procedures, dental students were significantly less likely than other groups, including dental hygiene students, to respond "yes" for most procedures. Objective findings indicated a change in dental students' perception of the dental hygienist profession. However, although dental hygiene students had opportunities to understand the value of information sharing and communication with dental students, they had limited opportunities to grasp the specialty and role of dentists. This may be attributed to their existing working relationships with supervising dentists in their daily clinical practicum, as the program was not focused on learning about dentist specialties. In other words, this program was an opportunity for dental students to learn about the work of dental hygienist, but not an opportunity for dental hygiene students to actively learn about the work of dentists. In addition, dental hygiene students knew more about TBI than dentist counterparts, making it more difficult to have respect for the dentists and their profession.

According to the report by Kersbergen et al.,²⁴ dental hygiene students demonstrated a more positive attitude towards IPE compared to dental students after a one-year student-run dental clinic program. This finding contrasts with our study results. Through their program, dental hygiene students appeared to become more aware of the dental students' scope of practice, thereby increasing their

readiness. Conversely, dental students did not have sufficient opportunities to understand the expertise of dental hygienists. A unique characteristic of the combination of dentists and dental hygienists in an IPE program is the overlap in their scopes of practice. As a result, it may be challenging to highlight the distinct expertise of both professions simultaneously. Therefore, we should consider developing and implementing new IPE programs that provide dental hygiene students with opportunities to learn about the dental profession in the future. One proposal to improve the D-DH practicum is to incorporate a treatment planning phase that emphasizes changes in patient behavior following interventions by dental hygiene students. Adding this future phase may further enhance our understanding of the differences between the two professions.

As a limitation of this study, the program was conducted at a single university in Japan, meaning that existing university curricula and other factors may have influenced the results. Additionally, since licensing systems and healthcare conditions vary by country, cultural backgrounds could have impacted the outcomes.

In the developed IPE program, dental hygiene students were involved in the clinical practicum of dental students. While the program showed significant effectiveness as an IPE program for dental students, its effectiveness for dental hygiene students was limited.

Declaration of competing interest

The authors have declared that there are no competing interests.

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