

Status and Development Direction of Dental Hygiene Infection Control Education*

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ABSTRACT

This study aimed to grasp the current status of infection control education in dental hygiene departments. The subjects of the study were professors who teach infection control content at 56 universities, and data were collected via an online survey from March 30 to April 23, 2023. The operational status of the courses teaching infection control content and the importance of learning objectives were analyzed. The results showed that 16 courses included dental hygiene infection control content, with Dental Infection Control, Dental Prophylaxis, and Clinical Preliminaries being the most related subjects. The importance of the learning objectives in the dental hygiene infection control education courses was highest for sterilization methods, with an average of 5 points (SD=0.00). The results of this study are expected to be used as basic data for standardizing infection control education and strengthening education in dental hygienist training.

1. Introduction

The Centers for Disease Control and Prevention (CDC) emphasizes that healthcare-associated infections can be prevented and managed through effective national policies and infection control

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at healthcare institutions. They report that active infection control in healthcare institutions can reduce healthcare-related infections by 32%, and in the absence of an infection control program, infections can increase by 18% (Centers for Disease Control and Prevention, 2020). In Korea, the 'Prevention of Hospital Infection' clause was added to the Medical Law in 2002, setting the groundwork for establishing a basic infection control system in medical institutions, including the mandatory operation of infection control committees and offices in general hospitals with more than 300 beds. Subsequent amendments to the Medical Law to strengthen infection control in medical institutions have led to a quantitative increase in medical institutions subject to the establishment and operation of infection control committees and offices (Korea Disease Control and Prevention Agency, 2019).

The experiences of the MERS crisis and the COVID-19 pandemic have heightened the need for reform in the fragile infection control environment and the epidemic system in medical institutions (Lee, 2023). In this context, the importance of dental infection control has been further highlighted due to the characteristics of dentistry, which has a high possibility of exposure to aerosols, droplets, and blood (Yun & Kim, 2023; Moon et al., 2021; Park & Noh, 2020). In 2020, the government proposed a standard guideline for dental infection control suitable for all dental medical institutions and based on evidence, distributing the "Dental Infection Control Standard Policy Manual" (Ministry of Health and Welfare, 2020).

Dentistry, being outpatient-based and involving invasive treatments, traditionally focuses on outpatient-based infection control and applies it to dental infection management (Lee, 2013; Choi, 2020). Furthermore, many basic and clinical subjects in dental hygiene departments address the importance and methods of infection control (Kang et al., 2021). In the field of dental medicine, dental hygienists are in charge of infection control, preventing serious medical accidents caused by dental infection control issues (Jang & Park, 2016; Yang & Lim, 2023; Lee, 2017). In addition, various studies in the field of dental hygiene have been continuously reporting by identifying the status of dental infection control in the clinic (Lee & Han, 2020; Moon et al., 2021) and the level of awareness related to infection control among students (Park, 2017; Son & Jung, 2017).

However, to date, the focus of dental hygiene infection control research has primarily been on understanding the perception and practice of dental infection control and emphasizing the importance of education (Son & Jung, 2016; Lee et al., 2017). With the recent pandemics of infectious diseases like COVID-19, there has been a rapid change in the perception and demand for infection control (Joo et al., 2021; Oh, 2023), which urgently calls for various attempts to improve existing infection control education programs and methods, as well as the development of new education programs and intensified education efforts (Kim, 2022). Therefore, this study seeks to systematically and comprehensively grasp the current status of dental hygiene infection control education in dental hygiene departments, with the aim of proposing measures for standardized infection control education and education reinforcement in the training of dental hygienists.

2. Research Method

2.1 Subjects of the study

This descriptive survey research investigated the operational status and the importance of learning objectives of courses teaching dental hygiene infection control content within the departments of dental hygiene established in universities nationwide. Among these universities, 56 professors from the 56 universities that agreed to participate in the study and completed the questionnaire were analyzed as the subjects of the research (KYU 2023-01-009-001).

The questionnaire consisted of a total of 55 items, including the operational status of the courses teaching dental hygiene infection control content and the importance of learning objectives. The learning objectives were extracted from the 5th edition of the learning objectives for the department of dental hygiene (A) and duplicated content from the syllabus and contents presented in the dental infection control textbooks and the standard policy manual for dental infection control. The validity of the final item content was enhanced by revising it after review by five professors of the department of dental hygiene. Specifically, the importance of the learning objectives was investigated in eight sections and 15 items, including microbiology (types and characteristics of microbes), infection (pathways of infection by pathogenic microbes, infectious diseases), immunity (types of immunity, immunological oral diseases), sterilization and disinfection (methods of sterilization, disinfectants), instrument preparation for sterilization (instrument management and packaging), clinical methods for infection control (hand washing and the use of personal protective equipment), environmental management (surface management, waterline management), and special infection management (medical waste management, laundry management, dental prosthesis management, handpiece management). A reliability analysis was conducted to verify the internal consistency of the learning objectives of the dental hygiene infection control education course. The analysis showed that the Cronbach's alpha for the learning objectives of the dental hygiene infection control education course was 0.778.

2.2 Data analysis

From March 30 to April 23, 2023, the professors of the 82 universities with a department of dental hygiene were explained the purpose of the research, and those who expressed a voluntary participation intent were sent a survey participation URL via email or online. A total of 56 questionnaires were collected and used for analysis. The operational status of the courses teaching dental hygiene infection control content by educational system and the importance of learning objectives were analyzed using the STATA 12.0 program.

3. Results

3.1 Characteristics of the study subjects

The geographical distribution of the 56 universities targeted in the study was as follows: Central region 33.93% (19 schools), Yeongnam region 32.14% (18 schools), Seoul Metropolitan area 17.86% (10 schools), Honam region 16.07% (9 schools). The distribution by educational system was 3-year colleges 75.00% (42 schools), 4-year universities 25.00% (14 schools) (Table 1).

Table 1. Characteristics of university

University area	Unit: N(%)		
	3-year	4-year	Total
Seoul metropolitan area	7(70.00)	3(30.00)	10(17.86)
Central region	11(57.89)	8(42.11)	19(33.93)
Honam region	7(77.78)	2(22.22)	9(16.07)
Yeongnam region	17(94.44)	1(5.56)	18(32.14)
Total	42(75.00)	14(25.00)	56(100.00)

3.2 Status of dental hygiene infection control education courses

The courses that teach dental hygiene infection control content in the target universities were confirmed to be a total of 16 subjects (Table 2). The related subjects were Dental Infection Control 73.21%, Dental Prophylaxis 67.85%, Oral Surgery 53.57%, Clinical Preliminaries 50.00%, Oral Microbiology 48.21% in descending order.

Table 2. Names of dental hygiene infection control education courses

Course name	Rank	Frequency (N=56)	Percentage (%)
Dental infection control	1	41	73.21
Dental prophylaxis	2	38	67.85
Oral surgery	3	30	53.57
Clinical preliminaries	4	28	50.00
Oral microbiology	5	27	48.21
Implantology	6	2	3.57
Dental prosthodontics	7	1	1.78
Oral radiology		1	1.78
Dental prosthodontics and practice		1	1.78
Clinical dental hygiene		1	1.78

Course name	Rank	Frequency (N=56)	Percentage (%)
Emergency dental care practice		1	1.78
Clinical pediatric dentistry		1	1.78
Dental hygiene practice and infection control		1	1.78
Comprehensive dental hygiene practice		1	1.78
Emergency dental care		1	1.78
Clinical dental hygiene practice 1, 2		1	1.78

Note: Multiple responses

3.3 Operational status of key courses in dental hygiene infection control education

3.3.1 Semester and credits

Examining the operational status (year/semester/credits) of the Dental Infection Control course by educational system, in 3-year programs, it was most commonly offered during the 2nd semester of the 1st year (2 credits) at 25.81%, followed by the 1st semester of the 1st year (2 credits) at 19.35%, and multi-semester offerings at 12.90%. In 4-year programs, the course was most commonly offered during the 2nd semester of the 1st year (2 credits) at 40.00%, with 20.00% offered during the 1st semester of the 2nd year (1 or 2 credits, with only credit differences shown). It was found that the Dental Infection Control course is mainly offered during the 2nd semester of the 1st year (2 credits) at the universities in the study.

For the Dental Prophylaxis course, in 3-year programs, multi-semester offerings were most common at 48.28%, followed by the 2nd semester of the 1st year (3 credits) at 20.69%, and the 2nd semester of the 1st year (2 credits) at 10.34%. In 4-year programs, the course was most commonly offered during the 1st semester of the 2nd year (3 credits) at 22.22%, with various applications of year/semester/credits across schools. It was evident that Dental Prophylaxis is mainly offered across multiple semesters in the universities studied.

Looking at the Oral Surgery course, in 3-year programs, it was most commonly offered during the 2nd semester of the 2nd year (2 credits) at 37.50%, followed by the 1st semester of the 2nd year (2 credits) at 29.17%, and the 1st semester of the 3rd year (2 credits) at 20.83%. In 4-year programs, the course was most commonly offered during the 1st semester of the 2nd year (2 credits) and the 1st semester of the 3rd year (2 credits) at 33.33% each, with 16.67% offered during the 2nd semester of the 1st year (2 credits) and the 2nd semester of the 2nd year (2 credits). The study found that Oral Surgery is primarily offered during the 2nd semester of the 2nd year (2 credits) at the target universities (Table 3).

Table 3. Completed semesters and credits

Unit: N(%)

Dental infection control				Dental prophylaxis				Oral surgery			
Year/ Semester/ Credits	3-year	4-year	Total	Year/ Semester/ Credits	3-year	4-year	Total	Year/ Semester/ Credits	3-year	4-year	Total
1-1-1	0(0.00)	1(10.00)	1(2.44)	1-2-2	3(10.34)	1(11.11)	4(10.53)	1-2-2	1(4.17)	1(16.67)	2(6.67)
1-1-2	6(19.35)	0(0.00)	6(14.63)	1-2-3	6(20.69)	1(11.11)	7(18.42)	2-1-2	7(29.17)	2(33.33)	9(30.00)
1-2-1	3(9.68)	0(0.00)	3(7.32)	2-1-2	1(3.45)	1(11.11)	2(5.26)	2-1-3	1(4.17)	0(0.00)	1(3.33)
1-2-2	8(25.81)	4(40.00)	12(29.27)	2-1-3	1(3.45)	2(22.22)	3(7.89)	2-2-2	9(37.50)	1(16.67)	10(33.33)
1-2-3	1(3.23)	0(0.00)	1(2.44)	2-1-4	2(6.90)	0(0.00)	2(5.26)	2-2-3	1(4.17)	0(0.00)	1(3.33)
2-1-1	1(3.23)	2(20.00)	3(7.32)	2-2-3	2(6.90)	1(11.11)	3(7.89)	3-1-2	5(20.83)	2(33.33)	7(23.33)
2-1-2	2(6.45)	2(20.00)	4(9.76)	3-1-3	0(0.00)	1(11.11)	1(2.63)	Total	24(80.00)	6(20.00)	30(100.00)
2-1-3	1(3.23)	0(0.00)	1(2.44)	3-1-4	0(0.00)	1(11.11)	1(2.63)				
2-2-1	1(3.23)	0(0.00)	1(2.44)	multiple semesters	14(48.28)	1(11.11)	15(39.47)				
2-2-2	1(3.23)	1(10.00)	2(4.89)	Total	29(76.32)	9(23.68)	38(100.00)				
3-1-2	1(3.23)	0(0.00)	1(2.44)								
3-1-3	1(3.23)	0(0.00)	1(2.44)								
3-2-2	1(3.23)	0(0.00)	1(2.44)								
multiple semesters	4(12.90)	0(0.00)	4(9.76)								
Total	31(75.61)	10(24.39)	41(100.00)								

3.3.2 Course classification and lecturers

Looking at the operational status (course classification/credit classification/lecturer) of the Dental Infection Control course, first in the course classification, theory and practice were at 48.78%, theory at 43.90%, and practice at 7.32%. By educational system, in 3-year programs, 54.84% of Dental Infection Control courses were offered with theory and practice, while in 4-year programs, 70.00% were offered as theory. In the credit classification, elective major subjects accounted for 58.54%, required major subjects for 36.59%, and general education for 4.88%. Upon further inspection, in both 3-year and 4-year programs, elective major subjects were offered at 58.06% and 60.00%, respectively.

For the Dental Prophylaxis course, theory and practice accounted for 78.95%, theory for 18.42%, and practice for 2.63%. By educational system, in 3-year programs, 79.31% of Dental Prophylaxis courses were offered with theory and practice, and in 4-year programs, 77.78% were also offered as theory and practice. In the credit classification, required major subjects accounted for 55.26%, elective major subjects for 42.11%. Looking at both 3-year and 4-year programs, required major subjects were offered at 55.17% and 55.56%, respectively.

Examining the Oral Surgery course, theory accounted for 83.33% and theory plus practice

for 16.67%. By educational system, in both 3-year and 4-year programs, 83.33% of Oral Surgery courses were offered as theory. In the credit classification, elective major subjects accounted for 56.67%, and required major subjects for 40.00%. In 3-year programs, elective major subjects were offered at 50.00%, and in 4-year programs, elective major subjects were analyzed at 83.33% (Table 4).

Table 4. Course classification and lecturers

Unit: N(%)

Classification		Dental infection control			Dental prophylaxis			Oral surgery		
		3-year	4-year	Total	3-year	4-year	Total	3-year	4-year	Total
Course classification	Theory	11(35.48)	7(70.00)	18(43.90)	6(20.69)	1(11.11)	7(18.42)	20(83.33)	5(83.33)	25(83.33)
	Practice	3(9.68)	0(0.00)	3(7.32)	0(0.00)	1(11.11)	1(2.63)	0(0.00)	0(0.00)	0(0.00)
	Theory & Practice	17(54.84)	3(30.00)	20(48.78)	23(79.31)	7(77.78)	30(78.95)	4(16.67)	1(16.67)	5(16.67)
Completion classification	Required major	11(35.48)	4(40.00)	15(36.59)	16(55.17)	5(55.56)	21(55.26)	11(45.83)	1(16.67)	12(40.00)
	Elective major	18(58.06)	6(60.00)	24(58.54)	12(41.38)	4(44.44)	16(42.11)	12(50.00)	5(83.33)	17(56.67)
	General education	2(6.45)	0(0.00)	2(4.88)	1(3.45)	0(0.00)	1(2.63)	1(4.17)	0(0.00)	1(3.33)
Lecturers	Full-time	9(29.03)	8(80.00)	17(41.46)	15(51.72)	9(100.00)	24(63.16)	10(41.67)	6(100.00)	16(53.33)
	Part-time	15(48.39)	0(0.00)	15(36.59)	0(0.00)	0(0.00)	0(0.00)	4(16.67)	0(0.00)	4(13.33)
	Adjunct	5(16.13)	2(20.00)	7(17.07)	0(0.00)	0(0.00)	0(0.00)	4(16.67)	0(0.00)	4(13.33)
	Shared lecture	2(6.45)	0(0.00)	2(4.88)	14(48.28)	0(0.00)	14(36.84)	6(25.00)	0(0.00)	6(20.00)

3.4 Analysis of the importance of learning objectives in dental hygiene infection control education courses

The importance of learning objectives within courses that teach dental hygiene infection control content was high across all 15 topics, with the sterilization methods scoring an average of 5 points (out of a perfect score of 5, SD=0.00). The sterilization method topic is presented as a learning objective in 4 out of 5 subjects in dental hygiene infection control education courses. Next in rank of importance was the management of medical waste, scoring an average of 4.94 points (SD=0.22), and instrument management and packaging, scoring an average of 4.92 points (SD=0.25). Even the lowest-ranked item, types and characteristics of microbes, showed high importance, with an average score of 4.12 points (SD=0.91) (Table 5).

Table 5. Importance of learning objectives in dental hygiene infection control education courses

Item	Rank	Importance Mean±SD	Key course					Number of courses covering the item
			Dental infection control	Dental prophylaxis	Oral surgery	Clinical preliminaries	Oral microbiology	
Sterilization methods	1	5.00±0.00	◎	◎	◎	◎	◎	5
Management of medical waste	2	4.94±0.22	◎			◎		2
Instrument management and packaging	3	4.92±0.25	◎	◎		◎		3
Surface management	4	4.91±0.28	◎			◎		2
Hand washing and personal protective equipment use	5	4.87±0.38	◎	◎		◎		3
Infectious diseases	6	4.83±0.41	◎		◎		◎	3
Disinfectant	7	4.82±0.47	◎	◎	◎		◎	4
Handpiece management	8	4.80±0.44	◎	◎		◎		3
Waterline management	9	4.75±0.54	◎					1
Pathways of infection by pathogenic microbes	10	4.67±0.54	◎				◎	2
Immunological oral diseases	11	4.66±0.58	◎				◎	2
Types of immunity	12	4.42±0.68	◎				◎	2
Laundry management	13	4.39±0.88	◎					1
Dental prosthesis management	14	4.25±0.74	◎					1
Types and characteristics of microbes	15	4.12±0.91	◎				◎	2
Total		4.69±0.48	15	5	3	6	7	36

* ◎: Presentation of the relevant learning objectives within the course

4. Considerations and Conclusion

A survey was conducted among professors at universities with dental hygiene departments, and as a result of verifying the operational status and the importance of learning objectives of the courses that educate on dental hygiene infection control within the curriculum, it was confirmed that there are a total of 16 courses teaching dental hygiene infection control. The main related subjects were Dental Infection Control, Dental Prophylaxis, Oral Surgery, Clinical Preliminaries, and Oral Microbiology in that order. The courses teaching dental hygiene infection control related content were operated diversely in terms of course names, academic years, semesters, credits, course classifications, and completion divisions, and there were differences in the educational curriculum

operation methods even within the same educational system. The importance of learning objectives for dental hygiene infection control was composed of basic themes that were evaluated to have high importance overall, with all 15 items scoring above 4 points (on a 5-point scale).

The quality of dental hygiene infection control education influences the quality of work performed by dental hygienists in the field; hence, systematization and standardization of dental hygiene infection control education are necessary. As the curricula are operated differently at each university and even within the same educational system, it is essential to design mandatory education content and education hours for courses teaching infection control in an integrated and systematic manner. Through this, all students can receive standardized quality education. It is necessary to determine the priorities and essential items for dental hygiene infection control education based on the importance of learning objectives and risk assessment. Along with theoretical education, practical training based on manuals that can be applied in the actual field must be conducted. To effectively perform infection control in a real environment, it is necessary to have the ability to apply theoretical knowledge to actual situations, and for this, practical training using manuals in the form of case studies is required. For evidence-based infection control practice, education that makes students aware of the importance of record-keeping should be conducted concurrently. In infection control, records provide essential information on the patient's infection status, the cause of infection, and the treatment process. Therefore, education is needed to accurately manage records and develop the ability to utilize them effectively.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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