

Overview of Professional Dental Students' Knowledge of Patient Safety Goals at Universitas Muhammadiyah Semarang Oral and Dental Hospital, Indonesia

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ABSTRACT

Background: Patient safety refers to actions taken to prevent medical errors and adverse events related to healthcare services, particularly in hospitals where the risk of patient safety incidents is relatively high. Professional dental students are involved in planning and performing patient care under the supervision of the attending physician, making it important to assess their level of knowledge regarding patient safety goals, which may influence the quality of hospital services. This study aimed to assess the knowledge of dental professional students regarding the six dimensions of patient safety goals established by the World Health Organization.

Subjects and Method: This study was conducted in December 2025 and involved 104 professional dental students who were actively participating in the Integrated Clinic at Universitas Muhammadiyah Semarang Dental Hospital, Semarang, Indonesia. A quantitative study with a cross-sectional design was employed. Data were collected using printed questionnaires that were distributed and collected on the same day. The variable examined was the level of knowledge of professional dental students regarding patient safety goals. Descriptive statistical analysis was used to present the characteristics of the respondents.

Results: Among 104 professional dental students, the overall knowledge regarding patient safety goals was categorized as good (mean score=80.93%). The highest knowledge score is Improve Effective Communication dimension (96.8%), whereas the lowest score was found in the Identify Patient Correctly dimension (64.73%).

Conclusion: The knowledge of professional dental students regarding patient safety goals at Universitas Muhammadiyah Semarang Dental Hospital is categorized as good.

Keywords: knowledge, patient safety, professional dental students

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BACKGROUND

Patient safety is a fundamental component of healthcare delivery systems that aims to protect patients from preventable harm associated with healthcare services. As healthcare becomes increasingly complex, the risk of medical errors and adverse events also increases, making patient safety a global priority. The World Health Organization emphasizes that strengthening patient safety is essential to improving healthcare quality and minimizing preventable patient harm worldwide (WHO, 2021).

Patient safety incidents remain a major challenge in both developed and developing countries. A multicenter study conducted in 11 hospitals across five countries reported patient safety incident rates of 31% in Hong Kong, 25% in Australia, 23% in India, 12% in the United States, and 12% in Canada (Pham et al., 2023). Similarly, national data in Indonesia reported that the highest proportion of patient safety incidents occurred in DKI Jakarta (37.5%), followed by Central Java (15.9%), the Special Region of Yogyakarta (13.8%), East Java (11.7%), South Sumatra (6.9%), West Java (2.8%), Bali (1.4%), Aceh (0.7%), and South Sulawesi (0.7%) (Nashifah et al., 2021). These findings demonstrate that patient safety incidents continue to occur across healthcare systems and remain a significant challenge for healthcare quality improvement.

The occurrence of patient safety incidents is influenced by various factors, including ineffective communication, incorrect patient identification, medication errors, inadequate infection prevention practices, and insufficient knowledge of patient safety principles among healthcare providers. Although professional dental students are still in training, they actively participate in patient examination, diagnosis, treatment planning, and clinical

procedures under the supervision of clinical instructors.

Consequently, inadequate knowledge of patient safety principles may increase the risk of preventable errors during clinical practice. Therefore, ensuring that professional dental students possess adequate knowledge of patient safety goals is essential for delivering safe, high-quality dental care while fostering a strong patient safety culture from the beginning of clinical education.

In Indonesia, patient safety is regulated through the Ministry of Health Regulation No. 11 of 2017 concerning Patient Safety, which emphasizes the development of a patient safety culture, increased institutional accountability, and continuous efforts to reduce adverse events in healthcare facilities. Internationally, the Joint Commission International (JCI) established the International Patient Safety Goals (IPSG) as a standardized framework for improving patient safety. These goals include identifying patients correctly, improving effective communication, improving the safety of high-alert medications, ensuring correct-site, correct-procedure, correct-patient surgery, reducing the risk of healthcare-associated infections, and reducing the risk of patient falls (Qabban et al., 2026). Mastery of these six goals is considered a fundamental competency for all healthcare professionals, including professional dental students involved in clinical practice.

Knowledge is the result of cognitive processes acquired through education, experience, and information exposure and is an important determinant of safe clinical behavior. Previous studies have demonstrated that higher levels of patient safety knowledge are associated with better compliance with patient safety practices and improved quality of healthcare services

(Al-Qattan et al., 2021). Since professional dental students are directly involved in patient care under supervision, evaluating their knowledge of the Patient Safety Goals is essential to ensure that patient safety principles are appropriately implemented throughout clinical education (Pratiwi et al., 2025).

Previous studies investigating patient safety knowledge among healthcare students have reported inconsistent findings. Alawiyah and Ramadhani (2023) reported that professional dental students at Prof. Dr. Moestopo University Faculty of Dentistry Dental Hospital had only a sufficient level of knowledge regarding patient safety (70%), primarily due to the lack of continuous education and regular patient safety training after pre-clinical orientation. Similarly, Nuryanti (2019) found that nursing clinical students demonstrated only sufficient knowledge of patient safety concepts. In contrast, Cho et al. (2020) reported that healthcare students who participated more frequently in structured patient safety education achieved significantly better knowledge of patient safety principles. These findings suggest that students' knowledge varies across institutions and may be influenced by differences in educational experiences and patient safety training.

Despite the growing body of literature, several important gaps remain. Most previous studies evaluated only the overall level of patient safety knowledge among healthcare students without examining knowledge across each of the six International Patient Safety Goals. Furthermore, no published study has specifically assessed the knowledge of professional dental students regarding all six dimensions Patient Safety Goals based World Health Organization at Universitas Muhammadiyah Semarang Dental Hospital. Conse-

quently, institution-specific baseline data are unavailable, making it difficult to identify which patient safety competencies require improvement and to evaluate the effectiveness of patient safety education within the professional dental curriculum.

As a teaching hospital where professional dental students provide supervised clinical care, Universitas Muhammadiyah Semarang Dental Hospital has a responsibility to ensure that students possess adequate knowledge of every dimension of patient safety before independently managing patients. Therefore, this study was conducted to describe the knowledge of professional dental students regarding the six dimensions of the International Patient Safety Goals at Universitas Muhammadiyah Semarang Dental Hospital.

This study offers a novel contribution by providing a comprehensive, dimension-specific assessment of professional dental students' knowledge across all six International Patient Safety Goals rather than reporting only an overall knowledge score. Identifying the strongest and weakest knowledge dimensions will provide institution-specific evidence that can be used to evaluate the existing clinical education program and develop targeted educational interventions to strengthen patient safety competencies among professional dental students at Universitas Muhammadiyah Semarang Dental Hospital.

SUBJECTS AND METHOD

1. Study Design

This study employed a descriptive research design with a cross-sectional approach. A cross-sectional study collects data at a single point in time (Wang & Cheng, 2020). The purpose of this study was to describe the level of knowledge of professional dental students regarding patient safety goals.

2. Population and Sample

The study population consisted of 139 active professional dental students who were undertaking clinical practice at the Integrated Clinic of the Universitas Muhammadiyah Semarang Dental and Oral Hospital, in December 2025, based on the official student registry. The required sample size was calculated using Slovin's formula with a 5% margin of error, resulting in a minimum sample of 104 participants (Antoro, 2024).

A two-stage cluster sampling technique was employed because the study population was naturally grouped into academic cohorts. In the first stage, the population was divided into five clusters according to academic cohort, namely Cohorts 11, 12, 13, 14, and 15. In the second stage, the total sample size was proportionally allocated to each cluster using the proportional allocation formula:

$$n_i = \frac{N_i}{N} \times n$$

Description:

- n_i = Sample size for each cohort
- N_i = Population size of each cohort
- N = Total population (139)
- n = Total sample size (104)

Table 1. Distribution of Population and Sample Size Across Cohorts

Cohorts	Population Size (N_i)	Sample Allocation	Sample Size (n_i)
11	23	$n_i = \frac{23}{139} \times 104$	17
12	3	$n_i = \frac{3}{139} \times 104$	2
13	40	$n_i = \frac{40}{139} \times 104$	30
14	15	$n_i = \frac{15}{139} \times 104$	11
15	58	$n_i = \frac{58}{139} \times 104$	44
Total	139		104

3. Study Variables

This study used a single variable were professional dental students knowledge of patient safety goals.

4. Operational Definition of Variables

Professional dental students knowledge of patient safety goals was defined as the level of understanding regarding the six dimensions of patient safety goals recommended by the World Health Organization (WHO). The variable was measured based on the

respondents total knowledge score and classified into three categories: good (76–100%), sufficient (56–75%), and poor ($\leq 55\%$).

5. Study Instruments

The level of knowledge was measured using a closed questionnaire adapted from a study by Tryartha (2023) regarding the level of professional students knowledge about patient safety. The questionnaire consisted of 18 knowledge items covering

the six dimensions of patient safety goals recommended by the WHO, including identify patient correctly, improve effective communication, Improve the safety of high alert medications, ensure correct-site, correct procedure, correct patient surgery, reduce the risk of health care associated infections, reduce of patient fall risk. The instrument comprised 12 favorable and 6 unfavorable statements and had been reported as valid and reliable in the previous study.

6. Data analysis

Data were analyzed using univariate analysis. This analysis presented the characteristics of respondents, including age, gender, knowledge distribution, knowledge categories, and knowledge distribution based on academic cohorts.

7. Research Ethics

This study receive ethical approval from the Health Research Ethics Committee of the Dental and Oral Hospital, Universitas Muhammadiyah Semarang, with ethical number 045/RSGM.KEPK/PE/2025.

RESULTS

1. Sample Characteristics

The respondent characteristics were described based on age, gender, and professional cohort. The professional cohorts were divided into five groups according to the duration of professional study, as follows:

- a. Cohorts 11 = 2.5 years
- b. Cohorts 12 = 2 years
- c. Cohorts 13 = 1.5 years
- d. Cohorts 14 = 1 year
- e. Cohorts 15 = 2–6 months

Table 1. Frequency Distribution of Dental Professional Students

Characteristics	Frequency	Percentage
Cohorts (Study Duration)		
11 (2.5 years)	17	16.3%
12 (2 years)	2	1.9%
13 (1.5 years)	30	28.8%
14 (1 years)	11	10.6%
15 (2-6 months)	44	42.3%
Gender		
Male	34	32.7%
Female	70	67.3%
Age		
21 years old	4	3.8%
22 years old	28	26.9%
23 years old	33	31.7%
24 years old	27	26%
25 years old	9	8.7%
26 years old	3	2.9%

Based on Table 1, the largest cohort was cohorts 15, consisting of 44 respondents (42.3%). The majority of respondents were female, totaling 70 individuals (67.4%). The respondents' ages ranged from 21 to 26 years, with a mean age of 23.17 years. Most respondents were 23

years old, accounting for 33 individuals (31.7%).

2. Univariate Analysis

Univariate analysis in this study was utilized to describe and summarize the data for each variable individually. Knowledge-related data were collected using a printed questionnaire comprising 18 statements,

the questionnaire was originally developed and administered in Indonesian language, and then translated into English. These statements were classified into two categories: 12 favorable (positive worded) items: numbers 2, 4, 5, 6, 7, 8, 9, 11, 12, 15, 16, and 18. And then, 6 unfavorable (negative worded) items: numbers 1, 3, 10, 13, 14, and 17. Measurement was evaluated using a Guttman scale format (scored as 1 or 0). For favorable statements, a correct

response was assigned a score of 1, while an incorrect response received a score of 0. Conversely, for unfavorable statements, a correct response (disagreeing with the negative statement) was assigned a score of 1, and an incorrect response received a score of 0. In detail, the distribution of the respondents' questionnaire outcomes for each statement across the six dimensions of the Patient Safety Goals is presented in Table 2 below:

Table 2. Results of the Assessment of Professional Dental Students Knowledge of Patient Safety Goals

No.		Statement	Correct		Incorrect	
			n	%	n	%
Dimension 1 : Identify Patient Correctly						
1	In the first patient safety goal, errors in patient identification can occur at all stages of diagnosis and treatment. Therefore, it the use of two patient identifiers, such as the patient’s name and medical record number, is recommended to reduce the risk of errors during the identification process.	7	6.7	97	93.3	
2	Patient safety refers to actions taken to prevent medical errors and adverse events associated with healthcare delivery.	99	95.2	5	4.8	
3	Verification of patient identity must always be performed, even if the patient is already known to the healthcare provider.	96	92.3	8	7.7	
Dimension 2 : Improve Effective Communication						
4	Communication with patients should be conducted clearly, and the read-back method should be used when conveying verbal instructions.	102	98.1	2	1.9	
5	Medical records represent one form of effective communication in patient care.	102	98.1	2	1.9	
6	In the second patient safety goal, effective communication that is timely, accurate, complete, clear, and understandable to the recipient can reduce the risk of errors and decrease the incidence of patient safety events. Communication may take both verbal and written forms.	98	94.2	6	5.8	
Dimension 3 : Improve the Safety of High Alert Medications						
7	Professional students administer medications according to the dosage required by the patient.	97	93.3	7	6.7	
8	In the third patient safety goal, the administration of high-alert medications must adhere to the “Six Rights” principle.	11	10.6	93	89.4	
9	Rechecking the medication dosage before administration is an essential component of patient safety.	102	98.1	2	1.9	

No.	Statement	Correct		Incorrect	
		n	%	n	%
Dimension 4 : Ensure correct-site, correct procedure, correct patient surgery					
10	Reverification of the procedure is not necessary if the patient has already signed the informed consent form.	98	94.2	6	5.8
11	The WHO Surgical Safety Checklist is used to ensure the correct site, correct procedure, and correct patient.	101	97.1	3	2.9
12	Clear marking of the surgical site is performed by the healthcare professional who will carry out the procedure.	94	90.4	10	9.6
Dimension 5 : Reduce the Risk of Health Care Associated Infections					
13	In the fifth patient safety goal, infection prevention and control are carried out in accordance with the World Health Organization’s hand hygiene guidelines, which include the Six Steps of proper handwashing using stagnant water.	46	44.2	58	55.8
14	The use of personal protective equipment (PPE) plays an important role in preventing cross-infection.	100	96.1	4	3.9
15	Professional students ensure that sterilized instruments are properly used before performing any clinical procedures.	101	97.1	3	2.9
Dimension 6 : Reduce of Patient Fall Risk					
16	Patients should be educated to move carefully when changing positions after completing a procedure in the dental unit.	83	79.8	21	20.2
17	Patients should be accompanied after receiving local anesthesia, as its effects may temporarily impair sensation or stability.	76	73.1	28	26.9
18	The floor area around the dental unit must be kept dry and non-slippery to prevent patients from slipping or falling.	102	98.1	2	1.9

Table 2 presents, the results of professional dental students' knowledge regarding patient safety goals. The statement with the highest score was item number 4, which stated, "Communication with patients should be conducted clearly, and the read-back method should be used when conveying verbal instructions", with 98.1% of respondents providing answers consistent with patient safety standards. In

contrast, the statement with the lowest score was item number 1, which concerned the use of two patient identifiers in the form of name and medical record number. This item was classified as an unfavorable statement because correct patient identification should use the patient's name and date of birth. For this statement, only 6.7% of respondents provided the correct answers.

Table 3. Knowledge Categories of Professional Dental Students on Patient Safety Goals at RSGM Unimus

Percentage Range	Category	n	Percentage
≤ 55%	Poor	2	1.9%
56 – 75%	Sufficient	19	18.3%
76 – 100%	Good	83	79.8%

Based on Table 3, the majority of professional dental students have a good level of knowledge regarding patient safety goals, with 83 respondents (79.8%). A total of 19 respondents (18.3%) are in the sufficient category, while only 2 respond-

ents (1.9%) fall into the poor category. These findings indicate that, overall, the level of knowledge of professional dental students on patient safety goals is considered good.

Table 4. Distribution Knowledge Categories of Professional Dental Students on Patient Safety Goals

Characteristics		Category n (%)			Total (%)
		Poor	Sufficient	Good	
Cohorts	11		2 (11.8%)	15 (88.2%)	17 (100%)
	12			2 (100%)	2 (100%)
	13	1 (3.3%)	8 (26.7%)	21 (70%)	30 (100%)
	14		4 (36.4%)	7 (63.6%)	11 (100%)
Gender	15	1 (2.3%)	5 (11.4%)	38 (86.4%)	44 (100%)
	Male	1 (2.9%)	9 (26.5%)	24 (70.6%)	34 (100%)
	Female	1 (1.4%)	10 (14.3%)	59 (84.3%)	70 (100%)
Age	21			4 (100%)	4 (100%)
	22	1 (3.6%)	5 (17.9%)	22 (78.6%)	28 (100%)
	23		5 (15.2%)	28 (84.8%)	33 (100%)
	24	1 (3.7%)	8 (29.6%)	18 (66.7%)	27 (100%)
	25		1 (11.1%)	8 (88.9%)	9 (100%)
	26			3 (100%)	3 (100%)

Based on Table 4, the highest proportion of good knowledge was found in cohort 12, accounting for 100%. Female respondents a higher proportion of good knowledge, totaling 59 individuals (84.3%).

Meanwhile, based on age, the highest proportion of good knowledge at 100% was dominated by the 21 years old and 26 years old age groups.

Table 5. Mean Scores and Knowledge Categories for Each Dimension of Patient Safety Goals

Dimensions of Patient Safety Goals		Score (%)	Knowledge Category
1.	Identify Patient Correctly	64.73%	Sufficient
2.	Improve Effective Communication	96.8%	Good
3.	Improve the Safety of High Alert Medications	67.3%	Sufficient
4.	Ensure correct-site, correct procedure, correct patient surgery	93.9%	Good
5.	Reduce the Risk of Health Care Associated Infections	79.1%	Good
6.	Reduce of Patient Fall Risk	83.7%	Good
Mean		80.93%	Good

Based on table 5, the dimension with the highest mean score was Dimensions 2 “improve effective communication” at 96.8%, categorized as good. While the

lowest mean score was Dimensions 1 “identify patient correctly” at 64.73%, categorized as sufficient. The overall mean score across all dimensions of patient safety

goals was 80.93%, which is classified as good.

DISCUSSION

Based on this study, A total of 104 professional dental students participated in this study. The respondents were aged between 21 and 26 years, with the majority being 23 years old (31.7%), and most were female (67.3%). These findings describe the demographic characteristics of the study participants and reflect the composition of active professional dental students at Universitas Muhammadiyah Surakarta Dental Hospital during the study period.

Overall, professional dental students demonstrated a good level of knowledge regarding the six patient safety goals, with a mean score of 80.93%. This finding indicates that the respondents generally had an adequate understanding of the fundamental patient safety principles required in dental clinical practice. Compared with the study by Alawiyah and Ramadhani (2023), which reported only a sufficient level of knowledge among professional dental students at Prof. Dr. Moestopo University Dental Hospital, the higher mean score observed in this study may be related to differences in educational approaches and clinical learning environments. The good results in the present study may be influenced by several factors. One of the main factors is the provision of specific patient safety training for professional dental students at the beginning of their clinical education at Universitas Muhammadiyah Surakarta Dental Hospital. During professional orientation, students receive training on clinical service standards, standard operating procedures (SOP), and the implementation of the six patient safety goals in accordance with hospital patient safety guidelines. This training plays a crucial role in shaping

students initial understanding of patient safety as a top priority in every healthcare service. With this foundational preparation, students become more cognitively prepared to recognize potential risks and apply patient safety principles in daily clinical practice.

In the first dimension, namely identify patient correctly, the study obtained a mean score of 64.73%, which falls into the sufficient knowledge category. This finding suggests that the students understanding of this fundamental aspect of patient safety has not yet reached an optimal level. These results contradict the findings of Kyriakeli (2025), which reported that most respondents answered correctly because they were accustomed to identifying patients completely and accurately (Kyriakeli et al., 2025). In the present study, it was found that some professional dental students were not fully aware of the correct patient identification procedure, as they were not accustomed to identifying patients using the patient's name and date of birth according to official identification cards, but instead relied on medical record numbers.

In the second dimension, namely improve effective communication, this study obtained the highest mean score of 96.8% which falls into the good knowledge category. These findings are consistent with the study conducted by Neri et al. (2018), which stated that nurses with sufficient work experience demonstrate increased knowledge of effective communication techniques, particularly the Situation, Background, Assessment, and Recommendation (SBAR) (Neri et al., 2018). The results are also in line with the study by Nuryanti (2023), which reported that the majority of dentists at Universitas Muhammadiyah Semarang Dental Hospital implemented effective communication among healthcare professionals, reaching 83.3%. In the

present study, professional dental students demonstrated adequate knowledge regarding the second patient safety goal, effective communication, likely because they have been trained and accustomed to communicating effectively during skills lab sessions.

In the third dimension, namely the improve the safety of high-alert medications, this study obtained a mean score of 67.3%, categorized as sufficient. This study revealed that the level of understanding among the majority of dental clinical students remains low. This is attributed to the fact that the management and identification of high-alert medications have not yet become a primary routine in their daily clinical services. In terms of frequency, dental clinical students also rarely administer high-dosage or high-alert medications to patients, given that most daily dental procedures focus primarily on restorative, preventive, and minor surgical interventions utilizing standard drug regimens.

The findings of this study align with a study by Haskas and Rasimin (2019), which asserts that knowledge regarding high-alert medications tends to be low among students who are rarely exposed directly to critical cases and are not intensively involved in daily intensive pharmacotherapy management, thereby requiring specialized visualization or training to maintain this aspect of safety.

In the fourth dimension, namely ensure correct-site, correct procedure, correct patient surgery, this study obtained a mean score of 93.9%, which is categorized as good. These findings different from the study conducted by Kyriakeli et al. (2025), which reported that the majority of students answered incorrectly because they had not yet received adequate training regarding the principles and procedures to reduce errors in identifying the surgical

site, location, and procedure. In the present study, however, most professional dental students demonstrated good knowledge regarding correct site, correct procedure, and correct patient, likely because they had received proper instruction on accurate identification procedures prior to performing clinical treatments.

In the fifth dimension, namely the reduce the risk of health care associated infections, this study obtained a mean score of 79.1%, which falls into the good knowledge category. This finding indicates that professional dental students understanding of the basic principles of hand hygiene, as a primary strategy for infection prevention, has not yet reached an optimal level. In fact, hand hygiene is a fundamental component in breaking the chain of cross-infection transmission in healthcare facilities.

In the sixth dimension, namely the reduce of patient fall risk, this study obtained a mean score of 83.7%, which is categorized as good. These findings are consistent with the study conducted by Altunsoy et al. (2020), which reported that the majority of nurses demonstrated knowledge of patient safety principles and fall risk identification. In the present study, most professional dental students at RSGM Unimus showed good knowledge regarding fall risk reduction, likely because they are routinely trained to identify patients who are at high risk of falling.

Overall, the findings indicate that professional dental students at Universitas Muhammadiyah Semarang Dental Hospital have a good level of knowledge regarding patient safety goals. However, the lower scores observed in the identify patient correctly and improve the safety of high-alert medications highlight specific areas that require greater emphasis in clinical education. Strengthening patient safety education through regular training, simula-

tion-based learning, and periodic evaluation may further improve student's knowledge and support safer dental clinical practice.

AUTHORS CONTRIBUTION

AM: Conceptualization, Data Collection, Data Analysis, Original Draft, Writing - Review & Editing. RK: Study Design, Methodology, Validation. NKS: Interpretation, Supervision, Writing - Review. TS: Interpretation, Supervision, Review.

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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