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The Correlation between Patient Safety Culture and Infection Prevention and Control (IPC) Compliance among Dental Clinical Students at Jember University Dental Hospital

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ABSTRACT

Patient safety is an indicator of healthcare quality that can be achieved through implementation of patient safety culture. A weak patient safety culture increases the risk of patient safety incidents, including Healthcare-Associated Infections (HAIs). This highlights the importance of Infection Prevention and Control (IPC) practices to prevent the transmission of infections. Therefore, high-quality future healthcare professionals that are crucially needed, no exception for dental clinical students. This study examined the correlation between patient safety culture and IPC compliance among dental clinical students at Jember University Dental Hospital. An observational analytic, cross-sectional design was employed, involving 152 purposively selected students from integration stages I, II, and III. Patient safety culture was assessed using HSOPSC version 2.0, consisting of nine dimensions. IPC compliance focused on adherence to six-step hand hygiene procedure and Personal Protective Equipment (PPE) use. Data were analyzed using Spearman rank correlation test. Patient safety culture demonstrated strength, with 89,4% positive responses, whereas IPC compliance was suboptimal, with the percentage of 45.4%. A positive correlation was identified between patient safety culture and IPC compliance. Consequently, enhancing safety culture is essential for improved IPC in clinical settings.

Keywords: Patient safety culture; Infection Prevention and Control; Compliance; Dental clinical student; HSOPSC

INTRODUCTION

Health plays a crucial role in improving the quality of life of individuals and communities **[1]**. To achieve the improvement of life quality among individuals and communities, good quality of healthcare services is needed. The quality of healthcare services is closely associated with patient safety, which serves as a key indicator of service quality **[2]**. World Health Organization (WHO) has developed the Global Patient Safety Action Plan 2021-2030 to promote the implementation of safer healthcare systems by integrating culture, processes, procedures, behavior, technology, and environment **[3]**. Yet,

among those, one of the primary strategies to achieve patient safety is through the strengthening of patient safety culture **[4]**.

Patient safety culture reflects the perceptions, attitudes, and behaviors of all healthcare personnel in prioritizing patient safety as a shared responsibility **[5]**. A study in Ethiopia reported that the patient safety culture score was only 44%, indicating that perceptions of safety practices in healthcare facilities remain low **[6]**. A weak patient safety culture may increase the risk of patient safety incidents, including Healthcare Associated Infection (HAIs) **[7]**. The incidence of HAIs in Indonesia has reached 15,74% **[8]**, highlighting serious indication that challenges in the implementation of patient safety persist.

Speaking specifically in dentistry, the risk of infection transmission is relatively high due to procedures involving aerosol exposure and the occurrence of Needle Stick Injury (NSI) **[9,10]**. This condition underscores the importance of consistent implementation of Infection Prevention and Control (IPC) programs. WHO emphasizes that IPC compliance is a critical indicator for improving service quality and patient safety **[11]**. National regulation, as outlined in the Ministry of Health Regulation No. 27 of 2017, mandates the implementation of IPC through standard precautions, including hand hygiene and Personal Protective Equipment (PPE) **[12]**.

Several studies have demonstrated that patient safety is significantly associated with IPC practices ad the reduction of HAIs, most of these have focused on healthcare workers in general hospital **[13,14]**. In dentistry, previous studies have reported that patient safety culture among dental student is categorized as moderate to strong **[15,16]**. Other findings indicate that hand hygiene compliance reaches 94,7%, whereas compliance with PPE use is lower at 60,23% **[17]**. These studies have not examined the correlation between IPC compliance and patient safety culture. Limited studies addressing patient safety culture among dental students highlight a gap in the existing literature **[16,18]**.

Jember Univeristy Dental Hospital trains dental clinical students through direct involvement in patient care. Giving this training to students is an effort to prepare future healthcare professionals that are ready to comply with healthcare policy because these students are crucial as a promoting agent of patient safety culture during early professional education **[15]**. Internal surveys indicate a moderate safety culture among staff and healthcare workers, but data for dental clinical students are unavailable **[19]**. Besides that, hand hygiene and PPE compliance rates vary, potentially leading to inconsistencies in IPC practice **[20]**. Currently, no studies have examined correlation between patient safety culture and IPC compliance among dental clinical students at Jember University Dental Hospital. So, this study was designed to examine the correlation between patient safety culture and IPC compliance among dental clinical students at Jember University Dental Hospital.

MATERIALS & METHODS

This study employed a quantitative design using an analytical observation method with a cross-sectional approach. Location of this study was at the integrated clinics of Jember University Dental Hospital from November to December 2025. The subjects of this study consisted of dental clinical students in integration I, II, and III at Jember University Dental Hospital, selected using a purposive sampling technique, with a total sample of 152 students. The subjects were distributed across seven clinics: oral surgery, periodontics, orthodontics, prosthodontics, oral medicine, conservative dentistry, and pediatric dentistry. The independent variable was patient safety culture, while the dependent variable was IPC compliance.

Measurement of Patient Safety Culture

Patient safety culture was measured using modified version of the Hospital Survey on Patient Safety Culture (HSOPSC) Version

2.0, consisting of 9 dimensions and 28 items with 5 response options. Scores were calculated based on the percentage of positive response, with categories defined as <50% (weak), 50-75% (moderate), and >75% (strong) **[19]**.

Pearson product-moment correlation was implemented on 20 dental clinical students in integration IV at Jember University Dental Hospital as the validity testing. 9 of 28 items were not valid. Thus, revisions were made to improve the relevance and suitability. For the reliability testing, Cronbach's alpha was used, yielding a value of 0,911 (>0,6), indicating good internal consistency in measuring patient safety culture.

Measurement of IPC Compliance

IPC compliance was assessed through direct observation using a checklist based on the type of clinical procedures, including aerosol and non-aerosol procedures. Compliance was evaluated based on two aspects, hand hygiene **[21]** and PPE usage **[22]**. Hand hygiene was assessed based on the six-step handwashing procedure performed sequentially. PPE use was evaluated according to the type of clinical procedure. Aerosol procedures required the wearing of surgical masks, gloves, head covers (nurse caps), face protection (face shields/goggles), and gowns/hazard protection. Meanwhile, non-aerosol procedures required the wearing of surgical masks and gloves.

Compliance was categorized as non-compliant if the six-step handwashing procedure was not followed sequentially, and PPE was not used. Partially compliant meant either that the six-step handwasing procedure was followed or that PPE was not used. Compliant indicated that the six-step handwashing procedure was followed, and PPE was used.

Statistical Analysis

Data were analyzed using Spearman rank correlation with the Statistical Package for the Social Science (SPSS)

RESULT

Table 1. Characteristics of Subjects

Characteristics	n	%
Sex		
Male	27	17,8%
Female	125	82,2%
Total	**152**	**100%**
Integration Level		
Integration I	34	22,4%
Integration II	68	44,7%
Integration III	50	32,9%
Total	**152**	**100%**
Clinical Procedure		
Aerosol	56	36,8%
Non-aerosol	96	63,2%
Total	**152**	**100%**

Table 2. Distribution of Patient Safety Culture among Dental Clinical Students at Jember University Dental Hospital

Dimensions	Negative Response		Neutral Response		Positive Response		Category
	n	%	n	%	n	%	
1	5	1,1%	7	1,5%	444	97,4%	Strong
2	24	5,3%	72	15,8%	360	78,9%	Strong
3	1	0,2%	39	8,6%	416	91,2%	Strong
4	11	1,8%	87	14,3%	510	83,9%	Strong
5	6	1,3%	24	5,3%	426	93,4%	Strong
6	3	0,7%	29	6,4%	424	93%	Strong
7	6	1%	79	13%	523	86%	Strong

8	5	1,6%	29	9,5%	270	88,8%	Strong
9	3	0,7%	21	4,6%	432	94,7%	Strong
Total	**64**	**1,5%**	**387**	**9,1%**	**3.805**	**89,4%**	**Strong**

Table 3. Distribution of Infection Prevention and Control (IPC) Compliance Aspect

IPC Aspect	Yes		No		Total	
	n	%	n	%	n	%
Hand Hygiene						
Rubing palm to palm	152	100%	0	0%	152	100%
Rubbing right palm over left dorsum and vice versa	150	98,7%	2	1,3%	152	100%
Rubbing palm to palm with finger interlaced	144	94,7%	8	5,3%	152	100%
Rubbing back of fingers to opposing palms with fingers interlocked	144	94,7%	8	5,3%	152	100%
Rubbing thumbs	146	96,1%	6	3,9%	152	100%
Rubbing fingertips	147	96,7%	5	3,3%	152	100%
Performed sequentially	73	48%	79	52%	152	100%
PPE						
Mask	152	100%	0	0%	152	100%
Gloves	152	100%	0	0%	152	100%
Head protection (nurse cap) *	28	50%	28	50%	96	100%
Face protection (face shield/ goggles) *	39	69,6%	17	30,4 %	96	100%
Gown/Hazard*	54	96,4%	2	3,6%	96	100%

*Applicable only for aerosol-generating procedures

Table 4. Classification of IPC Compliance

IPC Compliance Category	n	%
Non-compliant	25	16,4%
Partially compliant	58	38,2%
Compliant	69	45,4%
Total	**152**	**100%**

Table 5. IPC Compliance Classification Based on Type of Clinical Procedure

Clinical Procedure	IPC Compliance						Total	
	Non-compliant		Partially compliant		Compliant			
	n	%	n	%	n	%	n	%
Aerosol	25	44,6%	20	35,7%	11	19,7%	56	100%
Non-aerosol	0	0%	38	39,6%	58	60,4%	96	100%
Total	**25**	**16,4%**	**58**	**38,2%**	**69**	**45,4%**	**152**	**100%**

Table 6. Correlation Between Patient Safety Culture and IPC Compliance among Dental Clinical Students

			Patient Safety Culture	IPC Compliance
Spearman's rho	Patient Safety Culture	*Correlation Coefficient*	*1.000*	*.525***
		Sig. (2-tailed)	*.*	*.000*
		N	*152*	*152*
	IPC Compliance	*Correlation Coefficient*	*.525***	*1.000*
		Sig. (2-tailed)	*.000*	*.*
		N	*152*	*152*
***. Correlation is significant at the 0.01 level (2-tailed).*				

RESULT

A total of 152 dental clinical students participated in this study. The majority of respondents were female (82,2%). Based on the integration level, most respondents were from integration II (44,7%). In the terms of clinical procedures, non-aerosol procedures were more frequently performed compared to aerosol procedures (63,2%) (Table 1).

The measurement of patient safety culture showed that all dimensions were categorized as strong, with positive response from 78,9% to 97,4%. Total positive response reached 89,4%, indicating a strong patient safety culture among dental clinical student (Table 2).

In terms of IPC compliance in hand hygiene, although most respondents performed each step, only 48% completed the six-step handwashing procedure sequentially. In terms of PPE usage, all respondents wore mask and gloves (100%) (Table 3).

Based on the overall classification of IPC compliance, 45,4% of respondents were categorized as compliant (Table 4). When analyzed by the type of clinical procedures, non-compliance was more common in aerosol procedures 44,6%, whereas compliance was higher in non-aerosol procedures 60,4% (Table 5).

Spearman correlation test showed a statistically significant between patient safety culture and IPC compliance (p=0,000). Correlation coefficient (r=0,525) indicated a positive correlation with moderate strength (Table 6).

DISCUSSION

Patient Safety Culture among Dental Clinical Students at Jember University Dental Hospital

Patient safety culture among dental clinical students at Jember University Dental Hospital was categorized as strong, with a total positive response score of 89,4%. This finding indicates that practices aimed at ensuring patient safety within the Jember University Dental Hospital environment have been well established.

Teamwork dimension obtained the highest percentage of positive responses. This finding suggest that dental clinical students have developed the ability to collaborate and coordinate effectively in delivering patient care. Teamwork is a crucial component of patient safety culture, as it enables healthcare personnel to support one another in preventing errors and improving the quality of care [23]. This result is consistent with previous studies reporting that teamwork is among the highest-scoring dimensions of patient safety culture across various healthcare settings [24].

Despite a strong overall patient safety culture, the staffing and work pace dimension had the lowest percentage of positive responses. This dimension reflects staff, workload, and work organization in supporting safe healthcare services [23]. This finding is consistent with previous studies indicating that staffing-related aspects are often identified as areas requiring improvement in the implementation of patient safety culture [7]. High service demands and students involvement in clinical education may increase time pressure, potentially affecting safety practices.

IPC Compliance among Dental Clinical Students at Jember University Dental Hospital

IPC compliance was observed in 45,4% of respondents, reflecting variability in adherence to IPC practices. This finding indicates that a substantial proportion of dental clinical students have not fully implemented IPC practices in accordance with established policies and standarts. This condition requires particular attention, considering that dental clinical students are directly involved in patient care and are at high risk of cross-infection.

Regarding hand hygiene, 48% of subjects did not perform the six-step handwashing procedure in sequence. This finding is consistent with previous research [25]. Several factors may contribute to suboptimal adherence to proper handwashing techniques including time constrainsts, forgetfulness due to high workload, underdeveloped habits, and availability of hand hygiene facilities [26].

Regarding PPE usage, 50% of students did not wear a head protection, and 30,4% did not wear face protection. This finding align with previous studies indicating that nurse cap are among the last frequently worn PPE

items to be used [27]. Similary, face shields has been reported as having the lowest compliance rate among PPE components [22]. Variations in compliance across PPE items suggest that equipment such as mask, gloves, and gown are perceived as essential, whereas face and head protection are often considered less necessary, leading to inconsistent wearing. This finding is supported by previous research indicating that variations in PPE component occur in daily clinical practice [28].

IPC compliance was higher in non-aerosol procedures compared to aerosol procedures. This may be influenced by factors such as time constraints, in which the wearing of complete PPE is perceived as slowing down clinical procedures [27]. Limited clinical experience, insufficient training, suboptimal knowledge, and the absence of consistent enforcement mechanisms may contribute to lower IPC compliance [29]. Monitoring and diversion review also play a significant role in improving IPC compliance [30]. The lower compliance observed in aerosol-related procedures suggest that the perceived risk of aerosol exposure may not be fully understood or prioritized by some dental clinical students, despite the higher risk of infection transmission associated with such procedures.

Correlation between Patient Safety Culture and IPC Compliance among Dental Clinical Students

The correlation analysis demonstrated a significant association between patient safety culture and IPC compliance among dental clinical students. The moderate positive correlation indicates that higher levels of patient safety culture are associated with a greater likelihood of adherence to IPC practices. This correlation can be explained through the concept of organizational culture, which influences individual behaviour within the work environment. Patient safety culture share values, norms, and perceptions regarding the importance of safety practices in healthcare. These values, influence healthcare personnel's attitude and behaviors when implementing safety procedures, including compliance with IPC [31].

Furthermore, this correlation can also be explained by the Theory of Planned Behavior, which states that individual behaviour is influenced by attitudes, subjective norms, and perceived behavioral control [32]. In healthcare, patient safety culture may establish social norms that encourage individuals to adhere to safety practices as part of their professional responsibilities.

However, the moderate strength of the correlation indicates that patient safety culture is not the sole factor influencing IPC compliance. Other factors, such as knowledge, training, motivation, workload, and supervisory systems, may also affect compliance behavior among healthcare personnel [33,34].

This study suggest that a strong patient safety culture serves an important foundation for improving compliance with IPC practices. The consistent implementation of patient safety culture, supported by open communication, teamwork, and leadership, can create a safer healthcare environment for patients.

CONCLUSION

There was a statistically significant positive correlation between patient safety culture and IPC compliance among dental clinical students at Jember University Dental Hospital. A higher level of patient safety culture was associated with greater compliance with IPC practices. Patient safety culture serves as a behavioral framework that influences individuals in understand risks, adhere to procedures, and take responsibility for patient safety through IPC. A supportive patient safety culture environment encourages dental clinical students to be more consistent in complying with IPC practices.

Declaration by Authors

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