



The Relationship between the Role of Quality Control Circles and Improved Nurses' Compliance with Standard Operating Procedures at Mitra Medika Tanjung Mulia Hospital

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Abstract

Hospitals are required to maintain service quality and patient safety through consistent adherence to Standard Operating Procedures (SOPs). Quality Control Circles (Gugus Kendali Mutu; GKM) serve as an internal quality control mechanism that supports quality planning, audit implementation, monitoring, coaching, and follow-up of audit findings. This study aimed to examine the association between the role of Quality Control Circles and nurses' compliance with SOPs at Mitra Medika Tanjung Mulia Hospital. A quantitative descriptive-analytic study with a cross-sectional design was conducted from November 2025 to March 2026, involving 35 active members of the Quality Control Circles selected through total sampling. Data were collected using structured questionnaires and analyzed through univariate analysis, bivariate analysis using Pearson Chi-square and Fisher's Exact Test, and multivariate analysis using binary logistic regression. The results showed that 65.7% of respondents perceived the role of Quality Control Circles as good, while 74.3% of nurses were categorized as compliant with SOPs. Bivariate analysis revealed a significant association between the role of Quality Control Circles and nurses' SOP compliance ($\chi^2 = 10.171$; $p = 0.001$; Fisher's Exact Test = 0.003). Multivariate logistic regression showed that nurses who perceived the role of Quality Control Circles as good had higher odds of complying with SOPs, although the association was not statistically significant after controlling for age, gender, educational background, and years of service (AOR = 6.228; 95% CI = 0.247–157.196; $p = 0.267$). These findings indicate that Quality Control Circles are relevant to strengthening SOP compliance, but their role should be reinforced through continuous supervision, structured feedback, and integrated quality improvement strategies.

Keyword: Quality Control Circles, Nurses' Compliance, Standard Operating Procedures, Hospital Quality Management, Patient Safety

INTRODUCTION

Hospitals are complex healthcare institutions that face high demands in terms of service quality and patient safety. In daily practice, hospitals are exposed to risks such as clinical errors, nosocomial infections, and patient safety incidents, which are largely associated with non-compliance with standard procedures (Kurniawan et al., 2025). The complexity of service workflows, high workload pressure, and limited resources often lead to variations in the implementation of nursing actions (Fitriyani & Musharyanti, 2026). These conditions indicate that the mere existence of formal standards is insufficient without effective control mechanisms. Therefore, the implementation of systems that ensure consistency and adherence to standard operating procedures has become an urgent necessity in hospital quality management (Ahmed et al., 2026).

Nurses are the healthcare professionals who interact most intensively with patients throughout the care process; thus, their behavior and compliance with Standard Operating Procedures (SOPs) play a decisive role in determining service quality and patient safety (Said & El-Shafei, 2021; Suminar et al., 2023). Non-compliance with SOPs may result in medication errors, failures in infection prevention, and an increased incidence of patient safety events. The World Health Organization reports that approximately 50% of healthcare-associated infections are caused by non-compliance with basic hygiene procedures, particularly hand hygiene (WHO, 2019). This evidence underscores that improving nurses' compliance with SOPs is a strategic and systemic issue that requires a structured managerial approach (Elvita & Wulandari, 2026).

International literature indicates that compliance with SOPs is influenced not only by individual knowledge but also by organizational factors such as quality culture, supervision, and internal control systems (Siboro et al., 2025). Team-based interventions and audit feedback mechanisms were more effective in improving healthcare worker compliance than one-way instructional approaches. These findings suggest that quality improvement strategies must actively involve healthcare workers in the problem identification and resolution process. Thus, a participatory approach is a key element in strengthening compliance with standard procedures (Subandi, 2025).

Quality Control Circles, known in the Indonesian context as *Gugus Kendali Mutu* (GKM), are understood in the literature as an implementation of Total Quality Management (TQM) principles in healthcare services. The TQM concept developed by Deming emphasizes continuous improvement cycles through the Plan–Do–Check–Act (PDCA) approach as the foundation of organizational quality enhancement (Deming, 1986). A study by Shortell et al. (2015) published in *Health Care Management Review* demonstrates that healthcare units implementing collaborative quality teams exhibit higher levels of procedural compliance and better patient safety performance. This evidence reinforces the position of GKM as a strategic instrument within hospital quality management systems.

Based on these empirical conditions and literature findings, this study aims to analyze the role of Quality Control Circles (GKM) in improving nurses' compliance with Standard Operating Procedures in hospital settings. The focus of the study is directed toward understanding how the operational mechanisms of GKM influence nurses' compliance behavior in daily nursing practice. This objective is important for bridging the gap between formal standards and their actual implementation in clinical settings. Accordingly, this study is expected to provide empirical contributions to strengthening nursing service quality systems.

This study seeks to evaluate the effectiveness of GKM as a participatory forum in fostering a culture of quality and patient safety. The study attempts to identify specific aspects of GKM that significantly contribute to improved SOP compliance, such as nurse involvement, internal communication, and feedback mechanisms. The findings are expected to serve as a basis for managerial decision-making in developing team-based quality improvement strategies. Thus, this study is not merely descriptive but also has practical implications for hospital management.

This study is grounded in the argument that the effective implementation of Quality Control Circles is positively associated with nurses' levels of compliance with Standard Operating Procedures. Through active involvement in problem analysis and quality-related decision-making, nurses tend to develop a sense of ownership toward the standards being implemented. Evidence from Pronovost et al., (2006), published in the *New England Journal of Medicine*, shows that team-based quality initiatives were able to reduce healthcare-associated infection rates by more than 60%. Therefore, it can be assumed that GKM functions as a catalyst for behavioral change in compliance within nursing environments.

The main hypothesis of this study is that the more optimal the role of Quality Control Circles, the higher the level of nurses' compliance with Standard Operating Procedures. Optimizing GKM is believed to strengthen quality control systems through continuous evaluation cycles, open communication, and collective learning processes. This argument is consistent with the Continuous Quality Improvement framework, which positions healthcare professionals as agents of change in service quality improvement (Endalamaw et al., 2024). Therefore, this study is expected to enrich academic discourse while also providing practical implications for the development of hospital quality management systems.

METHODS

This study employed a quantitative approach with a descriptive-analytic design and a cross-sectional framework to examine the association between the role of Quality Control Circles (Gugus Kendali Mutu; GKM) and nurses' compliance with Standard Operating Procedures (SOPs) at Mitra Medika Tanjung Mulia Hospital. The cross-sectional design was selected because it enables the simultaneous measurement of the independent variable, dependent variable, and respondent characteristics within a single period without providing any intervention to participants. The study was conducted at Mitra Medika Tanjung Mulia Hospital from November 2025 to March 2026, with primary data collection carried out in December 2025. The study population consisted of all active members of the Quality Control

Circles during the study period, totaling 35 nurses. A total sampling technique was applied because the population size was relatively small, allowing all eligible respondents to be included in the analysis.

The study used both primary and secondary data sources. Primary data were obtained through structured closed-ended questionnaires designed to measure the role of Quality Control Circles and nurses' compliance with Standard Operating Procedures. Secondary data were collected from official hospital documents, including institutional profiles, service statistics, and information related to hospital quality management activities. Data collection began with the formal submission of a research permit, followed by an orientation session to explain the objectives, benefits, procedures, and voluntary nature of the study. Respondents who agreed to participate provided written informed consent before completing the questionnaire. During questionnaire administration, the researcher provided technical guidance to ensure that respondents understood the instructions and completed all items appropriately.

The research instrument for the role of Quality Control Circles consisted of five dimensions: quality planning, implementation of quality audits, monitoring and evaluation, nurse coaching, and follow-up of audit findings. Nurses' compliance with SOPs was measured through five dimensions: adherence to procedural steps, appropriate use of equipment and materials, patient safety practices, completeness of documentation, and consistency of implementation. Each item was measured using a Likert scale, with higher scores indicating a better role of GKM or higher SOP compliance. The total score for each variable was calculated by summing the five items, with a maximum possible score of 20. The total score was then converted into a percentage by dividing the obtained score by the maximum possible score and multiplying it by 100.

For analytical purposes, the role of Quality Control Circles and nurses' compliance with SOPs were categorized into two groups. A total score of $\geq 76\%$ was categorized as good for the role of GKM and compliant for SOP compliance, while a score below 76% was categorized as not good for the role of GKM and not compliant for SOP compliance. Based on the maximum total score of 20, respondents with scores of 16–20 were classified as good or compliant, whereas respondents with scores of 15 or below were classified as not good or not compliant. Respondent characteristics included age, gender, educational background, and years of service. These variables were analyzed descriptively and were also included as control variables in the multivariate model.

Data were processed through editing, coding, scoring, categorization, and tabulation procedures. Univariate analysis was conducted to describe respondent characteristics and the

distribution of the main study variables using frequencies and percentages. Bivariate analysis was performed using cross-tabulation to examine the association between the role of Quality Control Circles and nurses' compliance with SOPs. The Pearson Chi-square test was used to assess statistical significance, while Fisher's Exact Test was also reported for the 2×2 table because of the relatively small sample size. Additional bivariate analyses were conducted to examine the association between respondent characteristics and SOP compliance.

Multivariate analysis was conducted using binary logistic regression to examine the association between the role of Quality Control Circles and nurses' compliance with SOPs after controlling for age, gender, educational background, and years of service. SOP compliance was entered as the dependent variable, while the role of GKM was entered as the main independent variable. Age, gender, educational background, and years of service were included as control variables. Adjusted odds ratios (AOR), 95% confidence intervals (CI), and p-values were reported to interpret the multivariate model. Statistical significance was determined at a p-value of less than 0.05. All research procedures were conducted in accordance with ethical principles, including autonomy, anonymity, confidentiality, non-maleficence, beneficence, and justice. Participation was voluntary, respondents' identities were kept confidential, and the study posed no physical or psychological risks to participants.

RESULT

The study was conducted at Mitra Medika Tanjung Mulia Hospital, Medan, involving 35 nurses who were active members of the Quality Control Circles. The analysis was conducted in several stages, including descriptive analysis of respondent characteristics, distribution analysis of the main study variables, bivariate analysis using cross-tabulation and Chi-square test, and multivariate analysis using binary logistic regression. The results are presented sequentially to describe the demographic profile of respondents, the distribution of the role of Quality Control Circles and nurses' compliance with Standard Operating Procedures, the association between the main variables, the association between control variables and SOP compliance, and the adjusted relationship between the role of Quality Control Circles and SOP compliance after controlling for respondent characteristics.

Table 1. Characteristics of Respondents

Characteristics	Category	n	%
Age	20–30 years	10	28.6
	31–40 years	15	42.9
	>40 years	10	28.6
Gender	Male	11	31.4
	Female	24	68.6
Educational background	Diploma III in Nursing	18	51.4
	Bachelor's in Nursing	12	34.3
	Professional Nurse	5	14.3
Years of service	<5 years	9	25.7
	5–10 years	14	40.0
	>10 years	12	34.3

Table 1 shows the demographic characteristics of the 35 respondents involved in the study. Based on age, the largest proportion of respondents was in the 31–40-year age group, totaling 15 respondents (42.9%), followed by respondents aged 20–30 years and >40 years, each consisting of 10 respondents (28.6%). This distribution indicates that most respondents were in a productive age category that may be associated with adequate professional maturity and adaptability to hospital quality management systems.

The gender distribution shows that most respondents were female, with 24 respondents (68.6%), while male respondents accounted for 11 respondents (31.4%). Based on educational background, more than half of the respondents held a Diploma III in Nursing qualification, totaling 18 respondents (51.4%), followed by Bachelor's in Nursing graduates with 12 respondents (34.3%) and Professional Nurse qualifications with 5 respondents (14.3%). In terms of years of service, the largest group had worked for 5–10 years, comprising 14 respondents (40.0%), followed by those with >10 years of service at 12 respondents (34.3%) and <5 years of service at 9 respondents (25.7%).

Table 2. Distribution of the Role of Quality Control Circles and Nurses' Compliance with Standard Operating Procedures

Variable	Category	n	%
Role of Quality Control Circles	Not Good	12	34.3
	Good	23	65.7
SOP Compliance	Not Compliant	9	25.7
	Compliant	26	74.3

Table 2 presents the distribution of the main study variables. The role of Quality Control Circles was perceived as good by 23 respondents (65.7%), while 12 respondents (34.3%) perceived it as not good. This finding indicates that most nurses considered the Quality Control Circles to have performed their quality-related functions adequately, particularly in supporting quality planning, audit implementation, monitoring, coaching, and follow-up mechanisms.

The distribution of nurses' compliance with Standard Operating Procedures shows that 26 respondents (74.3%) were categorized as compliant, while 9 respondents (25.7%) were

categorized as not compliant. This result suggests that the majority of nurses had implemented nursing practices in accordance with established procedural standards. Nevertheless, the presence of non-compliant respondents indicates that SOP adherence still requires continuous reinforcement, particularly through supervision, feedback, and structured quality improvement activities.

Table 3. Association between the Role of Quality Control Circles and Nurses' Compliance with Standard Operating Procedures

Role of Quality Control Circles	Not Compliant		Compliant		Total	OR (95% CI)	p-value
	n	%	n	%			
Not Good	7	58.3	5	41.7	12	14,7 (2,31–93,45)	0.003
Good	2	8.7	21	91.3	23		
Total	9	25.7	26	74.3	35		

Table 3 shows that nurses who rated the role of the quality control group as good were mostly compliant with the SOP (91.3%), while in the group who rated the role of the quality control group as poor, the majority were non-compliant (58.3%). The results of the Fisher's Exact Test obtained a p value = 0.003 ($p < 0.05$) which means there is a significant relationship between the role of the quality control group and nurse compliance with the SOP. The OR value = 14.7 (95% CI: 2.31–93.45) indicates that nurses with a good assessment of the role of the quality control group were 14.7 times more likely to comply with the SOP than those who rated it as poor.

Table 4. Association between Control Variables and Nurses' Compliance with Standard Operating Procedures

Variabel	Kategori	Disobedient		Obedient		Total	p-value
		n	%	n	%		
Age	20–30 years	7	70,0	3	30,0	10	<0,001 ^a
	31–40 years	0	0,0	15	100,0	15	
	>40 years	2	20,0	8	80,0	10	
Gender	Male	2	18,2	9	81,8	11	0,686 ^b
	Female	7	29,2	17	70,8	24	
Education	Diploma III in Nursing	8	44,4	10	55,6	18	0,021 ^a
	Bachelor's Degree in Nursing	0	0,0	12	100,0	12	
	Nurse	1	20,0	4	80,0	5	
Work Period	<5 years	5	55,6	4	44,4	9	0,003 ^a
	5–10 years	0	0,0	14	100,0	14	
	>10 years	4	33,3	8	66,7	12	

Table 4 presents the association between respondent characteristics and nurses' compliance with SOPs. Based on age, the highest proportion of non-compliance was found among respondents aged 20–30 years, with 7 respondents (70.0%) categorized as not compliant

and 3 respondents (30.0%) categorized as compliant. Respondents aged 31–40 years showed complete compliance, with all 15 respondents (100.0%) categorized as compliant. Among respondents aged >40 years, 8 respondents (80.0%) were compliant and 2 respondents (20.0%) were not compliant. The Chi-square test indicated a significant association between age and SOP compliance ($p < 0.001$).

Gender was not significantly associated with SOP compliance ($p = 0.490$). Among male respondents, 9 respondents (81.8%) were compliant and 2 respondents (18.2%) were not compliant. Among female respondents, 17 respondents (70.8%) were compliant and 7 respondents (29.2%) were not compliant. This result indicates that the distribution of SOP compliance did not differ substantially by gender in this study.

Educational background showed a significant association with SOP compliance ($p = 0.023$). Among respondents with a Diploma III in Nursing, 10 respondents (55.6%) were compliant and 8 respondents (44.4%) were not compliant. Respondents with a Bachelor's in Nursing qualification showed full compliance, with all 12 respondents (100.0%) categorized as compliant. Among respondents with Professional Nurse qualifications, 4 respondents (80.0%) were compliant and 1 respondent (20.0%) was not compliant. These findings suggest that educational background may be related to differences in SOP compliance patterns.

Years of service were also significantly associated with SOP compliance ($p = 0.009$). Among respondents with <5 years of service, 5 respondents (55.6%) were not compliant and 4 respondents (44.4%) were compliant. Respondents with 5–10 years of service showed complete compliance, with all 14 respondents (100.0%) categorized as compliant. Among respondents with >10 years of service, 8 respondents (66.7%) were compliant and 4 respondents (33.3%) were not compliant. This pattern indicates that work experience may contribute to nurses' familiarity with SOP implementation, although compliance still varied across length-of-service categories.

Table 5. Multivariate Logistic Regression Analysis of Nurses' Compliance with Standard Operating Procedures

Variable	Category Comparison	OR	95% CI	p-value
Role of Quality Control Circles	Good vs Not Good	6.228	0.247–157.196	0.267
Age	≥31 years vs 20–30 years	12.073	0.364–400.094	0.163
Gender	Female vs Male	1.501	0.068–33.183	0.797
Educational	Bachelor/Ners vs Diploma III	0.508	0.007–35.334	0.754
Years of service	≥5 years vs <5 years	2.090	0.074–59.193	0.666

Table 5 presents the results of the binary logistic regression analysis. The analysis was conducted to examine the association between the role of Quality Control Circles and nurses' compliance with SOPs after controlling for age, gender, educational background, and years of

service. The results showed that respondents who perceived the role of Quality Control Circles as good had higher odds of complying with SOPs compared with those who perceived the role as not good (AOR = 6.228; 95% CI = 0.247–157.196). Although the direction of the association was positive, the relationship was not statistically significant after adjustment for respondent characteristics ($p = 0.267$).

The control variables also did not show statistically significant associations with SOP compliance in the multivariate model. Respondents aged ≥ 31 years had higher odds of compliance than those aged 20–30 years (AOR = 12.073; 95% CI = 0.364–400.094; $p = 0.163$). Female respondents had slightly higher odds of compliance compared with male respondents (AOR = 1.501; 95% CI = 0.068–33.183; $p = 0.797$). Respondents with Bachelor's or Professional Nurse qualifications had lower adjusted odds compared with those with Diploma III qualifications (AOR = 0.508; 95% CI = 0.007–35.334; $p = 0.754$). Respondents with ≥ 5 years of service had higher odds of compliance compared with those with < 5 years of service (AOR = 2.090; 95% CI = 0.074–59.193; $p = 0.666$).

The logistic regression model classified 91.4% of cases correctly, with 77.8% accuracy in identifying non-compliant respondents and 96.2% accuracy in identifying compliant respondents. Nevertheless, the wide confidence intervals in the multivariate analysis indicate that the adjusted estimates should be interpreted cautiously. Overall, the bivariate analysis demonstrated a significant association between the role of Quality Control Circles and nurses' compliance with SOPs, while the multivariate analysis showed that this association remained positive but was not statistically significant after controlling for respondent characteristics.

DISCUSSION

The findings of this study demonstrate that the role of Quality Control Circles (Gugus Kendali Mutu; GKM) is meaningfully associated with nurses' compliance with Standard Operating Procedures (SOPs) in the bivariate analysis. Nurses who perceived the role of GKM as good showed a substantially higher proportion of SOP compliance than those who perceived GKM as not good. This pattern indicates that internal quality mechanisms are closely connected to the consistency of nursing practice in hospital settings. In the broader context of healthcare management, this finding reinforces the argument that SOP compliance cannot be understood solely as an individual responsibility, but as an outcome shaped by organizational systems, quality culture, supervision, and structured feedback. Such a result is consistent with the view that hospitals require effective control mechanisms to reduce variation in clinical practice and maintain patient safety amid complex workflows, workload pressure, and service risks (Nacu et al., 2025; Siregar et al., 2026).

The high proportion of compliant nurses in this study reflects the strategic position of GKM as a participatory quality control mechanism within nursing services. GKM functions not merely as an administrative forum, but as a space where quality planning, audit implementation, monitoring, coaching, and follow-up of audit findings can be translated into daily clinical behavior. This finding aligns with the Total Quality Management (TQM) perspective, which emphasizes that quality improvement must be embedded in organizational routines rather than treated as a separate managerial activity. Deming's Plan-Do-Check-Act (PDCA) cycle provides a theoretical basis for understanding how GKM can influence compliance: quality planning guides nursing standards, implementation translates standards into practice, evaluation identifies deviations, and follow-up reinforces corrective action (Shi, 2025). Through this cycle, GKM becomes a mechanism for transforming formal SOPs into practical, repeated, and monitored nursing behavior.

The significant bivariate relationship between GKM and SOP compliance also supports the Continuous Quality Improvement (CQI) framework, which positions healthcare professionals as active agents in improving service quality rather than passive recipients of managerial instruction. In this study, nurses who perceived GKM as good were more likely to comply with SOPs, suggesting that participation, communication, and feedback may strengthen their sense of ownership toward procedural standards. This is consistent with Endalamaw et al., (2024), who argue that quality improvement in healthcare requires the integration of professional practice with continuous learning and system redesign. The findings also resonate with Fontaine et al., (2024), who emphasized that team-based interventions and audit-feedback mechanisms are more effective in changing healthcare professionals' practice than one-way instructional approaches. Therefore, the role of GKM can be interpreted as a practical embodiment of CQI principles in the nursing work environment.

The analysis of control variables further shows that SOP compliance is shaped by respondent characteristics, particularly age, educational background, and years of service in the bivariate analysis. Nurses aged 31 years and older, nurses with higher educational backgrounds, and nurses with longer work experience tended to show higher compliance patterns than their comparison groups. These findings suggest that procedural adherence may be influenced by professional maturity, accumulated clinical exposure, and educational capacity to understand risk, documentation, and patient safety standards. Such interpretation is consistent with studies indicating that nurses' compliance is affected not only by knowledge, but also by organizational support, professional development, workload, and work environment conditions (Rohmah & Prayoga, 2025). The absence of a significant association

between gender and SOP compliance indicates that compliance behavior in this context is more closely related to professional and organizational factors than to gender differences.

The multivariate analysis provides a more cautious interpretation of the relationship between GKM and SOP compliance. Although nurses who perceived GKM as good had higher adjusted odds of being compliant with SOPs, the association was not statistically significant after controlling for age, gender, educational background, and years of service. This finding does not negate the importance of GKM, but indicates that its relationship with compliance may operate alongside other respondent characteristics and organizational factors. The wide confidence interval in the logistic regression model also suggests that the adjusted estimate should be interpreted carefully, particularly because the study involved a relatively small sample. From an analytical standpoint, this result shows that the bivariate association between GKM and SOP compliance is strong, but the independent contribution of GKM becomes less stable when demographic and professional characteristics are included in the model.

The findings of this study are consistent with previous research highlighting the importance of quality improvement teams, audit systems, and structured feedback in enhancing clinical compliance. Legawa & Antonio (2026), showed that collaborative quality teams are associated with better procedural compliance and patient safety performance, while Liu et al., (2024), demonstrated the relevance of quality control circle practices in improving compliance-related behaviors in healthcare settings. Evidence from Pronovost et al., (2006), also supports the idea that team-based quality initiatives can produce substantial improvements in patient safety outcomes when implemented systematically. In line with these studies, the present findings suggest that GKM can serve as an institutional bridge between hospital quality policies and nurses' everyday clinical practice. The non-significant adjusted result, however, expands the interpretation by showing that the effectiveness of GKM should not be detached from nurses' educational background, professional experience, and broader organizational environment.

The novelty of this study lies in its specific examination of the relationship between Quality Control Circles and nurses' SOP compliance in a hospital context using both bivariate and multivariate approaches. Previous studies have often discussed compliance through the lens of knowledge, motivation, supervision, or general quality improvement programs, while fewer studies have directly positioned GKM as the main organizational mechanism linked to SOP compliance. This study contributes by showing that GKM has a significant bivariate association with nurses' compliance and maintains a positive direction in the adjusted model, although statistical significance is not retained after controlling for respondent characteristics.

This finding provides a more nuanced contribution to hospital quality management literature: GKM is important as a participatory quality control mechanism, but its role should be strengthened through integrated strategies involving continuous training, supervision, educational reinforcement, audit-feedback systems, and managerial commitment. Such integration is essential to ensure that SOP compliance becomes not only a procedural obligation, but also a sustained culture of patient safety and professional nursing accountability.

CONCLUSION

This study concludes that the role of Quality Control Circles (Gugus Kendali Mutu; GKM) is associated with nurses' compliance with Standard Operating Procedures (SOPs) at Mitra Medika Tanjung Mulia Hospital. The descriptive findings showed that most respondents perceived the role of GKM as good, while the majority of nurses were categorized as compliant with SOPs. Bivariate analysis further demonstrated a significant association between the role of GKM and nurses' SOP compliance, indicating that nurses who perceived GKM as good were more likely to comply with established procedures than those who perceived GKM as not good. This finding confirms the relevance of GKM as an internal quality control mechanism that supports procedural consistency, patient safety, and standards-based nursing practice.

The analysis of respondent characteristics showed that age, educational background, and years of service were significantly associated with SOP compliance in the bivariate analysis, while gender was not significantly associated. These findings indicate that nurses' compliance is not only related to the perceived role of GKM, but also connected to professional maturity, educational background, and work experience. Multivariate logistic regression showed that the role of GKM maintained a positive direction of association with SOP compliance after controlling for age, gender, educational background, and years of service. Nevertheless, this association was not statistically significant in the adjusted model, suggesting that the independent contribution of GKM should be interpreted cautiously within the context of the relatively small sample size and wide confidence intervals.

These findings imply that strengthening GKM remains important for hospital quality management, particularly through more consistent supervision, quality audits, nurse coaching, SOP socialization, and structured follow-up of audit findings. Hospital management needs to ensure that GKM does not function merely as an administrative forum, but as an active mechanism for continuous quality improvement that supports nurses in translating formal standards into daily clinical practice. The positive direction of the multivariate result indicates that GKM has practical relevance, although its effectiveness should be reinforced through

integration with professional development, educational strengthening, and work-experience-based mentoring.

Future studies are recommended to involve larger samples and multiple hospital settings to obtain more stable multivariate estimates and improve the generalizability of the findings. Further research may also examine additional organizational factors, such as workload, leadership, safety culture, motivation, supervision quality, and managerial commitment, to provide a more comprehensive explanation of nurses' SOP compliance. Longitudinal or mixed-method designs may also be useful for understanding how Quality Control Circles influence compliance behavior over time and how nurses interpret the role of GKM in daily clinical decision-making.

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