ORIGINAL RESEARCH

Patient Safety Culture, Infection Prevention, and Patient Safety in the Operating Room: Health Workers' Perspective

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Introduction: A hospital's patient safety culture affects surgical outcomes. Operating room safety culture has been overlooked despite the importance of patient safety. The AHRQ's Hospital Survey on Patient Safety Culture (HSOPSC) has been used worldwide to assess and enhance patient safety culture. This study examined how patient safety culture and infection prevention effect patient safety in the Operating Room (OR).

Methods: This observational study used an online survey and included 143 OR workers. Descriptive statistics and multilinear regression were used to examine how patient safety culture and infection prevention affects level of patient safety.

Results: Most responders worked in excellent-accredited general hospitals. Most responders were male, aged between 26 to 40 years old, and had bachelor's degrees. Most were hospital-experienced nurses. Less than half had worked in units for over ten years. Organizational Learning - Continuous Improvement; Teamwork and Handoffs; and Information Exchange had the most positive responses in the OR. However, Staffing, Work Pace, and Patient Safety ranked lowest. Organizational Learning - Continuous Improvement and Hospital Management Support for Infection Prevention Efforts were found to affect OR patient safety level perceptions.

Conclusion: According to the findings of our study, the overall patient safety culture in the operating room remains weak which highlights the importance of continuing efforts to improve patient safety in the OR. Further study could be directed to identify organizational learning in infection prevention to enhance the patient safety in the OR.

Keywords: patient safety, infection prevention, organizational culture, safety culture, operating room

Introduction

Maintaining patient safety in the operating room (OR) is crucial.[1] It is vital to avoid unnecessary problems, and the pressure to avoid these consequences during surgery is extremely intense. From 2012 to 2015, a research in a medium-sized hospital in a developed country identified 220 occurrences in the OR.[2] According to WHO data, surgical mistake (18%) was one of the top three activities leading to hazardous occurrences in poor countries.[3] Furthermore, a blaming culture, a lack of support, and a lack of a clear and transparent investigative process appeared to amplify the impact of patient safety issues in the OR.[4] Whereas patient safety is one indicator that must be considered in the OR.[5]

Patient safety culture is characterized as employees' attitudes, views, and values around patient safety.[6] The Agency for Healthcare Research and Quality (AHRQ) released the Hospital Survey on Patient Safety Culture (HSOPSC) to examine patient safety culture in hospitals.[7] The perceptions of frontline employees about the OR's safety culture may thus provide a credible foundation for evaluating and enhancing surgical patient safety.[8] A hospital's patient safety

culture can influence surgical patient outcomes.[9] Improving a hospital's safety culture can help to assist hospital-level surgical quality improvement efforts.

Infection control and prevention are crucial for guaranteeing the safety of patients undergoing surgical operations in the OR.[10] To limit the risk of problems in surgical procedures, the WHO established 10 fundamental objectives for safe surgery and a Surgical Safety Checklist (SSC).[11] SSC by WHO included three steps: before anesthesia induction (sign-in), before skin incision (time-out), and before the patient left the OR (sign-out). Nursing staff may check proof of sterility and equipment availability as an example of SSC items. This checklist is generally applicable to reduce major surgical complications.

Infection is a significant cause of morbidity and mortality in the OR, possibly due to an increase in the number of elderly surgical patients or those with a variety of chronic and immunocompromising conditions, as well as the emergence of antibiotic-resistant microorganisms.[10,12] As a result, adequate interventions to limit the occurrence of related infections must be implemented in order to assure improved surgical outcomes.[10] Infection prevention should be integrated into comprehensive surgical quality improvement programs to improve patient safety.[13]

Surgeons, anesthesiologists, nurses, and other OT personnel play an important role in improving patient safety.[14] The presence of errors, such as unintentional patient exposure in the OR, will have an impact on patient safety.[15] Doctors and nurses who worked longer hours in the OR and reported more mishaps had less positive opinions about patient safety.[16] A positive work atmosphere is critical because it can improve treatment outcomes and promote a safer care setting when combined with proper staffing.[16] However, insufficient attention has been paid to the OR safety culture.[8] Furthermore, a study conducted in one hospital in Indonesia discovered that the surgical department, including the OR, had the lowest patient safety culture score.[17] Therefore purpose of this study was to investigate the impact of patient safety culture and infection prevention on patient safety in the OR.

Materials and Methods

Research Design

A quantitative method was utilized in this study to examine the impact of organizational culture and infection control on patient safety in the OR from the perspective of health workers. Quantitative approaches can give light on how reality is ordered and how discourses materialize.[18] They can also aid in the reduction of personal bias.

Sampling and Data Collection

The Hospital Survey on Patient Safety Culture (HSOPSC) version 2.0.[7] was used in this study which took place between March and April 2023. The survey was distributed online to health care workers via social media platforms such as WhatsApp and Instagram. The survey included 143 health workers with inclusion criteria health workers that has been working in the OR for at least 6 months.

Instruments

The questionnaire contained 57 items, which were separated into three categories: hospital characteristics, demographic factors, and Surveys on Patient Safety Culture (SOPS) dimensions. SOPS dimensions included: 1) Error Communication; 2) Communication Openness; 3) Handoffs and Information Exchange; 4) Hospital Management Support for Patient Safety; 5) Organizational Learning - Continuous Improvement; 6) Reporting Patient Safety Events; 7) Error Response; 8) Staffing and Work Pace; 9) Supervisor, Manager, or Clinical Leader Support for Patient Safety; 10) Teamwork; and 11) Hospital Management Support for Infection Prevention Efforts. In SOPS dimensions, the options for each question were "Strongly disagree or Never" (1 point), "Disagree or Rarely" (2 point), "Neither agree nor disagree or Sometimes" (3 point), "Agree or Most of the time" (4 point), "Strongly agree or Always" (5 point), and "Doesn't apply/Do not know" (9 point, but not included in frequency analysis). To assess the overall perception of patient safety in the OR, the question "how do you assess patient safety in your unit/work area?" was added. The questionnaire, which was in Indonesian, was derived from previous studies that had been validated for validity and reliability.[19]

Data Analysis and Synthesis

IBM SPSS 29 was used for the statistical analysis and the variables were reported using descriptive statistics. The hospital component variables and demographic data were first computed. The percentage of positive responses for each dimension was determined after inverting negatively phrased items, as advised in the guideline. The percentages greater than 75 showed satisfactory results in terms of patient safety culture, while those less than 50 indicated weak dimensions. Second, we used multilinear regression analysis to examine the effect of the SOPS variable on patient safety ratings, as well as the *T*-test and F-test because we tested more than one independent variable whether it was statistically predictive of patient safety in OR. A p-value of less than or equal to 0.05 is deemed statistically significant, showing the influence between the variables.

Ethics Approval

The study was approved by the ethics committee of Faculty of Nursing, Universitas Airlangga (No: 2796-KEPK). Due to the use of a questionnaire in this study, participation indicated a confirmation of implied consent.

Results

Hospital Factor Variables and Demographic Factors

This study had 143 participants, with 79% (113) working in government owned hospitals, 97.2% (139) working in hospitals with excellent accreditation status, and 97.9% (140) working in general hospitals. The majority of respondents, 67.1% (96), were male, and 61.5% (88) were between the ages of 26 and 40. Half of the respondents (49.7% (71) hold a bachelor's degree or higher. The majority of respondents in the research (87.4% (125) work as nurses, 61.5% (88) have worked in hospitals for more than ten years, and 48% (69) have worked in units for more than ten years. 52.4% (75) of respondents work an average of 30–40 hours each week. The vast majority of respondents, 95.1% (136), work directly with patients. Table 1 displays the hospital factor variables as well as the demographic factors.

Patient Safety Culture at the Unit Level

The average percentage of positive answers to "Organizational Learning - Continuous Improvement" is 96%. The majority of respondents felt that their hospital has a constructive manner or activities to promote patient safety. Furthermore, "Teamwork" and "Handoffs and Information Exchange" receive 92% positive responses on average. Respondents believe that hospital employees across different units or departments are cooperating and coordinating better. It also implies that respondents believe critical patient care information is shared between hospital units and shifts.

The average percentage of positive replies to "Reporting Patient Safety Events" and "Responses to Error" is 75%. It was observed that hospital staff believe there is a low level of reporting of errors noticed and addressed before they reach the patient. Furthermore, errors that could have harmed the patient but did not; are rarely reported. When hospital staff make mistakes, they are rarely treated fairly, and there is little emphasis on learning from mistakes and helping employees who are involved in errors. Furthermore, the average percentage of positive replies to the dimensions "Staffing and Work Pace" is just 66%. It proved that there are insufficient personnel to meet the demand, and employees work irregular hours and are pressed for time. However, the general impression of patient safety is low (43%). The average proportion of positive response for the SOPS dimensions is shown in Table 2.

Variables Predictive on Patient Safety

The *T*-test results revealed that there was an influence between the dimensions "Organizational Learning - Continuous Improvement" (p value = 0.000) and "Hospital Management Support for Infection Prevention Efforts" (p value = 0.000) on the overall perspective of patient safety in OR (could be seen in Table 3). The F-test findings revealed a simultaneous influence of SOPS dimensions on patient safety (p value = 0.000). Based on the termination coefficient output, the R square value is 0.973, indicating that the effect of the SOPS variable on the patient safety variable is 97.3%.

Table 1 Hospital Factor and Demographics Frequency Distribution

Variables	n (%)
Hospital factors	
Hospital ownership	
- Government hospital	113 (79%)
- Private hospital	25 (17.5%)
- BUMN hospital (stated-owned enterprises)	5 (3.5%)
Accreditation status	
- Basic level	2 (1.4%)
- Middle level	2 (1.4%)
- Excellent level	139 (97.2%)
Hospital type	
- General hospital	140 (97.9%)
- Special hospital	3 (2.1%)
Total	143 (100%)
Demographic factors	
Sex	
- Male	96 (67.1%)
- Female	47 (32.9%)
Age	
- 18–25 years old	1 (0.7%)
- 26–40 years old	88 (61.5%)
- 41–55 years old	47 (32.9%)
- > 55 years old	7 (4.9%)
Education level	
- D3	62 (43.4%)
- D4/S1	71 (49.7%)
- S2/Specialist/Consultant	9 (6.3%)
- S3	1 (0.7%)
Profession	
- Doctor	9 (6.3%)
- Nurse	125 (87.4%)
- Other	9 (6.3%)

(*Continued*)

Table 1 (Continued).

Variables	n (%)
Working period in hospital	
- < 1 year	6 (4.2%)
- 1–5 years	29 (20.3%)
- 6–10 years	20 (14.0%)
- > 10 years	88 (61.5%)
Working period in the OR	
- < 1 year	9 (6.3%)
- 1–5 years	38 (26.6%)
- 6–10 years	27 (18.9%)
- > 10 years	69 (48%)
Average hours worked per week	
- < 30 hours per week	5 (3.5%)
- 30–40 hours per week	75 (52.4%)
- > 40 hours per week	63 (44.1%)
Interaction with patient	
- Yes	136 (95.1%)
- No	7 (4.9%)
Total	143 (100%)

Table 2 Average Positive Response Rate for the SOPS

SOPS Dimension	Average Positive Response (%)	p-value
Communication About Error	87%	0.320
Communication Openness	81%	0.315
Handoffs and Information Exchange	92%	0.117
Hospital Management Support for Patient Safety	88%	0.237
Organizational Learning – Continuous Improvement	96%	0.000
Reporting Patient Safety Events	75%	0.376
Response to Error	75%	0.946
Staffing and Work Pace	66%	0.810
Supervisor, Manager, or Clinical Leader Support for Patient Safety	88%	0.543
Teamwork	92%	0.951
Hospital Management Support for Infection Prevention Efforts	84%	0.017

Table 3 Regression Results

Variable	Coefficients		p-value
	Unstandardized	Standardized	
Organizational Learning – Continuous Improvement	0.110	0.410	0.000
Hospital Management Support for Infection Prevention Efforts	0.054	0.580	0.017

Discussion

This is Indonesia's first study to look into the impact of patient safety culture and infection prevention on patient safety in the OT. Patient safety culture in OT is essential because surgical services have a high risk of adverse patient safety outcomes such as surgical site infection or wrong operation. The higher risks were influenced by the patient, the procedure, the surgeon(s), and the hospital environment.

Several concerns were highlighted in the research. First, some hospital culture dimensions in the OR had low scores, including "Staffing and Work Pace", "Reporting Patient Safety Events", and "Response to Errors". The AHRQ defines "Staffing and Work Pace" as employees working reasonable hours and without feeling pressured. According to the findings of this study, staff felt "Staffing and Work Pace" were at their lowest points, possibly because working in the OR can present a number of challenges that can lead to work-related stress or burnout, such as a lack of proper coordination, poor performance of the head nurse and hospital managers, and additional workload.[20]

Furthermore, the findings of this study are consistent with other studies that found the lowest scores for SOPS dimensions "Reporting Patient Safety Events" and "Response to Error" in the OR.[8,21] The low "Response to Error" score implies a common blame culture.[8] According to the data, 20.3% of health workers believe that when a patient safety issue happens, the attention is on the individual rather than the problem. Other studies that revealed poor event reporting scores in OR found similar results.[22] The findings of this study are consistent with prior findings, indicating that OR safety culture has to be improved.[8]

Second, the most predictive organizational culture determinants of patient safety were the "Organizational Learning - Continuous Improvement" dimensions, which received the highest scores. "Organizational Learning - Continuous Improvement" is defined by the AHRQ as "work processes that are reviewed on a regular basis, changes are made to avoid repeating mistakes, and changes are evaluated".[7] According to the findings of this study, the majority of healthcare employees believe that hospitals should examine work processes on a frequent basis. Also, healthcare workers agreed that hospitals analyze adjustments and make modifications to prevent mistakes from occurring again.

The findings of this study support prior findings that the organizational learning dimension gets the highest score in the OR.[23] In the OR, user behavioral intention is indirectly influenced by strong organizational learning abilities, particularly in social influence.[24] Furthermore, proper precautions must be implemented in the OR to limit the frequency of related infections in order to ensure patient safety.[10] Working with staff attitudes toward patient safety could be another technique for improving compliance, which should reduce the number of surgical site infections.[25]

The average favorable answer for the dimensions "Hospital Management Support for Infection Prevention Efforts" was 84%. The majority of health workers believe that the checklist, standard operating procedure, clinical pathway, surveillance program, hospital policy, surgical site infection coordinator, feedback, and computer-based decision-making support system in the OR are satisfactory. A good infection control program in the OR decreases wound infection rates in patients and speeds up their postoperative recovery.[26]

This study has several limitations. First, the questionnaire was self-reported, which may cause potential boredom of respondents due to time, individual bias on one's own behavior, and potential concealment of true thoughts and perspectives.[27] Other problems were connected to the use of Likert scales, the answers to which could be influenced by preceding questions or favor one side. Furthermore, using an online form may reduce participant coverage while also influencing participation characteristics, as seen in this study when nurse participants outnumbered other occupations.

Conclusion

According to the findings of our study, the overall patient safety culture in the OR remains weak. This highlights the importance of continuing efforts to improve patient safety in the OR. Furthermore, our research found that the dimensions "Organizational Learning - Continuous Improvement" and "Hospital Management Support for Infection Prevention Efforts" were among the significant dimension that affecting the overall perception of patient safety in the OR. Further study could be directed to identify organizational learning in infection prevention to enhance the patient safety in the OR.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation; took part in drafting, revising or critically reviewing the article; have agreed on the journal to which the article will be submitted; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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