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# Implementation of the Surgical Safety Checklist in the Operating Room of Luwuk Regional General Hospital: A Descriptive Study

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**ABSTRACT**
Background: The World Health Organization Surgical Safety Checklist (SSC) uses sign-in, time-out, and sign-out checks to support perioperative team communication and patient safety. Objective: To describe phase-specific implementation of the SSC among operating-room personnel at Luwuk Regional General Hospital.
Methods: This descriptive cross-sectional study included all 36 nurses and midwives working in the hospital's operating room in August 2022. Data were collected through direct observation using a 22-indicator checklist based on WHO guidance and grouped into three phases. Frequencies and percentages were used to summarize phase-specific implementation.
Results: Among the 36 personnel, sign-in was recorded as performed for 27 (75.0%), time-out for 22 (61.1%), and sign-out for 32 (88.9%). Sign-out had the highest reported proportion, whereas time-out had the lowest. These findings indicate variation in recorded checklist implementation across the three phases.
Conclusion: Time-out had the lowest reported implementation proportion, supporting focused audit and feedback on phase-specific checklist use. The findings provide a local descriptive baseline for improvement efforts.

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## INTRODUCTION

Surgery is an essential component of health care, but it involves preventable risks that require coordinated safety practices. The WHO Global Patient Safety Action Plan and the Global Patient Safety Report emphasize system-level action, learning, and measurement to reduce avoidable harm (World Health Organization [WHO], 2021, 2024). The Surgical Safety Checklist (SSC) supports team verification and communication at three operative stages: before anesthesia induction (sign-in), before skin incision (time-out), and before the patient leaves the operating room (sign-out) (Sotto et al., 2021; Wyss et al., 2023).

Evidence indicates that checklist implementation depends on meaningful team engagement and integration into perioperative workflow. Reviews and implementation studies identify staff understanding, leadership, workload, hierarchy, local adaptation, audit, and feedback as relevant considerations (Barimani et al., 2020; Liu & Mehigan, 2021; Ramírez-Torres et al., 2021; Wæhle et al., 2020; Wani et al., 2022; Lim et al., 2023; Paterson et al., 2024). Studies have also described variation in staff attitudes, participation, and phase-specific completion (Gong et al., 2021; Tan et al., 2021; Mersh et al., 2021; Gul et al., 2022).

Indonesian studies have examined factors associated with checklist compliance and the relationship between checklist use and surgical patient safety. Recent work has also described how surgical teams experience implementation in local hospital settings (Daryani et al., 2023; Insyah et al., 2023; Ardhana & Haryanto, 2024; Dhamanti et al., 2025). These findings support the value of measuring local practice by checklist phase.

Quality-improvement reports describe strategies such as staff engagement, repeated audit, feedback, and workflow adaptation to strengthen checklist use. Such approaches have been studied in different resource settings and should preserve essential safety checks while fitting local perioperative routines (Rohsig et al., 2020; Wæhle et al., 2020; Forrester et al., 2021; White et al., 2021; Panda et al., 2021; Etheridge et al., 2024). Evidence syntheses also emphasize that implementation quality can influence how checklist use relates to outcomes (Qaiser et al., 2024; Habtie et al., 2025).

Although the SSC is used in operating rooms, phase-specific implementation data from individual Indonesian hospitals remain useful for identifying areas that may warrant local review. This study described implementation of the surgical safety checklist among operating-room personnel at Luwuk Regional General Hospital.

## METHODS

A descriptive cross-sectional study was conducted in the operating room of Luwuk Regional General Hospital, Central Sulawesi, Indonesia, in August 2022. The study population comprised 36 nurses and midwives working in the operating room. Total-population sampling was used, and all 36 personnel were included. Checklist implementation was assessed through direct observation. Data were collected through direct observation using a checklist based on the WHO Surgical Safety Checklist. The instrument contained 22 indicators grouped into sign-in, time-out, and sign-out phases. Each observation was recorded as performed or not performed. The respondent profile included age, sex, educational level, and length of service. Descriptive analysis was used to report checklist implementation by phase. Percentages were recalculated from the reported counts using the total sample of 36.

## RESULTS

### Respondent Characteristics

**Table 1. Characteristics of Operating-Room Personnel (N = 36)**

| Characteristic | Category | n | % |
|---|---|---|---|
| Age (years) | 29–34 | 24 | 66.7 |
| Age (years) | 35–40 | 10 | 27.8 |
| Age (years) | 41–44 | 2 | 5.6 |
| Sex | Male | 8 | 22.2 |
| Sex | Female | 28 | 77.8 |
| Education | Diploma III | 32 | 88.9 |
| Education | Bachelor's degree | 4 | 11.1 |
| **Total** | **All respondents** | **36** | **100.0** |

The study included 36 operating-room personnel. Most were 29–34 years (24; 66.7%), women (28; 77.8%), held a Diploma III qualification (32; 88.9%).

**Table 2. Implementation of the Surgical Safety Checklist by Phase (N = 36)**

| SSC phase | Performed, n (%) | Not performed, n (%) |
|---|---|---|
| Sign-in (before anesthesia induction) | 27 (75.0) | 9 (25.0) |
| Time-out (before skin incision) | 22 (61.1) | 14 (38.9) |
| Sign-out (before leaving the operating room) | 32 (88.9) | 4 (11.1) |

Phase-Specific Implementation

Checklist implementation was recorded for all three phases. Sign-in was performed for 27 of 36 personnel (75.0%), time-out for 22 (61.1%), and sign-out for 32 (88.9%)

## DISCUSSION

This descriptive study found different implementation proportions across the three SSC phases. Sign-out had the highest reported frequency (88.9%), followed by sign-in (75.0%); time-out had the lowest (61.1%). These findings indicate that implementation varied across the operative pathway.

The sign-in proportion in this study (75.0%) is close to the pooled estimate of 76% reported in a 2025 systematic review. The time-out proportion (61.1%) is also close to the pooled estimate of 61%, whereas the sign-out proportion (88.9%) is higher than the pooled estimate of 62% (Habtie et al., 2025). This comparison should be interpreted cautiously because the reviewed studies differed in setting, measurement, and operational definitions. The time-out phase nevertheless merits attention in local follow-up because it had the lowest proportion in the present study.

Time-out requires the surgical, anesthesia, and nursing team to pause and confirm key information before incision. Studies have described workload, time pressure, team hierarchy, unclear responsibility, and incomplete verbal participation as possible barriers to checklist implementation (Gong et al., 2021; Tan et al., 2021; Lim et al., 2023; Paterson et al., 2024). These factors were not measured in the present study and should not be treated as explanations for the Luwuk findings. A focused local audit could identify which indicators or workflow steps require attention.

For practice, the findings support reviewing checklist use at each phase, with particular attention to time-out. Refresher education, clear designation of the checklist coordinator, participation of the full team, and feedback based on direct observation are implementation approaches described in the literature (Liu & Mehigan, 2021; Rohsig et al., 2020; White et al., 2021; Etheridge et al., 2024). Any local changes should preserve essential safety checks and fit the operating room workflow (Panda et al., 2021; Wæhle et al., 2020; Forrester et al., 2021).

This study provides a local baseline for future evaluation. Indonesian studies have linked checklist use with surgical patient-safety measures and described implementation challenges, supporting periodic measurement and staff engagement (Daryani et al., 2023; Insyah et al., 2023; Ardhana & Haryanto, 2024; Dhamanti et al., 2025). Broader patient-safety guidance also calls for sustained organizational support and learning from safety data (WHO, 2021, 2024).

### Limitations

This study was descriptive, involved one hospital, and included 36 personnel; it did not assess patient outcomes or examine factors associated with checklist use. Its findings should therefore be interpreted as phase-specific descriptive proportions and not as evidence of causal effects.

## CONCLUSION AND RECOMMENDATIONS

Among 36 operating-room personnel at Luwuk Regional General Hospital, the reported implementation proportions were 75.0% for sign-in, 61.1% for time-out, and 88.9% for sign-out. Time-out had the lowest observed proportion. These results may serve as a baseline for phase-specific audit, feedback, and staff education.

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