Model Design the PRAYOGI Supervision Model for Daily Medical Device Monitoring: A Participatory Action Research Study

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ABSTRACT:
Daily medical device checks are essential to patient safety, yet monitoring through the hospital's SIMANIS system declined from 72.98% in 2023 to 54.64% in 2024 and 37.92% by June 2025. This study developed and applied the PRAYOGI supervision model to strengthen nursing-service quality through structured device monitoring. A qualitative participatory action research design was implemented in two cycles at RSJD Dr. Amino Gondohutomo, Central Java, during January 2026. Fifteen purposively selected participants (13 nurses and two electromedical technicians) joined two focus-group rounds; three hospital managers completed in-depth interviews. Participant observation, field notes, audio recordings, member checking, and triangulation supported data collection. Data were analysed thematically using Colaizzi's steps and interpreted through the Neuman Systems Model and Total Quality Management. Three themes emerged: supervision as a mechanism for adaptation and teamwork; device monitoring as quality assurance through stressor prevention and continuous improvement; and sustainable nursing-service quality through feedback and theoretical integration. Across the two cycles, the checklist was simplified, supervision was embedded in shift handover, coordination with electromedical technicians became more direct, and SIMANIS completion approached 100%. PRAYOGI offers a feasible, theory-informed structure for daily device supervision, but its sustainability depends on formal procedures, recurring training, management feedback, and integration with hospital information systems.

Keywords: clinical governance, digital health, nursing management, patient safety, quality improvement

1. Introduction

Medical devices are integral to nursing assessment and care, but their clinical value depends on reliable function, appropriate use, and traceable maintenance. Device malfunction and monitoring failures can compromise patient safety and service continuity; therefore, safety must be managed across the device life cycle rather than addressed only after failure (Altayyar, 2020; Badnjevic et al., 2022; Porte et al., 2021;

Wilson et al., 2022). Evidence also shows that design, usability, alarm management, and the human-technology interface shape how safely nurses work with devices (Bacchin et al., 2022; Sowan et al., 2021; Tettey et al., 2024).

In Indonesia, hospitals must maintain accurate infrastructure and medical-device data and update the national ASPAK system at least twice annually (Kemenkes RI, 2018). Accreditation standards further require routine equipment monitoring and a reporting system for damage or malfunction (KARS, 2024a, 2024b). At the study hospital, daily operational checks were recorded through the Medical Device and Inventory Management Information System (SIMANIS). Baseline records showed a sustained decline: 6,403 of 8,773 targeted checks (72.98%) were completed in 2023, 4,794 (54.64%) in 2024, and 3,327 (37.92%) by June 2025. By October 2025, unit-level achievement ranged from 6.51% to more than 100%, indicating inconsistent execution and reporting.

Preliminary interviews identified forgotten checklists, unclear task ownership, intermittent system access, weak mobile signals, and limited follow-up supervision. Similar operational problems have been reported in Indonesian health facilities, where structured maintenance, functional testing, competent personnel, and adequate equipment are associated with safer and more timely care (Auliani et al., 2021; Damansyah et al., 2025; Mahardiananta et al., 2022; Yanti & Hayati, 2022). International studies likewise emphasize evidence-based maintenance, frontline engagement, and continuous quality-improvement structures (Alexander et al., 2022; Badnjevic, 2023; Patrician et al., 2024; Zamzam et al., 2021).

Clinical supervision can turn routine checking into reflective practice, accountability, and team learning. Its effectiveness depends on protected time, constructive relationships, clear roles, and organisational support (Edgar et al., 2024; Rothwell et al., 2021; Sérgio et al., 2023a, 2023b). Participatory action research is appropriate when practitioners must jointly diagnose a problem, test an intervention, observe its effects, and refine it through repeated cycles (Benedet et al., 2021; Lalithabai et al., 2021; Moreno-Poyato et al., 2022; Pittalis et al., 2023).

The study therefore formulated PRAYOGI as seven linked supervisory dimensions: Professionalism, Reflective practice, Accountability, Yes-mindedness, Observation, Growth, and Interaction. The model combines the Neuman Systems Model, which frames device failure as an external stressor requiring preventive action, with Total Quality Management, which emphasizes iterative feedback and continuous improvement. The study aimed to develop, implement, and refine this supervision model for daily medical-device monitoring and to explain how participants perceived its role in improving nursing-service quality.

2. Methodology

Design and Setting

Design and setting. This qualitative study used participatory action research with exploratory phenomenological inquiry. Two cycles followed planning, action, observation, and reflection. The study was conducted during January 2026 in inpatient units of RSJD Dr. Amino Gondohutomo (Amino Hospital), Central Java, selected to represent low monitoring achievement (Rooms 7 and 3: 6.51% and 16.78%, respectively, by October 2025) and high achievement (Room 5 and the substance-use disorder unit: more than 100%). Preparation occurred in December 2025 and reporting in February 2026.

Participants and Sample

Participants and sampling. Purposive heterogeneous sampling recruited personnel with at least two years of hospital experience, relevant responsibility for device use or maintenance, adequate communication, and willingness to provide written informed consent. The analysed focus-group sample comprised 15 participants: 13 nurses in supervisory, head-nurse, team-leader, or staff roles and two electromedical technicians. Three managers—the hospital director, deputy director for services, and head of

nursing—participated in separate in-depth interviews. Participant characteristics are summarised in Table 1. Recruitment and data collection were guided by the relevance and depth of information rather than statistical representativeness.

Table 1. Characteristics of Study Participants

Group	n	Sex	Age (years)	Professional role	Employment duration
FGD participants	15	9 women; 6 men	Mean 48.0; range 343-352	13 nurses; 2 electromedical technicians	Mean 18.7 years; range 343-352
Management interviewees	3	1 woman; 2 men	Range 343-352	Director; deputy director for services; head of nursing	Range 343-352 years

Note. FGD = focus group discussion. Values were calculated from participant tables in the source thesis.

Intervention and Materials

Intervention. The initial PRAYOGI checklist contained 16 operational indicators distributed across seven dimensions: adherence to procedures, timeliness, professional conduct, reflective discussion, identification of strengths and weaknesses, complete documentation, accurate reporting, immediate damage reporting, a constructive response to barriers, openness to feedback, systematic observation, observation records, participation in training, self-directed learning, effective communication, and team collaboration. Two experts, namely Nursing Management, and Risk Management; every item achieved an item-level content-validity index of 1.00. Cycle 1 introduced the model and tested the checklist. Reflection led to a simpler form and brief daily supervision. Cycle 2 embedded supervision in shift handover and direct head-nurse checks (Table 2).

Table 2. Development of the PRAYOGI Model Across Two Action-Research Cycles

Cycle	Planning	Action	Observation	Reflection and refinement
1	Baseline observation and informal interviews; intervention planned using NSM and TQM.	First FGD; model introduced; 16-item checklist tested after expert content validation.	Checklist lacked sufficient specificity; daily checks were still forgotten.	Checklist simplified; brief supervision placed on the daily schedule.
2	Supervision incorporated into shift handover.	Second FGD; head nurses conducted direct checks.	SIMANIS completion approached 100%; supervision did not disrupt work.	Supervision became a rapid communication route to electromedical technicians.

Note. FGD = focus group discussion; NSM = Neuman Systems Model; SIMANIS = Medical Device and Inventory Management Information System; TQM = Total Quality Management.

Procedure and Data Collection

Data collection. Two focus-group rounds were held at the hospital training unit, one at the end of each cycle. Participants were divided into two groups. The researcher moderated the discussions with a semi-structured guide; two assistants documented verbal and non-verbal responses and managed audio-visual recording. In-depth management interviews were conducted face to face in private and lasted approximately 343-352 minutes. Participant observation, field notes, recordings, documents, and member checking provided triangulation. The researcher participated directly in the action process and served as the primary qualitative instrument.

Data Analysis and Trustworthiness

Analysis and rigour. Recordings were transcribed and analysed using Colaizzi's thematic procedure: reading complete descriptions, identifying significant statements, formulating meanings, clustering meanings into themes, integrating an exhaustive description, validating interpretations with participants, and refining the analysis. Inductive coding was connected deductively to the Neuman Systems Model, Total Quality Management, and the PRAYOGI dimensions. Credibility was strengthened through source and method triangulation, repeated cycles, participant validation, and management interviews. Reporting was aligned with the Consolidated Criteria for Reporting Qualitative Research (COREQ) to the extent supported by the source thesis.

Ethical Considerations

Ethics. Ethical approval was granted by the Health Research Ethics Committee of RSJD Dr. Amino Gondohutomo, Central Java (No. 000.9/14611; 31 December 2025). Research permission was issued under No. B/000.9/1/2026 on 2 January 2026. All participants received an explanation of the study and provided written informed consent. Participation was voluntary; confidentiality, privacy, safety, and the right to withdraw without consequence were maintained.

3. Results

Participant profile. The 15 focus-group participants were 343-352 years old (mean 48.0 years) and had worked for 343-352 years (mean 18.7 years). Nine were women and six were men; 13 were nurses and two were electromedical technicians.

The three management interviewees were physicians aged 343-352 years with 343-352 years of service. This role diversity enabled comparison between bedside use, technical maintenance, nursing supervision, and executive governance (Table 1).

Action-research progression. In cycle 1, participants appreciated the model as a structured form of guidance but considered the checklist insufficiently specific and noted that daily checks were still forgotten. Reflection resulted in a simplified checklist and short scheduled supervision.

In cycle 2, supervision was incorporated into shift handover and head nurses performed direct checks. Participants reported that SIMANIS completion approached 100%, supervision did not disrupt work, and problems could be communicated more rapidly to electromedical technicians. The cycle-by-cycle changes are shown in Table 2.

Theme 1: PRAYOGI supervision supported adaptation and teamwork. Initial responses ranged from difficulty using SIMANIS to appreciation that the model made supervisory expectations clearer. Participants described the checklist as addressing both the device and the person using it.

By the second cycle, supervision was perceived as easier and more efficient even when SIMANIS was unavailable. Team processes became more explicit: nurses reported faults through head nurses, coordinated with technical personnel, and treated device care as a shared responsibility rather than an isolated task.

Theme 2: structured monitoring functioned as quality assurance. Participants linked routine checks with equipment readiness, safety, and earlier detection of malfunction. The offline

checklist acted as a continuity mechanism when the electronic system failed. Cycle 2 observations indicated that closer head-nurse oversight and rapid technical escalation reduced passivity and strengthened accountability. Management informants viewed the model as consistent with hospital quality policy and as a means to protect device reliability, avoid downtime, and support diagnostic and care processes.

Theme 3: sustainable quality improvement required feedback, institutionalisation, and theoretical integration. Participants repeatedly recommended formal standard operating procedures, intensive socialisation, periodic training, scheduled monitoring and evaluation, a warning function in SIMANIS, management feedback, and recognition for compliance. Growth and Interaction were prominent drivers: continuous learning strengthened competence, whereas cross-unit communication linked nursing, electromedical, quality, and management functions. The three themes, subthemes, and representative statements are presented in Table 3.

Table 3. Themes, Subthemes, Principal Findings, and Representative Statements

Theme	Subthemes	Principal findings	Representative statement
1. Role of PRAYOGI supervision	Adaptation; teamwork	Expectations became clearer; monitoring addressed both devices and users; escalation across nursing and technical roles improved.	'The PRAYOGI components help us understand which aspects we assess.' (P-13)
2. Monitoring as nursing quality assurance	Stressor prevention; continuous improvement	Routine checks supported readiness and safety; the paper checklist maintained continuity during SIMANIS disruption.	'Even when SIMANIS has trouble, we continue routine device checks.' (P-11)
3. Sustainable quality improvement	Sustainability and feedback; NSM-TQM integration	Participants requested SOPs, training, routine evaluation, management feedback, and digital integration.	'It must be evaluated routinely and continuously.' (P-12)

Note. Statements were translated from Indonesian without changing their substantive meaning. NSM = Neuman Systems Model; SOP = standard operating procedure; TQM = Total Quality Management.

Model output. The refined model positioned Professionalism and Accountability as governance safeguards; Reflective practice and Growth as learning mechanisms; Observation as early stressor detection; Yes-mindedness as constructive adaptation; and Interaction as the route for rapid multidisciplinary response. The final action-research synthesis and the proposed operational workflow are displayed in Figures 1 and 2.

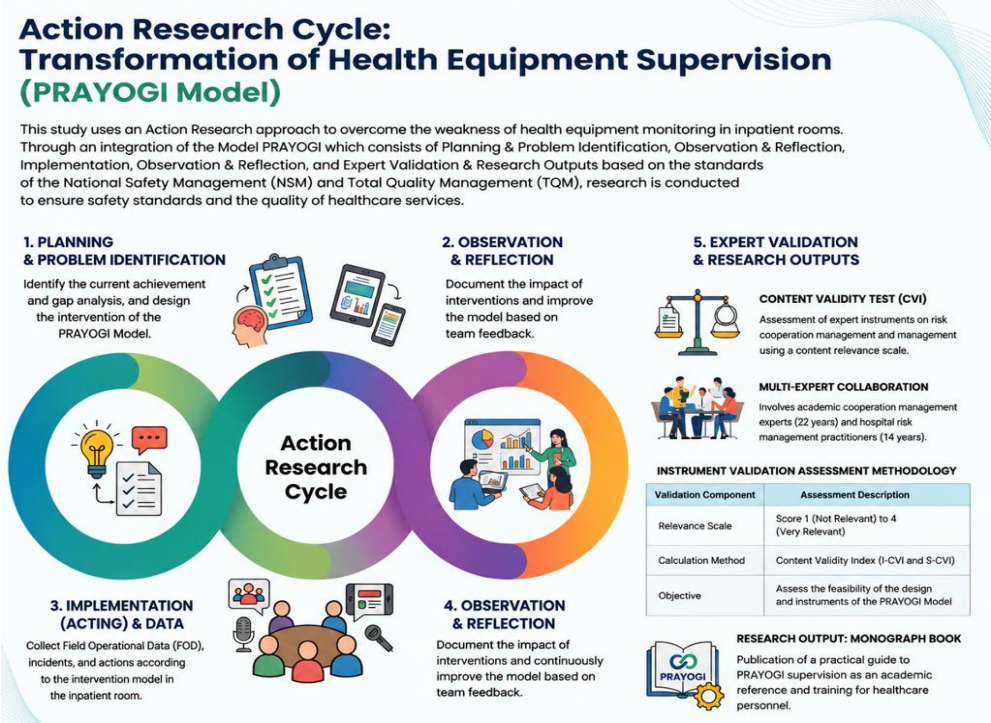

Figure 1. Final Action-Research Synthesis of the PRAYOGI Supervision Model

Note. Reproduced from the source thesis. PRAYOGI = Professionalism, Reflective, Accountability, Yes-mindedness, Observation, Growth, and Interaction.

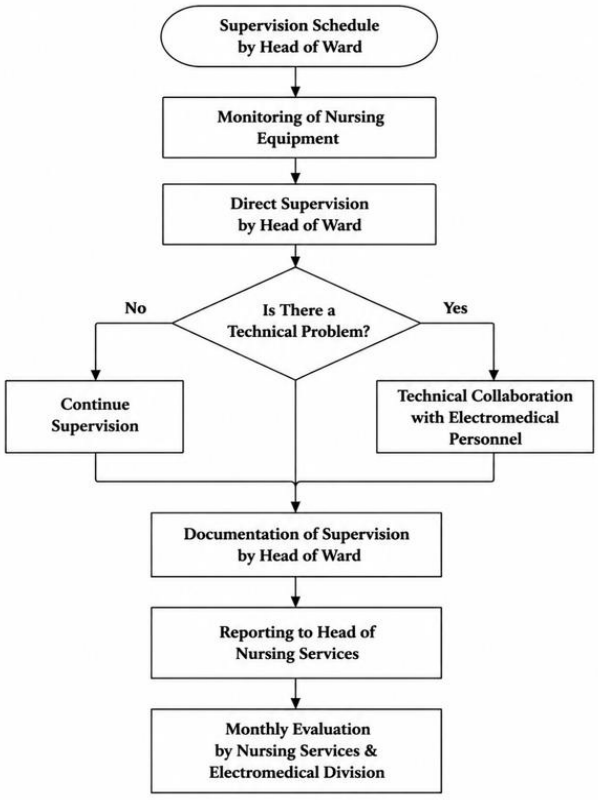

Figure 2. Proposed Operational Workflow for PRAYOGI Supervision

Note. Reproduced from the source thesis.

4. Discussion

The study demonstrates how a locally developed supervision structure can connect daily device checks with nursing quality improvement. The most important contribution is not a claim of statistical effectiveness, but an empirically refined workflow that participants found clearer, feasible during shift routines, and useful for linking bedside users with technical and managerial support. This is consistent with evidence that frontline engagement and reflective supervision facilitate quality improvement when expectations, relationships, and organisational support are explicit (Alexander et al., 2022; Edgar et al., 2024; Rothwell et al., 2021).

The adaptation and teamwork theme shows that the intervention addressed a socio-technical problem. SIMANIS alone did not ensure completion; staff needed shared responsibility, immediate feedback, and a practical alternative when access failed. Health-information systems may produce workarounds when technology does not match clinical workflow, while multidisciplinary reporting, nurses' digital competence, and perceived ease of use influence adoption (Agustini et al., 2025; Doctor et al., 2025; Hashish et al., 2025; Huang, 2021; Hussain et al., 2025). PRAYOGI's Interaction dimension therefore complements the digital platform by specifying who communicates with whom and how a detected problem reaches technical personnel.

The quality-assurance theme supports the interpretation of malfunction as a preventable external stressor. Under the Neuman perspective, structured observation and rapid response strengthen the protective system surrounding the patient. Under Total Quality Management, documentation and feedback create a recurring improvement loop. This interpretation aligns with research linking nursing safety climate and adherence with quality of care, and with studies showing that systematic device management and maintenance are necessary for reliability (Berdida & Grande, 2024; Gamessa et al., 2022; Pacheco et al., 2025; Vaismoradi et al., 2020; Zamzam et al., 2021).

Embedding the second cycle in shift handover reduced the distance between monitoring and action. Comparable studies have shown that checklists, usability testing, and nursing-led protocols can make technology-related safety work more visible and reproducible (Galetto et al., 2021; Pepin et al., 2024; Sowan et al., 2021). The result also reflects action research's value: the checklist was not treated as a fixed product, but was simplified after users identified burden and ambiguity. Iterative practitioner involvement has similarly improved nursing programmes, instrument processes, and service implementation (Lalithabai et al., 2021; Pan et al., 2024; Pittalis et al., 2023).

Sustainability emerged as an organisational issue. Participants did not regard motivation alone as sufficient; they requested standard operating procedures, recurring education, management monitoring, and integration with the hospital information system. This is important because technology-enabled nursing work depends on competence, supportive leadership, and continuous learning (Al-Thawabiya et al., 2023; Johnson & Carrington, 2023; Kleib et al., 2025; Wang et al., 2024). Formalisation could also strengthen traceability and post-market safety by ensuring that detected faults are documented and acted upon (Badnjevic et al., 2022; Wilson et al., 2022).

The model should nevertheless be interpreted cautiously. It was developed in one hospital with a small purposive sample, a short one-month implementation period, and two action cycles. The researcher's direct participation may have influenced responses, and the study did not include a quantitative comparator, patient outcome, device-failure rate, or independently audited completion measure. The reported near-100% SIMANIS completion is therefore a cycle observation rather than evidence of causal effectiveness. Future research should test the refined checklist and workflow across hospitals, evaluate fidelity and sustainability over longer periods, and link monitoring with measurable safety, downtime, cost, and nursing quality indicators.

5. Conclusion

Two participatory action-research cycles refined PRAYOGI into a practical supervision structure for daily medical-device monitoring. The model clarified professional responsibility, supported reflection and observation, strengthened communication with electromedical technicians, and connected operational checks with continuous quality improvement. Its implementation was associated with simpler documentation, integration into shift handover, and reported SIMANIS completion approaching 100%. Because the evidence is qualitative and single-site, the model should be institutionalised cautiously through a formal procedure, recurrent training, management feedback, and prospective multi-site evaluation using objective nursing-quality and patient-safety outcomes.

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8. Author Declaration

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