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Integrated Phlebotomy Training Model for Healthcare Workers in a Private Hospital in North Minahasa

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ABSTRACT

Phlebotomy is a high-frequency clinical procedure whose quality strongly affects laboratory accuracy, patient safety, service efficiency, and public trust in hospital care. This article examines the governance of a phlebotomy training model for healthcare workers in a private hospital in North Minahasa by focusing on planning, implementation, evaluation, and formulation of an integrated model. The study used a qualitative descriptive approach. Data were collected through in-depth interviews, participatory observation, focus group discussion, and documentation of training plans, standard operating procedures, learning activities, and evaluation records. Data were analyzed thematically through transcription, coding, categorization, triangulation, and interpretation based on educational management and health-training theories. The findings show that training planning had been initiated through curriculum preparation, competency-need identification, standard operating procedures, and management involvement. However, planning remained more administrative than performance-based because it was not fully supported by a measurable competency map, modern simulation facilities, certified instructors, and digital learning infrastructure. Training implementation combined lectures, demonstrations, and laboratory practice, but it was still dominated by conventional methods and limited simulation. Evaluation showed improvement in knowledge, but psychomotor skill, workplace behavior, and organizational outcomes were not yet measured consistently. The proposed model integrates ADDIE, POAC, blended learning, simulation, mentoring, Kirkpatrick-based evaluation, clinical audit, and continuous professional development. The model is expected to strengthen technical competence, communication ethics, patient safety, data-based monitoring, and sustainable service quality improvement.

Keywords: blended learning, continuous professional development, educational management, healthcare workers, Kirkpatrick evaluation, patient safety, phlebotomy training.

INTRODUCTION

Modern hospital services increasingly depend on the capacity of healthcare workers to perform routine clinical procedures accurately, safely, and consistently. Among these procedures, phlebotomy occupies a strategic position because blood sampling is the first clinical step that determines the reliability of laboratory examination. If the specimen is collected from the wrong patient, placed in the wrong tube, insufficient in volume, contaminated, hemolyzed, or transported without proper handling, the clinical information produced by the laboratory may become invalid. The consequences are not merely technical. They may include delayed diagnosis, inappropriate therapy, repeated venipuncture, higher operational costs, discomfort for patients, and reduced confidence in the health service. For this reason, phlebotomy must be understood not only as a manual skill, but as a professional competence that connects clinical accuracy, communication, infection prevention, patient safety, and hospital quality governance.

International guidelines place strong emphasis on the pre-analytical phase of laboratory service. The World Health Organization and the Clinical and Laboratory Standards Institute underline the importance of patient identification, hand hygiene, selection of the correct equipment, venipuncture technique, specimen labeling, transport, and post-procedure care (WHO, 2019; CLSI, 2017). These standards show that phlebotomy competence cannot be created through short, informal orientation only. It requires a structured training system that combines theory, demonstration, supervised practice, simulation, feedback, and post-training monitoring. A hospital that treats phlebotomy training as a routine administrative activity may be able to deliver training events, but it will not necessarily produce measurable improvement in clinical behavior and service outcomes.

The need for a systematic training model becomes more urgent in private hospital settings where service quality, efficiency, and patient satisfaction are strongly interrelated. In a private hospital in North Minahasa, phlebotomy is performed by healthcare workers with different educational backgrounds, work experiences, and levels of exposure to standardized training. Such diversity is common in hospital organizations, yet it also creates variability in procedural quality. When workers rely mainly on personal experience, local habit, or imitation of senior staff, the hospital may face inconsistent practices across units. Therefore, management must design training not only to transmit knowledge, but also to align individual practice with institutional standards and patient-safety principles.

The empirical context indicates that phlebotomy training had been conducted through curriculum preparation, identification of competency needs, and the establishment of standard operating procedures. Nevertheless, several limitations remained visible. Simulation facilities were not yet modern and sufficient, certified instructors were limited, digital learning media had not been fully integrated, and evaluation was still concentrated on participant satisfaction rather than on learning, behavior, and service outcomes. In addition, field observations revealed procedural issues such as lysed samples, insufficient blood volume, repeated blood collection, and patient-identification risks. These conditions show that the training system needed to move from event-based training to an integrated educational management model.

Educational management provides a relevant framework for this transformation. Training must be governed through planning, organizing, actuating, and controlling (Terry, 2014; Robbins & Coulter, 2018). In the health sector, those management functions should be translated into competency mapping, curriculum design, instructor preparation, learning-resource management, implementation of simulation and clinical practice, supervision, audit, and continuous improvement. Training is effective when it is connected to organizational needs and when its results are measured beyond attendance lists. Thus, the study of phlebotomy training becomes part of the

broader discourse on human-resource development, quality assurance, and evidence-based hospital management.

The novelty of the article lies in the formulation of an integrated phlebotomy training model that combines educational management, clinical simulation, digital learning, mentoring, continuous evaluation, and professional development. Previous studies have often discussed simulation, e-learning, or evaluation separately (Carter & Lee, 2015; Johnson & Kim, 2020; Kirkpatrick & Kirkpatrick, 2016). This article links these components into a single operational model suitable for hospital-based training in an Indonesian private hospital context. The model is designed to answer practical problems in training implementation while contributing theoretically to health-education management.

The article addresses four questions: how phlebotomy training is planned; how the training is implemented; how the training is evaluated for human-resource development; and what integrated model can be formulated to strengthen healthcare-worker competence. By answering these questions, the article aims to offer an academic and practical framework for hospitals that seek to improve phlebotomy quality through training governance rather than through sporadic technical instruction. The expected contribution is a model that is systematic, adaptive, measurable, and sustainable.

THEORETICAL FRAMEWORK

Educational management is the foundation for designing health training because it organizes learning objectives, resources, participants, instructors, evaluation, and institutional accountability into a coherent system. Terry (2014) describes management as a process of planning, organizing, actuating, and controlling the use of resources to achieve predetermined objectives. In training, planning refers to needs assessment and curriculum preparation; organizing refers to the allocation of instructors, modules, facilities, time, and budget; actuating refers to the learning process itself; and controlling refers to evaluation, monitoring, and corrective action. This logic is relevant to phlebotomy training because skill quality cannot be guaranteed unless every stage is planned and monitored systematically.

Human-resource development theory emphasizes that training must be connected to organizational performance. Armstrong (2018) argues that an effective training system links needs analysis, learning design, implementation, evaluation, and follow-up development. Dessler (2020) similarly notes that training becomes meaningful when it is based on job requirements and measurable performance standards. In hospital settings, phlebotomy training should therefore be aligned with clinical indicators such as sample quality, patient-identification accuracy, infection control compliance, repeated venipuncture rates, patient satisfaction, and documentation accuracy. These indicators make training visible as a managerial instrument for service improvement rather than a one-time educational activity.

The Indonesian educational-management literature also supports this orientation. Sumual et al. (2023) state that human-resource management in education should be performed systematically through planning, competency development, coaching, and continuous evaluation in order to achieve institutional goals effectively. Palilingan et al. (2026) emphasize that institutional effectiveness is influenced by educator competence, learning-resource management, leadership, and academic culture. Rotty et al. (2021) add that effective educational management should integrate planning, implementation, supervision, and evaluation continuously to strengthen professionalism and organizational service quality. These three statements are important because they connect training with institutional competence, supervisory systems, and continuous professional development.

Competency-based training is another key perspective. Spencer and Spencer (2016) define competence as underlying characteristics that are causally related to effective performance. In a phlebotomy context, competence includes procedural knowledge, hand skill, patient identification, communication, infection prevention, specimen handling, problem solving, and ethical sensitivity. A competency-based curriculum should not only explain the steps of venipuncture, but also require participants to demonstrate performance through observation, checklist-based assessment, and supervised clinical application. This is consistent with Notoatmodjo (2018), who views health training as a systematic short-term educational process for improving knowledge, skills, and attitudes.

Adult learning theory strengthens the case for active methods. Knowles (1984) argues that adult learners bring experience, need relevance, prefer problem-centered learning, and value immediate application. Therefore, healthcare workers should not be trained only through lectures. They need case discussion, simulation, demonstration, reflection, peer feedback, and direct practice. Kolb (1984) explains that experiential learning occurs through a cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation. In phlebotomy training, this cycle may be represented by observing the procedure, practicing on a simulator, receiving feedback, correcting mistakes, and then applying the skill in the clinical unit under supervision.

Simulation-based education is particularly relevant to invasive procedures. Carter and Lee (2015) found that simulation-based phlebotomy training improves practical skill, confidence, and procedural accuracy. Simulation reduces ethical risk because participants can make mistakes and receive correction before performing procedures on patients. When simulation is combined with checklists and instructor feedback, training can become more objective and safer. The lack of modern simulation equipment, therefore, is not a minor facility problem. It affects the ability of the institution to protect patients while developing competence.

Digital learning expands access and supports continuity. Garrison and Vaughan (2008) explain that blended learning combines face-to-face interaction and online learning to improve flexibility and learning quality. Bonk and Graham (2016) describe hybrid learning as the integration of classroom and technology-based learning in one mutually reinforcing system. Johnson and Kim (2020) show that e-learning and digital simulation can improve knowledge transfer and learning engagement in phlebotomy training. For hospital workers with shift schedules, digital modules can help participants review SOPs, watch demonstration videos, complete pre-tests, and prepare for practice sessions without depending fully on classroom time.

Training evaluation must move beyond participant satisfaction. Kirkpatrick and Kirkpatrick (2016) propose four levels of evaluation: reaction, learning, behavior, and results. Reaction measures participant perception; learning measures knowledge and skill improvement; behavior measures workplace application; and results measure organizational impact. In phlebotomy training, these levels may be translated into satisfaction with instructors and facilities, pre-test and post-test scores, observed procedural compliance in the ward or laboratory, and outcomes such as lower hemolysis, fewer repeated venipunctures, improved turnaround time, and better patient experience. If evaluation stops at reaction level, management cannot determine whether training has improved service quality.

Finally, the ADDIE model provides an instructional design structure for integrating these perspectives. ADDIE consists of Analysis, Design, Development, Implementation, and Evaluation (Molenda, 2003). Analysis identifies competency gaps and service problems; Design formulates objectives, modules, methods, and assessment tools; Development prepares learning materials, videos, checklists, simulations, and digital platforms; Implementation delivers training through blended and supervised methods; and Evaluation measures results for revision. When ADDIE is

combined with POAC and Kirkpatrick, phlebotomy training becomes both an educational program and a management-control system. See table 1.

Table 1. Theoretical Anchors Used in the Article

Theory / Source	Core Idea	Relevance to Phlebotomy Training
Educational management (Terry, 2014; Robbins & Coulter, 2018)	Planning, organizing, actuating, and controlling resources to achieve objectives.	Guides training governance from needs assessment to monitoring.
Human-resource development (Armstrong, 2018; Dessler, 2020)	Training must respond to job needs and improve organizational performance.	Links phlebotomy competence with quality indicators and patient safety.
Educational HRM citations from UNIMA sources (Sumual et al., 2023; Palilingan et al., 2026; Rotty et al., 2021)	Competency development, learning-resource management, supervision, and continuous evaluation improve organizational quality.	Strengthens the argument that hospital training must be systematic, supervised, and sustainable.
Adult and experiential learning (Knowles, 1984; Kolb, 1984)	Adults learn best through relevant, experience-based, problem-centered activities.	Supports simulation, case discussion, reflection, and supervised practice.
ADDIE (Molenda, 2003)	A structured instructional-design cycle.	Provides the architecture for the proposed integrated model.
Kirkpatrick evaluation (Kirkpatrick & Kirkpatrick, 2016)	Four-level training evaluation: reaction, learning, behavior, results.	Ensures training impact is measured beyond attendance and satisfaction.

METHOD

This article is based on a qualitative descriptive study. The qualitative approach was selected because the problem concerned the meaning, process, and managerial experience of phlebotomy training rather than statistical testing. The study explored how training was planned, implemented, evaluated, and reconstructed into a model for healthcare-worker development. Qualitative inquiry enabled the collection of detailed descriptions from management, instructors, healthcare workers, and other parties involved in training implementation.

The research setting was a private hospital in North Minahasa. The participants included hospital management, training instructors, nurses, laboratory personnel, and stakeholders who were involved in the design or delivery of phlebotomy training. Data were collected through in-depth interviews, participatory observation, focus group discussion, and document review. The documents included training curriculum materials, SOPs, evaluation forms, training documentation, and visual materials related to learning activities and the proposed model.

Data analysis followed a thematic procedure. Interview and observation data were transcribed, coded, categorized, and interpreted according to the research focus: planning, implementation, evaluation, and model formulation. Triangulation was used by comparing interview statements, field observation, focus group discussion, and documents. This approach strengthened credibility because findings were not based on a single source. The analysis also used theoretical lenses from educational management, competency-based training, ADDIE, blended learning, and Kirkpatrick evaluation.

The study maintained confidentiality by describing the institution as a private hospital in North Minahasa. The article does not identify individual participants. The findings are presented in

synthesized form to protect participants while preserving the substantive meaning of the empirical data. Quotations were not reproduced extensively; instead, interview meanings were summarized into thematic findings so that the article can function as a publishable journal manuscript. See table 2.

Table 2. Research Focus and Analytical Dimensions

Focus	Analytical Dimension	Data Sources	Expected Output
Planning	Need analysis, curriculum, SOP, facilities, instructors, digital readiness	Interviews, training documents, SOPs, observation	Assessment of planning strengths and gaps
Implementation	Methods, simulation, instructor performance, participant engagement, clinical relevance	Observation, documentation, interviews, training photos	Assessment of learning process and implementation barriers
Evaluation	Reaction, learning, behavior, results, monitoring, feedback	Evaluation forms, participant responses, quality indicators	Assessment of effectiveness and evaluation limitations
Model formulation	ADDIE, POAC, blended learning, simulation, supervision, audit, CPD	Synthesized findings, theory, FGD input	Integrated phlebotomy training model

RESULTS AND DISCUSSION

Planning of the Phlebotomy Training Model

The findings indicate that the hospital had already taken important initial steps in planning phlebotomy training. Training planning was reflected in the preparation of a curriculum, identification of competency needs, involvement of management, and use of standard operating procedures. These elements show that the institution recognized phlebotomy as a competence requiring formal preparation rather than informal imitation. In terms of educational management, this is a positive foundation because planning is the first function that determines the direction of training implementation (Terry, 2014).

However, the planning stage was still more administrative than performance-based. Curriculum preparation existed, but the link between training objectives and measurable service indicators was not fully developed. For example, the plan did not consistently translate clinical problems such as hemolyzed samples, insufficient specimen volume, repeated punctures, and patient-identification errors into specific learning outcomes and assessment instruments. A competency-based plan should begin with a clear map of what participants must know, demonstrate, and sustain in clinical practice. Without this map, training may appear organized on paper while remaining weak in its ability to change practice.

The planning gap also appeared in facility readiness. Simulation is essential in invasive-skill training because it protects patients and gives participants repeated opportunities to practice before clinical application. Yet the available simulation facilities were limited. The training plan therefore could not fully support step-by-step mastery from cognitive understanding to psychomotor performance. From the perspective of Carter and Lee (2015), the absence of adequate simulation facilities reduces the potential of training to build confidence and procedural accuracy.

Instructor readiness was another planning issue. Participants viewed the instructors positively, but certified instructor capacity and systematic use of technology remained limited. In health training, instructor competence includes not only mastery of the clinical procedure, but also the ability to facilitate adult learning, use assessment rubrics, provide feedback, and integrate digital resources. The finding supports the argument by Rotty et al. (2021) that supervision and structured professional development are necessary for improving the quality of organizational learning and professional performance.

Digital learning was included as a strategic need but had not yet become an operationally mature component. A modern training plan should specify digital modules, learning-management platforms, video demonstrations, online pre-tests, post-tests, electronic logbooks, and feedback dashboards. The absence of these elements means that blended learning was more an aspiration than a fully designed system. In the context of hospital shift work, digital readiness is particularly important because it gives healthcare workers flexible access to preparatory learning before face-to-face practice.

Thus, the planning stage can be interpreted as a partially developed system. It already contained important managerial foundations, but it required stronger integration between needs assessment, competency standards, facilities, instructor certification, digital learning, and evaluation indicators. The problem was not the absence of planning, but the need to shift planning from a document-centered approach toward a data-driven and performance-oriented educational management system. See table 3, and figure 1.

Table 3. Planning Findings and Improvement Needs

Planning Aspect	Empirical Condition	Main Gap	Improvement Direction
Needs assessment	Training needs were identified through operational experience and competency concerns.	Needs were not fully translated into measurable competency indicators.	Use sample-quality data, patient safety reports, and individual skill assessment as planning inputs.
Curriculum	Curriculum and SOP references existed.	Learning outcomes were not consistently linked to performance indicators.	Develop competency-based modules covering knowledge, skill, communication, infection control, and ethics.
Facilities	Basic practice facilities were available.	Modern simulation facilities and dedicated training laboratory were limited.	Provide phlebotomy arms, mannequin, visual aids, specimen-handling tools, and video demonstration resources.
Instructors	Participants appreciated instructor support.	Certified trainers and digital-facilitation capacity were limited.	Implement Training of Trainers and periodic instructor calibration.
Digital readiness	Digital technology was recognized as important.	E-learning, learning dashboard, and digital feedback were not yet optimized.	Develop blended-learning modules and electronic learning records.

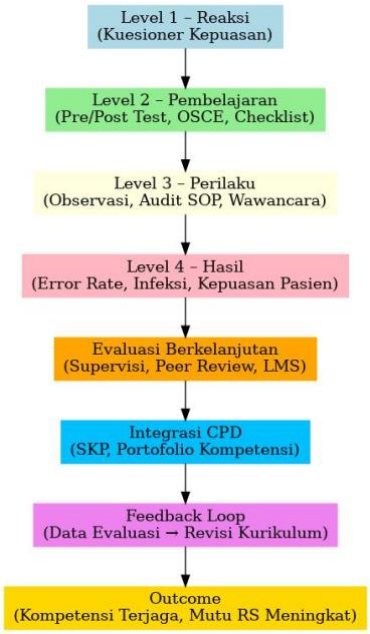

Figure 1. Needs Analysis Flow for Integrated Phlebotomy Training

Implementation of Phlebotomy Training

Training implementation combined lectures, demonstrations, and laboratory practice. This combination shows that the program did not rely solely on theory. Participants were exposed to technical materials, communication with patients, and occupational safety aspects. The presence of demonstration and practice also indicates that the hospital understood the practical nature of phlebotomy. Nevertheless, implementation remained dominated by conventional delivery, especially classroom explanation and simple demonstration. The balance between theory and practice had not yet reached the level required for competency-based clinical training.

The conventional pattern created a gap between understanding and performance. Participants could explain SOP components but were not always able to apply them consistently in real work situations. This finding is consistent with Kolb's experiential learning theory, which states that skill development requires concrete experience, reflection, conceptualization, and active experimentation (Kolb, 1984). If training moves quickly from explanation to limited practice without structured reflection and repeated supervised attempts, learning may remain cognitive rather than behavioral.

The limitation of simulation was one of the most important implementation barriers. Phlebotomy requires motor precision and confidence. The use of real patients too early in training may create ethical and safety concerns, while insufficient simulation may leave participants unprepared. Modern phlebotomy training should include staged practice: first, procedure walkthrough; second, simulator or phantom practice; third, checklist-based assessment; fourth, supervised clinical practice; fifth, independent practice after competence is validated. The observed implementation had not yet fully institutionalized this sequence.

Another implementation issue was the variation in participant competence. Healthcare workers came from different professional and educational backgrounds. Some participants had stronger laboratory experience, while others relied on nursing practice or work habit. Training needs to accommodate this diversity through pre-assessment, differentiated learning support, peer mentoring, and remediation. A single uniform delivery mode is insufficient when participant readiness varies. This confirms the importance of adult learning and competency-based education, in which the learning process must respond to individual gaps (Knowles, 1984; Spencer & Spencer, 2016).

The use of technology in the learning process was not yet optimal. Training activities were still largely face-to-face and depended on instructor availability. Digital learning could have supported implementation by providing pre-class modules, videos of correct technique, interactive quizzes, virtual discussion, and digital checklists. The absence of a strong digital component reduced flexibility and continuity. Johnson and Kim (2020) show that digital learning and simulation can improve engagement and procedural confidence. Therefore, the implementation stage needs a stronger blended-learning design.

Despite these limitations, the training process showed important strengths. Participants perceived the instructors positively, and the training helped reinforce awareness of SOP, patient safety, and communication. The training also created a shared space where healthcare workers could discuss procedural difficulties and learn from each other. This collaborative dimension should be preserved in the proposed model. The challenge is to transform these strengths into a structured system with clear standards, reliable facilities, measurable assessment, and continuous follow-up. See figure 2, 3, and table 4.

Figure 2. Training Documentation: Classroom-Based Phlebotomy Learning Activity

Figure 3. Training Documentation: Venipuncture Practice and Procedure Demonstration

Table 4. Implementation Gap Analysis

Component	Current Pattern	Ideal Standard	Interpretation

Learning method	Lecture, demonstration, and limited laboratory practice.	Blended learning with simulation, practice, feedback, and supervised clinical application.	Training needs stronger active and experiential learning.
Practice sequence	Practice existed but was not fully staged from simulator to clinical validation.	Structured sequence from demonstration to simulation, assessment, supervision, and independent practice.	Competence validation should precede independent clinical application.
Participant readiness	Participants had varied backgrounds and competence levels.	Pre-assessment and differentiated learning support.	One-size delivery may leave competence gaps unresolved.
Instructor role	Instructors were appreciated by participants.	Certified instructors capable of clinical coaching and digital facilitation.	Instructor development remains a strategic requirement.
Digital support	Limited use of e-learning and digital monitoring.	Digital modules, videos, quizzes, logbooks, and dashboard.	Blended learning should be institutionalized.

Evaluation of the Training Model

Evaluation results showed that the training was relevant and appreciated by participants. Reaction-level evaluation was generally positive. Participants felt that the training materials were related to daily tasks and helped them understand SOP, infection prevention, patient communication, and specimen handling. This positive response is important because participant acceptance influences motivation to learn. However, positive reaction alone cannot be treated as evidence of training effectiveness. Kirkpatrick and Kirkpatrick (2016) remind that reaction is only the first evaluation level.

At the learning level, the study identified improvement in knowledge. Pre-test and post-test comparison showed an increase in understanding, indicating that participants absorbed the theoretical content. This is a meaningful achievement because accurate phlebotomy practice depends on knowledge of patient identification, equipment selection, order of draw, specimen labeling, infection prevention, and post-procedure care. Nevertheless, knowledge improvement did not automatically guarantee skill consistency. The study found that psychomotor competence still varied, especially when procedures required precision under real clinical pressure.

At the behavior level, evaluation was not yet sufficiently systematic. The hospital had not consistently conducted post-training observation in clinical units using standardized checklists. As a result, management could not fully determine whether participants applied the SOP after returning to work. This is a common weakness in training systems. Training may increase knowledge during the session, but behavior change requires reinforcement, supervision, mentoring, and accountability. Noe (2020) emphasizes that feedback and follow-up are essential for transferring learning to workplace practice.

At the results level, the organizational impact of training had not been measured comprehensively. The available evidence suggested some improvement, but not enough to conclude that training had transformed service quality. Outcome indicators such as hemolysis rate, repeated puncture frequency, sample rejection, patient satisfaction, turnaround time, and infection-control compliance were not yet integrated into a training-evaluation dashboard. This confirms that the evaluation system remained weaker than the training intention. The program needed to connect training evaluation with hospital quality-management data.

The evaluation gap reveals a managerial problem. Evaluation was implemented more as an activity report than as a continuous learning system. In a mature educational management model, evaluation becomes a feedback loop. The findings of each training cycle should inform curriculum revision, instructor development, facility improvement, participant remediation, and policy decisions. Deming's continuous improvement principle supports this orientation because quality is improved through repeated cycles of evaluation, analysis, correction, and standardization (Deming, 2018).

The evaluation findings also imply that hospitals should establish a multi-level system. Level 1 should measure participant response to materials, instructors, facilities, and relevance. Level 2 should assess knowledge and skill through tests and Objective Structured Clinical Examination or checklist-based practice. Level 3 should observe behavior in real units after training. Level 4 should analyze organizational outcomes such as reduced sample errors and improved patient experience. This model makes training accountable and connects educational activity to service quality. See figure 4, 5, 6, and table 5.

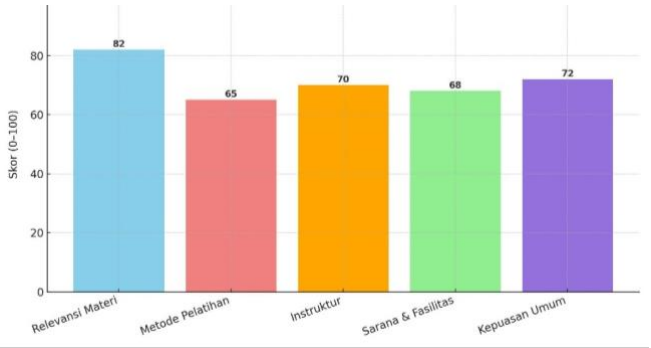

Figure 4. Reaction Evaluation Chart for Phlebotomy Training

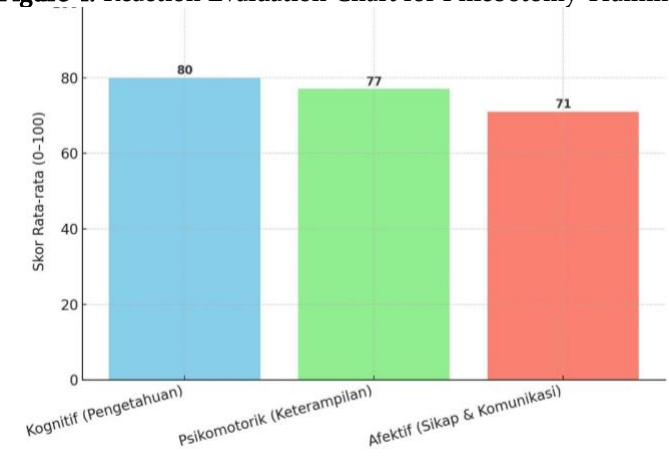

Figure 5. Learning Evaluation: Pre-Test and Post-Test Comparison

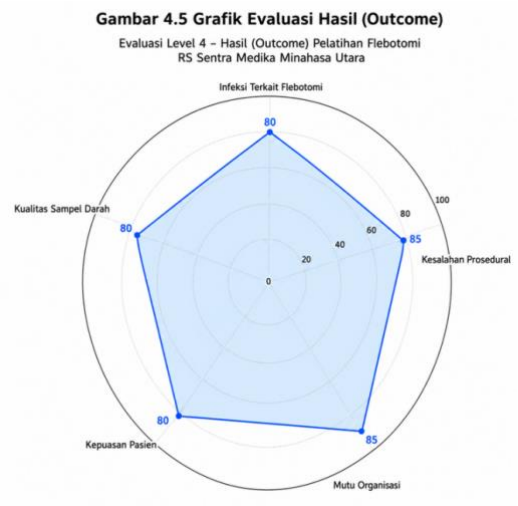

Figure 6. Outcome Evaluation Radar of Phlebotomy Training

Table 5. Kirkpatrick-Based Evaluation Interpretation

Evaluation Level	Empirical Meaning	Limitation Found	Recommended Measurement
Reaction	Participants perceived the training as relevant and useful.	Often treated as the main evaluation evidence.	Satisfaction scale, open feedback, perceived relevance, facility rating.
Learning	Knowledge increased after training.	Skill mastery was not consistently validated.	Pre-post-test, OSCE, simulation checklist, knowledge retention test.
Behavior	Workplace application was expected but not continuously monitored.	No systematic post-training observation in clinical units.	Supervisor checklist, mentoring logbook, peer audit, compliance observation.
Results	Organizational impact was not yet strongly documented.	Outcome indicators were not integrated into training evaluation.	Hemolysis rate, sample rejection, repeated venipuncture, patient satisfaction, turnaround time.

Formulation of an Integrated Phlebotomy Training Model

Based on the planning, implementation, and evaluation findings, the article formulates an Integrated Phlebotomy Training Model based on competency, simulation, digital learning, supervision, and continuous evaluation. The model is not merely a learning design. It is a training-governance framework that connects hospital quality needs, educational management, technology, and professional development. Its purpose is to ensure that phlebotomy training produces measurable improvement in healthcare-worker competence and patient-safety outcomes.

The model begins with competency-needs analysis. This stage uses data from clinical service, quality reports, laboratory sample rejection, patient complaints, supervisor observation, and individual competence assessment. The analysis answers four questions: what competence is required; what competence is currently lacking; what service problems are connected to competence gaps; and what resources are available to close the gaps. This stage reflects the Analysis phase of ADDIE and the Planning function of POAC.

The second stage is curriculum design. The curriculum should include patient identification, communication and consent, hand hygiene, equipment preparation, venipuncture technique, order of draw, specimen labeling, handling and transport, infection prevention, complication management, documentation, ethics, and patient-centered service. Each module should have learning outcomes, content, method, time allocation, assessment instrument, and required resources. This stage must also define minimum competence standards for passing the training.

The third stage is development of learning resources and infrastructure. The hospital should prepare SOP-based modules, digital learning materials, video demonstrations, simulation equipment, checklists, pre-test and post-test instruments, and electronic learning records. Development also includes instructor preparation through Training of Trainers. Instructor calibration is needed so that all trainers use the same standards when demonstrating procedures and assessing participants.

The fourth stage is implementation through blended and simulated learning. Participants first complete digital modules and online pre-tests. They then attend face-to-face sessions for discussion, demonstration, and supervised practice. Simulation is used before clinical application. After participants meet the minimum checklist score, they proceed to supervised practice with real clinical cases. The process should be accompanied by mentoring and feedback. This stage integrates adult learning, experiential learning, and competency-based training.

The fifth stage is evaluation and improvement. The model adopts Kirkpatrick's four levels and expands them into hospital quality indicators. Immediate evaluation measures participant reaction and knowledge. Skill evaluation uses simulation checklist and clinical observation. Behavior evaluation measures SOP compliance after the training. Results evaluation uses hospital indicators such as hemolysis, sample rejection, repeated venipuncture, turnaround time, and patient satisfaction. Findings from evaluation are used to revise the curriculum, improve facilities, update digital modules, and plan the next training cycle.

The sixth stage is continuous professional development. Phlebotomy competence should not be considered complete after one training event. The hospital needs refresher training, periodic competency reassessment, clinical audit, peer review, mentoring for new staff, and certification or internal credentialing. Continuous development ensures that competence is maintained as technology, standards, and patient needs evolve. This stage is aligned with the view of Sumual et al. (2023), Palilingan et al. (2026), and Rotty et al. (2021), who emphasize systematic development, learning-resource management, supervision, and continuous evaluation as foundations for professional and organizational quality.

The integrated model therefore converts training from a periodic event into a continuous quality-improvement system. It makes management responsible not only for scheduling training, but for ensuring that training changes behavior and improves service outcomes. It also positions healthcare workers as active learners who engage in a cycle of preparation, practice, feedback, supervision, and professional growth. See figure 7, 8, and table 6, 7.

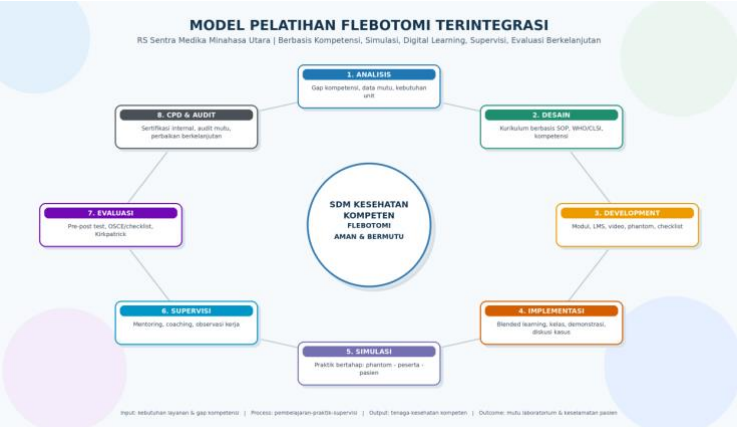

Figure 7. Integrated Phlebotomy Training Model

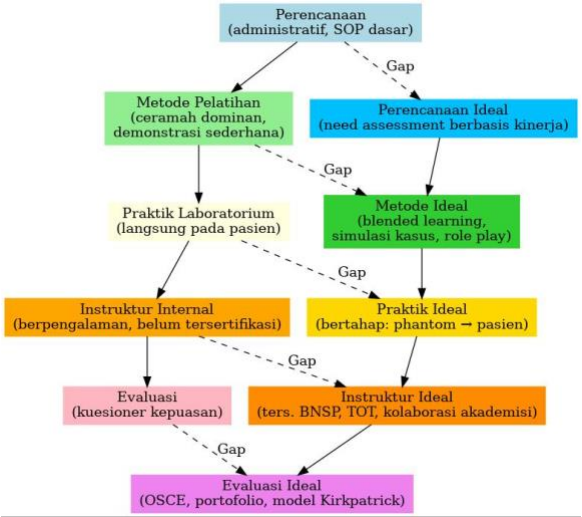

Figure 8. Integration of Needs Analysis, Curriculum, Implementation, Evaluation, and CPD

Table 6. Operational Matrix of the Integrated Phlebotomy Training Model

Stage	Main Activity	Responsible Unit	Output	Quality Indicator
1. Needs analysis	Review service data, staff competence, patient safety reports, and training history.	Hospital management, laboratory, nursing, training unit	Competency-gap map	Clear linkage between service problems and training objectives
2. Curriculum design	Prepare competency-based modules and assessment criteria.	Training unit, clinical instructors, quality committee	Training syllabus and lesson plan	Modules cover technical, communication, ethics, and safety components
3. Resource development	Prepare digital materials, videos, checklists, simulation tools, and instructor calibration.	Training unit, IT unit, instructors	Learning package and simulation set	Availability of digital module and simulation checklist
4. Implementation	Run blended learning, simulation, supervised	Instructors, supervisors, unit heads	Validated training participation and practice record	Participants pass knowledge and skill standards

	practice, and mentoring.			
5. Evaluation	Measure reaction, learning, behavior, and results.	Training unit, quality committee, supervisors	Evaluation report and dashboard	Improvement in knowledge, skill, SOP compliance, and sample-quality indicators
6. CPD	Conduct refresher, re-assessment, audit, and certification.	Management, training unit, HR department	Continuous professional development cycle	Sustained competence and reduced procedural errors

Table 7. Success Indicators for Model Implementation

Indicator Area	Specific Indicator	Target Orientation
Technical competence	Correct patient identification, venipuncture technique, specimen labeling, and handling.	Participants meet minimum checklist score and maintain compliance in clinical practice.
Knowledge retention	Pre-test, post-test, and follow-up knowledge test.	Post-test increases and knowledge is retained after training.
Patient safety	Reduced hemolysis, sample rejection, repeated venipuncture, and patient complaints.	Training contributes to safer and more accurate laboratory service.
Learning system	Availability of modules, simulation, digital learning, and mentoring.	Training becomes structured, flexible, and repeatable.
Organizational quality	Audit results, turnaround time, documentation accuracy, and patient satisfaction.	Training is connected to measurable hospital performance.

Discussion: From Training Activity to Educational Governance

The findings suggest that the central issue is not whether phlebotomy training exists, but whether it is governed as a complete educational system. The hospital had implemented training, but the links among needs analysis, curriculum, implementation, evaluation, and service outcome were not yet strong enough. This reflects a common problem in organizational training: programs are often documented and delivered, but not managed as continuous performance-improvement systems. Educational management requires that every training decision be connected to organizational goals and evaluated through measurable results (Sallis, 2015).

The planning findings show that the hospital needed a stronger data-driven basis. Training should begin with clinical evidence. If hemolyzed samples, insufficient specimens, and repeated venipunctures are recurring problems, those issues must become learning objectives. For example, a high hemolysis rate should lead to modules on needle size, tube handling, tourniquet time, blood flow technique, and specimen transport. This connection between data and curriculum is the heart of competency-based training. Without it, training may cover general topics but fail to address the causes of service errors.

The implementation findings show that conventional methods are insufficient for procedural competence. Lectures can explain principles, but they cannot produce hand skill by themselves. Demonstrations are useful, but participants still need repeated practice and corrective feedback. Simulation provides a safe bridge between knowledge and patient care. Therefore, hospital training should allocate more time to simulation, use standardized checklists, and provide remediation for

participants who do not achieve competence. This is consistent with experiential learning and adult learning principles (Knowles, 1984; Kolb, 1984).

The evaluation findings show that satisfaction must not be confused with effectiveness. Participants may be satisfied with the training because the instructor is supportive and the topic is relevant, yet clinical behavior may remain unchanged. This is why Kirkpatrick-based evaluation is important. Level 1 tells management whether participants accept the training. Level 2 tells whether they learned. Level 3 tells whether they apply the learning. Level 4 tells whether service quality improves. A hospital that stops at Level 1 loses the opportunity to use training as a quality-management instrument.

The proposed model also responds to digital transformation. Technology should not replace clinical supervision, but it can strengthen training continuity. Online modules can prepare participants before class; videos can standardize demonstration; digital quizzes can measure readiness; electronic logbooks can document supervised practice; dashboards can help managers monitor competence; and online refresher content can support continuous learning. In this way, blended learning becomes practical rather than merely conceptual.

The role of instructors is also strategic. A phlebotomy instructor is not only a technically skilled worker. The instructor must be a clinical educator who can explain, demonstrate, observe, correct, motivate, and evaluate. Training of Trainers is therefore necessary. It ensures that instructors use the same SOP, the same checklist, the same scoring criteria, and the same feedback principles. Instructor development is part of human-resource management and organizational learning, as emphasized by Sumual et al. (2023) and Rotty et al. (2021).

From a management perspective, the proposed model strengthens accountability. Planning becomes accountable because it is based on clinical data. Implementation becomes accountable because it uses defined modules and checklists. Evaluation becomes accountable because it measures behavior and results. Continuous professional development becomes accountable because staff competence is reassessed periodically. This approach can help hospitals prevent training from becoming ceremonial. Training becomes a mechanism for ensuring safe, accurate, and patient-centered service.

The model also has implications for policy within the hospital. Management should issue an internal policy that makes phlebotomy training mandatory for relevant staff, defines minimum competence standards, requires periodic reassessment, and links training outcomes with quality-improvement reports. The hospital should also allocate budget for simulation facilities and digital-learning infrastructure. Without policy and resource support, even a good model may remain difficult to implement.

Another implication concerns organizational culture. A strong training model encourages a learning culture where errors are not ignored or hidden, but analyzed for improvement. If a sample is rejected, the event should not only be treated as an individual mistake; it should become data for training revision, mentoring, and system improvement. This culture aligns with continuous improvement and patient-safety principles. Healthcare workers become part of a learning organization that uses evidence to improve practice.

In summary, the findings and model demonstrate that phlebotomy training must be reconstructed as an integrated educational-management cycle. The cycle begins with evidence, continues with competency-based learning, strengthens practice through simulation and mentoring, measures impact through multi-level evaluation, and sustains competence through CPD. This transformation is essential for improving clinical accuracy, reducing procedural errors, and strengthening the quality of hospital services.

CONCLUSION

The study concludes that phlebotomy training in a private hospital in North Minahasa had been planned and implemented, but it had not yet reached the level of an integrated, competency-based, and continuously evaluated training system. Planning included curriculum preparation, competency-need identification, and SOP reference, but it remained insufficiently connected to measurable clinical-performance indicators. The main planning limitations were restricted simulation facilities, limited certified instructor capacity, and the absence of a fully operational digital learning system.

Implementation combined lectures, demonstrations, and laboratory practice. This structure created a basic learning process, but the dominance of conventional methods limited the development of psychomotor competence. Participants benefited from instructor guidance and relevant materials, yet the lack of staged simulation, structured feedback, and differentiated support caused uneven competence. Training implementation should therefore be strengthened through blended learning, simulation-based practice, checklist assessment, mentoring, and supervised clinical application.

Evaluation showed that participants reacted positively and knowledge improved, but evaluation had not consistently measured behavior change and organizational outcomes. The training system needs to adopt Kirkpatrick's four levels and connect evaluation with hospital quality indicators such as hemolysis, sample rejection, repeated venipuncture, patient satisfaction, turnaround time, and SOP compliance. Without such evaluation, management cannot determine the real contribution of training to patient safety and service quality.

The proposed Integrated Phlebotomy Training Model combines ADDIE, POAC, competency-based training, blended learning, simulation, mentoring, Kirkpatrick evaluation, quality audit, and continuous professional development. The model offers a practical framework for hospitals to transform phlebotomy training from a periodic activity into a sustainable educational-governance system. Its implementation is expected to improve technical competence, professional behavior, patient safety, laboratory accuracy, and organizational service quality.

Recommendations

First, hospital management should strengthen needs analysis by using clinical quality data as the foundation for training planning. Sample rejection, hemolysis, repeated venipuncture, and patient complaints must be analyzed and translated into training objectives. Second, the curriculum should be redesigned as a competency-based curriculum that includes technical, communication, ethical, infection-control, and patient-safety competencies. Third, the hospital should invest in simulation facilities and digital-learning resources so that participants can practice safely and flexibly.Fourth, instructors should receive Training of Trainers and regular calibration to ensure consistency in demonstration, feedback, and assessment. Fifth, evaluation should be conducted using Kirkpatrick's four levels and integrated into a dashboard that links training data with service-quality indicators. Sixth, the hospital should establish continuous professional development through refresher training, periodic reassessment, mentoring, clinical audit, and internal credentialing. Future studies may test the model quantitatively across several hospitals to measure its effect on competence, service outcomes, and patient safety.

Practical implications for hospital governance

The practical implication of the model is that hospital management should view phlebotomy competence as part of institutional risk management. Errors in blood sampling are often treated as isolated technical mistakes, whereas the findings show that they are connected to planning,

facilities, instructor readiness, learning method, supervision, and evaluation. Therefore, a quality-oriented hospital should integrate phlebotomy indicators into regular management meetings. Laboratory rejection reports, nursing feedback, patient complaints, and infection-prevention data should be reviewed together with the training unit so that every clinical problem can be translated into a learning agenda. This approach will make training responsive to real service needs and prevent the repetition of the same procedural errors.

The model also implies the need for interprofessional collaboration. Phlebotomy is not the responsibility of one profession alone. Nurses, laboratory analysts, physicians, infection-prevention teams, quality committees, and managers all contribute to the safety of blood sampling. A training program will be stronger when these actors participate in designing the curriculum, observing practice, providing feedback, and evaluating outcomes. Interprofessional involvement also helps participants understand that phlebotomy is connected to the entire diagnostic pathway. When sample quality improves, physicians receive more reliable data, laboratories reduce rejection rates, nurses reduce repeated procedures, and patients experience safer care.

For sustainability, management should adopt a phased implementation strategy. The first phase can focus on curriculum revision and instructor calibration. The second phase can introduce simulation equipment and digital learning modules. The third phase can apply clinical observation and mentoring. The fourth phase can connect training evaluation with quality dashboards. This gradual strategy is more realistic for hospitals with limited resources because it allows improvement without waiting for all facilities to be perfect. What is essential is the existence of a clear roadmap, leadership commitment, budget allocation, and a monitoring mechanism that ensures the model continues to develop over time.

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