African Journal of Health, Nursing and Midwifery
ISSN: 2689-9418
Volume 8, Issue 4, 2025 (pp. 24-30)
www.abjournals.org

ENHANCING PERIPHERAL INTRAVENOUS LINE COMPLICATION FROM INSERTION TO REMOVAL IN ASTER SANAD HOSPITAL, RIYADH.

Ihab Ibrahim Alawor[1], Ghada Gomma Elsayed[1], Prameela Babu[1], Malathi Arshanapalai[1], Neesha Nair[1], Suha Suleiman Matar[1], and Zulkiflu Musa Argungu[2].

[1]Aster Sanad Hospital, Northeast of Exit 9, Al-Hamra District, Al Imam Saud Ibn Abdulaziz Road, Riyadh, Saudi Arabia.

[2]Department of Nursing, College of Applied Sciences, Almaarefa University, Riyadh, Saudi Arabia.

*Corresponding Author's Email: ihabjou@yahoo.com

Cite this article:

I. I., Alawor, G. G., Elsayed, P., Babu, M., Arshanapalai, N., Nair, S. S., Matar, Z. M., Argungu (2025), Enhancing Peripheral Intravenous Line Complication from Insertion to Removal in Aster Sanad Hospital, Riyadh. African Journal of Health, Nursing and Midwifery 8(4), 24-30. DOI: 10.52589/AJHNM-KJSLXELJ

Manuscript History

Received: 11 Oct 2025

Accepted: 10 Nov 2025

Published: 3 Dec 2025

ABSTRACT: *Background: Peripheral intravenous (IV) lines are among the most commonly performed clinical procedures, yet they remain associated with high complication rates, including thrombophlebitis, infiltration, infection, and patient dissatisfaction due to multiple insertion attempts. Aim: This quality improvement (QI) project aimed to reduce IV-related complications, increase first-attempt success rates, and enhance patient satisfaction at Aster Sanad Hospital, Riyadh. Methods: The project followed the FOCUS-PDCA framework. A multidisciplinary team reviewed current practices, identified root causes, and implemented targeted interventions including staff training, competency-based privileges, improved equipment, enhanced infection control (IC) adherence, and patient feedback mechanisms. Results: Post-intervention, first-attempt IV insertion success increased from 82% to 99% and benchmark is 95%, while complication rates (≥ Grade 2 thrombophlebitis) decreased to 0.112% with benchmark of <5%. Patient satisfaction rate related to IV insertions were improved and reach to 99%. Conclusion: Structured QI initiatives can significantly improve IV line safety, patient satisfaction, and clinical outcomes. Sustained monitoring and reinforcement of standards are essential for long-term success.*

KEYWORDS: Intravenous line, complications, patient safety, quality improvement, nursing practice.

Article DOI: 10.52589/AJHNM-KJSLXELJ
DOI URL: https://doi.org/10.52589/AJHNM-KJSLXELJ

African Journal of Health, Nursing and Midwifery
ISSN: 2689-9418
Volume 8, Issue 4, 2025 (pp. 24-30)

www.abjournals.org

INTRODUCTION

Peripheral intravenous (IV) cannulation is one of the most frequently performed invasive procedures in healthcare, with estimates suggesting that over 60–90% of hospitalized patients require at least one IV line during their admission. Despite its ubiquity, IV line insertion and maintenance remain fraught with complications such as infiltration, phlebitis, occlusion, dislodgement, and catheter-related bloodstream infections (CRBSIs). These events not only increase patient morbidity but also contribute to extended hospital stays, increased healthcare costs, and compromised patient trust in clinical care.

The Centers for Disease Control and Prevention (CDC) guidelines on the prevention of intravascular catheter-related infections (2011) and the Infusion Nurses Society (INS) Standards of Practice (2021) emphasize strict adherence to aseptic technique, appropriate device selection, timely removal, and continuous monitoring to mitigate complications. However, challenges persist in clinical practice, especially in high-volume settings where variability in staff skills, availability of specialized equipment, and adherence to protocols may be inconsistent.

At Aster Sanad Hospital in Riyadh, the Nursing Department identified a recurring pattern of patient complaints regarding IV insertions, delayed removal of IV lines, and complications such as thrombophlebitis. Audit data indicated that many insertions required multiple attempts, and IV line assessments were not consistently documented. In pediatric cases, parental presence and pressure further complicated successful insertions.

Study Aim

This study was undertaken to:

1. Decrease patient complaints related to IV line procedures (insertion, maintenance, removal) by 50%.
2. Improve the percentage of successful IV line insertions on the first attempt to 95%.
3. Reduce the complication rate of IV insertions (≥ Grade 2 thrombophlebitis) to less than 5% of total audited insertions.

METHODS

Study Design

A prospective quality improvement initiative was conducted using the FOCUS-PDCA model (Find, Organize, Clarify, Understand, Select; Plan, Do, Check, Act).

Setting

The project was implemented at Aster Sanad Hospital, Riyadh, Saudi Arabia, across adult and pediatric inpatient units, outpatient areas, and the emergency department.

Article DOI: 10.52589/AJHNM-KJSLXELJ
DOI URL: https://doi.org/10.52589/AJHNM-KJSLXELJ

Project Team

- Project Champion: Mr. Ihab Al Awour
- Project Leader: Ms. Ghada ElGhareeb
- Facilitator: Ms. Suha Mater
- Core Members: Nursing educators, ward charge nurses, PICU head nurse, pharmacy representative (Dr. Louai), QPS representative

Problem Analysis

A cause-effect (Ishikawa) diagram was used to identify contributing factors:

- Manpower: Variable nurse competency, lack of dedicated IV access experts, phlebotomy team not always available
- Machines: Limited access to vein viewer machines, no dedicated pediatric procedure room
- Materials: Poor quality IV dressings, inappropriate cannula size, non-waterproof dressings
- Methods: Inconsistent site assessment, multiple insertion attempts, lack of regular IV site checks, delayed removal
- Patient Factors: Pediatric agitation, parental interference, adult patient confusion or limb movement

Interventions

1. Policy and Procedure Update: Reviewed and updated IV insertion and maintenance guidelines to align with CDC and INS standards.
2. Staff Education and Competency: Conducted training sessions, developed updated competency checklists, and restricted IV insertion privileges to staff who successfully completed training.
3. Dedicated Resources: Requested an additional vein viewer machine; established a dedicated pediatric procedure room to minimize parental interference.
4. Phlebotomy Training: Sent nurses for specialized training to strengthen the phlebotomy team.
5. IV Line Audits: Introduced routine hourly IV site assessments and added new key performance indicators (KPIs) to the nursing dashboard.
6. Improved Equipment: Replaced low-quality dressings with waterproof transparent dressings for secure fixation.
7. Patient Feedback: Integrated patient experience feedback into evaluation to measure satisfaction with IV access.

Article DOI: 10.52589/AJHNM-KJSLXELJ
DOI URL: https://doi.org/10.52589/AJHNM-KJSLXELJ

Data Collection and Outcome Measures

Data were collected through:

- Audits of IV insertions and complications.
- Nursing dashboard KPIs (success rate, complications, adherence to hourly checks).
- Patient feedback reports through Nursing PREM.
- Patient complaints.

Primary outcomes:

- Percentage of first-attempt success.
- Rate of complications (≥ Grade 2 thrombophlebitis, infiltration, dislodgement).
- Number of patient complaints related to IV access.

Secondary outcomes:

- Staff competency improvement (training completion rates).
- Compliance with infection control guidelines (72–96 hrs line change).

Statistical Analysis

Descriptive statistics were used to summarize baseline and post-intervention data. Chi-square tests were applied to compare complication rates before and after interventions. Results were considered significant at $p < 0.05$.

RESULTS

Post-Intervention Outcomes

- First-attempt success rate improved to [99 %] (target ≥95%).
- Complication rate reduced to 0.112% (target ≤5%).
- Patient improved by 99%.
- Staff competency: 61 % have privileges.
- Training completed for all the staff.
- IC guideline compliance: 100 %adherence to timely IV line removal.

Article DOI: 10.52589/AJHNM-KJSLXELJ
DOI URL: https://doi.org/10.52589/AJHNM-KJSLXELJ

African Journal of Health, Nursing and Midwifery
ISSN: 2689-9418
Volume 8, Issue 4, 2025 (pp. 24-30)

Figure 1: Trend of Baseline vs post-intervention outcomes.

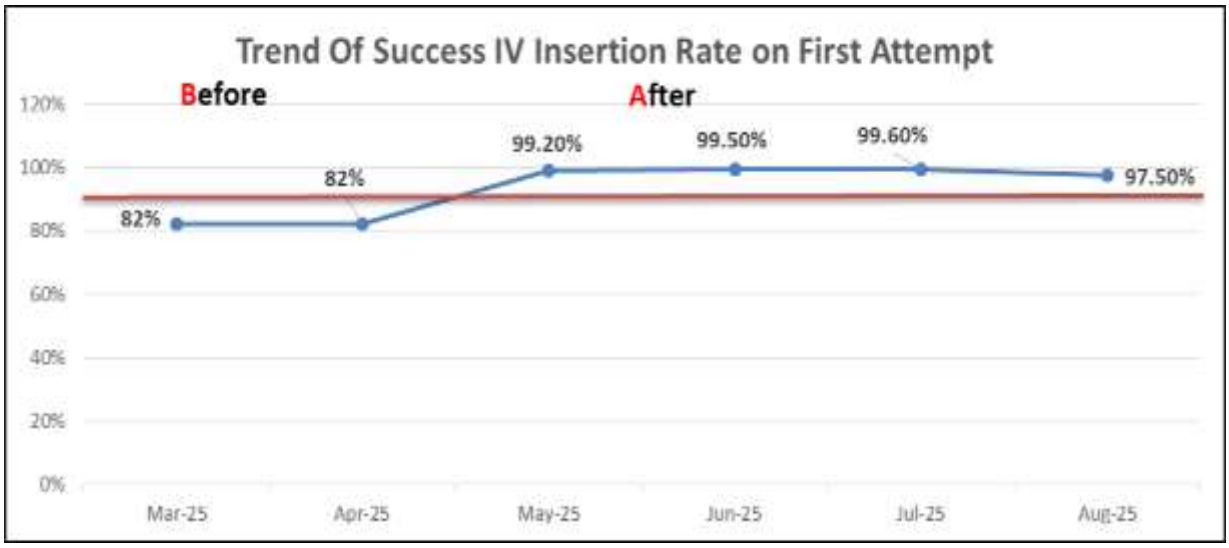
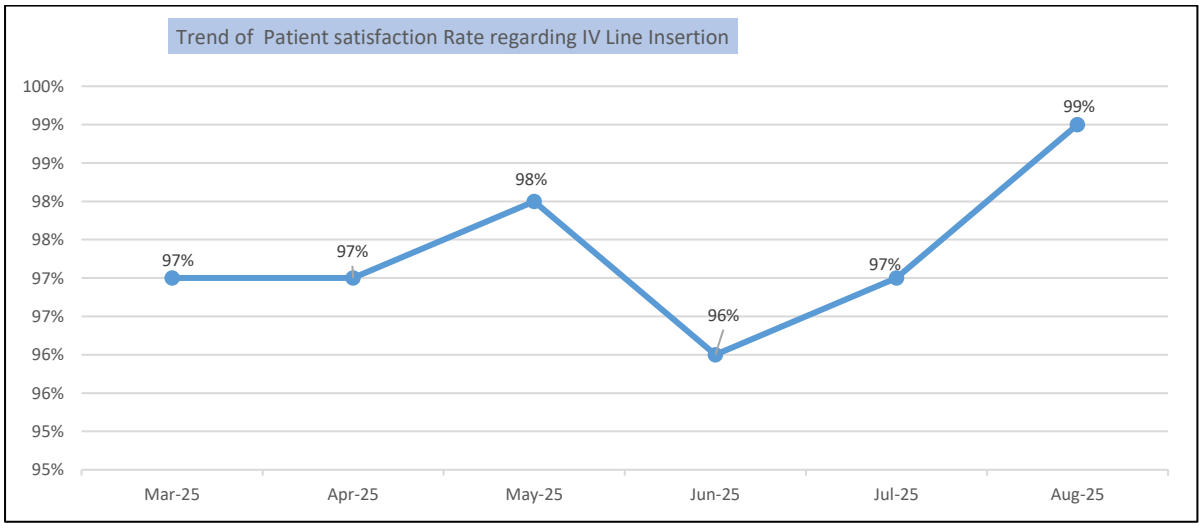


Figure 2: Trend of patient satisfaction rates before and after QI implementation.



DISCUSSION

Principal Findings

This study demonstrated that structured interventions targeting staff competency, policy reinforcement, equipment improvement, and patient engagement can substantially reduce IV-related complications and improve first-attempt insertion success.

The interventions aligned with international guidelines, and our results echo findings from prior studies. For instance, Rickard et al. (2012) reported that staff education and standardized insertion protocols reduced complications significantly. Similarly, the INS 2021 standards highlight the importance of competency-based privileges and hourly IV assessments, both of which were crucial to our project's success.

Article DOI: 10.52589/AJHNM-KJSLXELJ
DOI URL: https://doi.org/10.52589/AJHNM-KJSLXELJ

Patient-Centered Outcomes

One of the most meaningful impacts was the reduction in patient complaints. Successful first attempts are strongly linked to patient satisfaction, particularly in pediatric care, where repeated attempts increase distress for both children and parents.

Strengths

- Multidisciplinary approach.
- Use of FOCUS-PDCA, ensuring systematic problem solving.
- Integration of both clinical and patient experience measures.

Limitations

- Single-center study, limiting generalizability.
- Data dependent on documentation quality and audit reliability.
- Limited availability of phlebotomy staff despite training efforts.
- Cultural factors (parental presence in pediatrics) may not apply universally.

Implications for Practice

Hospitals aiming to improve IV safety should:

- Establish competency-based privileges for IV insertion.
- Provide adequate equipment, such as vein viewers.
- Use high-quality, waterproof dressings to secure cannulas.
- Implement routine audits and include IV-related KPIs on dashboards.
- Involve patients and families in feedback processes.

CONCLUSION

The implementation of a structured QI project using the FOCUS-PDCA model significantly improved IV line safety at Aster Sanad Hospital. First-attempt success rates increased, complication rates declined, and patient complaints were reduced. Sustaining these improvements requires ongoing monitoring, continuous education, and policy reinforcement. The lessons learned from this project can serve as a model for other institutions aiming to strengthen patient safety and quality of care.

Article DOI: 10.52589/AJHNM-KJSLXELJ
DOI URL: https://doi.org/10.52589/AJHNM-KJSLXELJ

Conflict of Interest

The authors have declared no conflict of interest

Funding Statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Acknowledgement

We acknowledge the experts who participated in the study.

REFERENCES

1. Rickard CM, Webster J, Wallis MC, et al. Routine versus clinically indicated replacement of peripheral intravenous catheters: a randomised controlled equivalence trial. Lancet. 2012;380(9847):1066–1074.
2. O'Grady NP, Alexander M, Burns LA, et al. Guidelines for the prevention of intravascular catheter-related infections. Clin Infect Dis. 2011;52(9):e162–e193.
3. Infusion Nurses Society. Infusion therapy standards of practice. J Infus Nurs. 2021;44(1S Suppl 1):S1–S224.
4. Wallis MC, et al. Risk factors for peripheral intravenous catheter failure: a multivariate analysis of data from a randomized controlled trial. Infect Control Hosp Epidemiol. 2014;35(1):63–68.
5. Ullman AJ, et al. Complications of peripheral intravenous catheters: a systematic review and meta-analysis. Lancet. 2015;386(10009):1097–1105.
6. CDC. Guidelines for the Prevention of Intravascular Catheter-Related Infections. 2011. https://www.cdc.gov/infectioncontrol/guidelines/bsi/index.html
7. INS. Infusion Therapy Standards of Practice. 2021. https://www.ins1.org/standards2021

Article DOI: 10.52589/AJHNM-KJSLXELJ
DOI URL: https://doi.org/10.52589/AJHNM-KJSLXELJ