International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

Assessment of Knowledge, Attitudes and Practices of Staff Nurses Regarding the Visual Infusion Phlebitis Scale in a Tertiary Care Hospital in Delhi/NCR

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Abstract

Background & objectives: Intravenous therapy is associated with phlebitis, a preventable complication with incidence rates of 6–48 per cent in Indian hospitals. The Visual Infusion Phlebitis (VIP) Scale, a standardised 0–5 scoring tool endorsed by the Royal College of Nursing, enables early detection and timely intervention. However, its effectiveness depends on nurses' knowledge, attitudes and practices (KAP). This study assessed KAP of staff nurses regarding the VIP Scale in a tertiary care hospital in Delhi/NCR to identify gaps and inform targeted interventions for improved patient safety in intravenous therapy management.

Methods: A descriptive cross-sectional study was conducted among 341 registered staff nurses using simple random sampling. Data were collected with a validated 25-item knowledge questionnaire, 10-item Likert-scale attitude tool and 15-item observational checklist for practices. Descriptive statistics, Pearson's correlation and chi-square tests were used for analysis (SPSS v25.0, $p<0.05$).

Results: Knowledge was good in 92.7 per cent (mean 19.72 ± 2.68, 78.9%), attitudes positive in 97.4 per cent (mean 26.16 ± 2.47), but practice was suboptimal (mean 7.49 ± 2.07, 49.9%) with only 6.5 per cent achieving good scores. A moderate positive correlation existed between knowledge and practice ($r=0.326$, $p<0.001$). No significant associations were found with age, experience, gender or qualification ($p>0.05$). Item-wise practice analysis revealed consistent weaknesses in documentation (45.7%) despite strengths in routine monitoring (53.7%).

Interpretation & conclusions: High knowledge and positive attitudes contrast sharply with suboptimal practice, indicating a critical theory-practice gap. Systemic factors (workload, training deficiencies) drive poor adherence. Targeted simulation training, protocol enforcement and policy standardisation are urgently required to reduce phlebitis incidence and improve intravenous therapy outcomes in tertiary care settings.

Key words: Attitudes,intravenous therapy,knowledge, nurses, phlebitis, practices,VIP Scale

Introduction

Intravenous (IV) therapy is one of the most frequently performed invasive procedures in hospital settings, essential for fluid resuscitation, medication delivery and nutritional support. However, it is associated with a high risk of complications, particularly phlebitis—an

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inflammatory response of the vein wall that can progress to thrombophlebitis, infection or catheter-related bloodstream infections (CRBSIs) if not detected early[1–3]. In India, reported phlebitis incidence ranges from 6 to 48 per cent across hospital settings, contributing to prolonged hospital stays, increased healthcare costs and patient morbidity[4–6]. The Visual Infusion Phlebitis (VIP) Scale, developed by the Royal College of Nursing (RCN), provides a simple, standardised 0–5 scoring system based on observable clinical signs (erythema, pain, swelling, induration, palpable venous cord and purulent discharge) to facilitate early detection and guide clinical decisions such as increased monitoring or catheter removal[7].

Effective implementation of the VIP Scale depends heavily on nurses' knowledge, attitudes and practices (KAP). Knowledge gaps can lead to misclassification of symptoms and delayed interventions[8], while negative attitudes—often stemming from time constraints or perceived low utility—reduce compliance[9]. Inconsistent practices further compromise patient safety[10]. Tertiary care hospitals in Delhi/NCR manage high patient volumes and complex cases, where the consequences of undetected phlebitis are amplified[11]. Despite global endorsement of the VIP Scale, region-specific data on nurses' KAP remain limited, particularly in high-workload Indian settings where staffing ratios and training opportunities vary widely[12–14].

Several studies have highlighted gaps in nurses' knowledge and application of the VIP Scale, often due to inadequate training, lack of awareness, or inconsistent adherence to protocols[15–17]. For instance, a study in a tertiary hospital setting found that nurses' limited understanding of phlebitis assessment criteria led to delayed interventions, increasing complication rates[18]. Additionally, attitudinal barriers, such as skepticism about the tool's necessity or time constraints due to heavy workloads, can hinder its routine use[19]. In India, where tertiary hospitals like those in Delhi/NCR manage large patient volumes and complex cases, these challenges are exacerbated by staff shortages, high nurse-to-patient ratios, and varying levels of training among nursing staff[20]. A study by Mandal and Mondal (2020) reported that inconsistent monitoring practices contributed to elevated phlebitis rates in Indian hospitals, underscoring the need for improved training and protocol adherence[21].

Moreover, the cultural and organizational context of Indian healthcare systems adds complexity to the implementation of standardized tools like the VIP Scale. Nurses in tertiary hospitals often face systemic challenges, including limited access to continuous professional development, inadequate documentation practices, and a lack of institutional policies mandating the use of tools like the VIP Scale[22]. These factors can lead to underutilization or incorrect application of the VIP Scale, compromising patient safety and increasing healthcare costs due to prolonged hospital stays and treatment of complications[23].

In Delhi/NCR, tertiary care hospitals such as AIIMS, Safdarjung, and Apollo Hospitals serve as referral centres for millions of patients annually, managing a diverse range of acute and chronic conditions[24]. The high patient turnover and complexity of cases in these settings necessitate robust IV therapy management to prevent complications. However, there is a paucity of data on nurses' KAP regarding the VIP Scale in this region, making it difficult to assess the extent to which this tool is integrated into routine practice[25]. A comprehensive KAP assessment will provide empirical evidence on nurses' understanding of the VIP Scale, their

attitudes toward its use, and their actual practices in clinical settings. This information is critical for identifying knowledge gaps, attitudinal barriers, and practical challenges that hinder effective implementation.

The findings of this study will have several implications. First, they will inform nursing educators and hospital administrators about specific areas where training and support are needed, enabling the design of targeted educational interventions[26]. Second, the results will guide the development or revision of institutional protocols to ensure consistent use of the VIP Scale, aligning with global patient safety standards[7]. Third, by addressing barriers to implementation, such as time constraints or lack of resources, the study will support quality improvement initiatives in vascular access care, ultimately reducing phlebitis incidence and associated complications[27]. Finally, the study will contribute to the broader literature on evidence-based nursing practices in India, where data on IV therapy management remains limited, particularly in the context of tertiary care[21].

This study is further justified by its alignment with global healthcare priorities, such as reducing hospital-acquired infections and improving patient safety. The World Health Organization emphasizes the importance of standardized protocols and continuous training to enhance infection prevention and control (IPC) in healthcare settings[28]. By focusing on nurses' KAP regarding the VIP Scale, this study addresses a critical component of IPC, ensuring that IV therapy—a high-risk procedure—is managed effectively. Additionally, the study's findings will support the professional development of nurses by fostering a culture of accountability, critical thinking, and patient-centred care, which are essential for delivering high-quality healthcare in tertiary settings[22].

In conclusion, assessing the knowledge, attitudes, and practices of staff nurses regarding the VIP Scale in a tertiary care hospital in Delhi/NCR is both timely and necessary. The study will provide valuable insights into the current state of IV therapy management, identify barriers to effective practice, and pave the way for targeted interventions to enhance patient safety and care quality. By bridging the gap between evidence-based tools and their real-world application, this study will contribute to reducing IV-related complications and improving outcomes in one of India's most critical healthcare settings.

Material & Methods

Study design and setting This descriptive cross-sectional study was conducted at a 500+ bed multi-specialty tertiary care hospital in Delhi/NCR serving as a major referral centre for complex medical and surgical cases. The setting was selected for its high volume of IV therapy cases across medical, surgical, intensive care, paediatric and emergency units, providing a robust environment to assess real-world VIP Scale application[11].

Study population and sampling The target population comprised all 1000 registered staff nurses actively involved in bedside patient care. Sample size was calculated using the finite population proportion formula with Z=1.96 (95% confidence), p=0.5, margin of error=0.05 and N=1000, yielding a minimum of 278 participants. To account for non-response and enhance robustness, the final sample size was fixed at 300; 341 nurses ultimately participated. Simple

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random sampling was performed using a random number generator from the hospital nursing administration roster, ensuring every eligible nurse had an equal chance of selection[15].

Inclusion and exclusion criteria Inclusion criteria were registered staff nurses employed at the hospital, actively involved in IV therapy administration and monitoring, and willing to provide written informed consent. Exclusion criteria included non-nursing staff, administrative or supervisory nurses without direct patient care responsibilities, and those unavailable or unwilling to participate.

Data collection tools A mixed-method approach was used with three validated instruments developed through extensive literature review and expert consultation[16]: (i) A 25-item multiple-choice knowledge questionnaire (score range 0–25) assessing understanding of IV therapy, phlebitis risk factors, clinical signs and VIP Scale application[7]. (ii) A 10-item 5-point Likert-scale attitude questionnaire (score range 10–50) measuring perceptions of the VIP Scale's importance, feasibility and barriers[9]. (iii) A 15-item observational checklist (score range 0–15) evaluating actual practices during routine IV site assessment and documentation[10].

Content validation was performed by five experts (senior nursing faculty, clinical supervisors and vascular access specialists). Pilot testing on 20 nurses (excluded from main sample) confirmed clarity and feasibility. Reliability was established with Cronbach's $\alpha \geq 0.7$ for the knowledge tool and Cohen's kappa ≥ 0.8 for inter-rater reliability of the observational checklist[15].

Data collection procedure Ethical approval was obtained from the Institutional Ethics Committee and administrative permission from the nursing administration. Written informed consent was secured after providing an information sheet detailing the study purpose, voluntary nature and right to withdraw. Knowledge and attitude questionnaires were administered via secure Google Forms with a 7-day completion window and reminders on days 3 and 5. Practice observations were conducted discreetly during routine shifts using the checklist to minimise the Hawthorne effect. Data collection occurred between February and August 2025.

Data management and statistical analysis Knowledge scores were categorised as poor (0–10), average (11–18) and good (19–25). Attitude scores were classified as negative (≤20), neutral (21–35) and positive (36–50). Practice scores were grouped as poor (0–5), average (6–10) and good (11–15). Descriptive statistics (means, standard deviations, frequencies and percentages) summarised KAP scores and demographic variables. Pearson's correlation coefficient examined the relationship between knowledge and practice scores. Chi-square tests assessed associations between KAP scores and demographic variables (age, years of experience, gender, qualification). Thematic analysis supplemented observational data. All analyses were performed using SPSS version 25.0 with statistical significance set at $p<0.05$[15].

Ethical considerations The study adhered to the principles of the Declaration of Helsinki. Participation was voluntary, with confidentiality maintained through anonymised coding. Data were stored securely and accessible only to the research team[17].

Results

Demographic profile Of the 341 participants, 56.6 per cent (n=193) were aged 20–25 years, 30.8 per cent (n=105) aged 25–30 years, 8.5 per cent (n=29) aged 30–35 years and 4.1 per cent

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(n=14) aged 40–45 years. The majority (79.8%, n=272) had 0–5 years of experience, 13.8 per cent (n=47) had 5–10 years, 2.3 per cent (n=8) had 10–15 years, 2.6 per cent (n=9) had 15–20 years and 1.5 per cent (n=5) had >20 years. Females constituted 79.5 per cent (n=271) of the sample and males 20.5 per cent (n=70). Educational qualifications were predominantly GNM (55.7%, n=190), followed by B.Sc/Post Basic Nursing (44.0%, n=150) and M.Sc Nursing (0.3%, n=1) (Table I).

Table I. Demographic Profile of Participants (N=341)

Variable	Category	Frequency (n)	Percentage (%)
Age	20–25 years	193	56.6
	25–30 years	105	30.8
	30–35 years	29	8.5
	40–45 years	14	4.1
Years of Experience	0–5 years	272	79.8
	5–10 years	47	13.8
	10–15 years	8	2.3
	15–20 years	9	2.6
	>20 years	5	1.5
Gender	Male	70	20.5
	Female	271	79.5
	Prefer not to say	0	0.0
Qualification	GNM	190	55.7
	B.Sc Nursing/Post Basic Nursing	150	44.0
	M.Sc Nursing	1	0.3
	Ph.D Nursing	0	0.0

Knowledge assessment Knowledge regarding the VIP Scale was good in 92.7 per cent of participants (mean score 19.72 ± 2.68, representing 78.9% of maximum). Item-wise correct responses exceeded 85 per cent for most questions, with particularly high accuracy on VIP scoring criteria (96.8%) and clinical signs of phlebitis (97.4%). This strong theoretical proficiency reflects recent emphasis on evidence-based tools in nursing curricula and continuing education programmes[18],[19].

Attitude assessment Attitudes toward the VIP Scale were overwhelmingly positive in 97.4 per cent of nurses (mean score 26.16 ± 2.47 out of 50), with no negative or neutral responses recorded. Participants strongly endorsed the tool's role in patient safety, feasibility in daily practice and value in reducing complications, consistent across all demographic subgroups[20].

Practice assessment In contrast to knowledge and attitudes, practice performance was suboptimal. Only 6.5 per cent (n=22) achieved good scores (11–15 on the 15-item observational checklist), 75.1 per cent (n=256) scored average (6–10) and 18.5 per cent (n=63) scored poor (0–5). The mean practice score was 7.49 ± 2.07 (49.9% of maximum), with a

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median of 8.00, range of 2–14 and considerable variability (SD=2.07). Descriptive statistics confirmed moderate dispersion, indicating inconsistent application despite high knowledge (Table II).

Table II. Frequency and Percentage Distribution of Practice Scores (N=341)

Category	Score Range	Frequency (n)	Percentage (%)
Good	11–15	22	6.5
Average	6–10	256	75.1
Poor	0–5	63	18.5

Correlation between knowledge and practice A moderate positive correlation was observed between knowledge and practice scores ($r=0.326$, $p<0.001$), indicating that higher knowledge levels were associated with better practice, though the relationship was not strong, suggesting mediating factors such as workload or training reinforcement.

Association of practice scores with demographic variables Chi-square tests revealed no statistically significant associations between practice scores and age ($\chi^2=12.204$, $p=0.058$), years of experience ($\chi^2=5.637$, $p=0.688$), gender ($\chi^2=1.289$, $p=0.525$) or qualification ($\chi^2=5.048$, $p=0.282$). Descriptive breakdowns showed comparable mean practice scores across groups (e.g., 7.47 for 0–5 years experience vs 7.75 for 10–15 years), reinforcing that systemic rather than individual demographic factors primarily influence performance.

Item-wise analysis of practice questions Correct response rates ranged from 45.7 per cent (Q14: documentation) to 53.7 per cent (Q10: routine monitoring), with most items clustering around 50 per cent. This narrow range highlighted inconsistent mastery, particularly in administrative tasks (documentation, patient education) despite relative strengths in routine site inspection (Table III).

Table III. Item-Wise Analysis of Practice Questions (N=341)

Question	Correct (%)	Incorrect (%)
Q1	51.3	48.7
Q2	48.1	51.9
Q3	49.0	51.0
Q4	50.4	49.6
Q5	49.6	50.4
Q6	49.3	50.7
Q7	47.2	52.8
Q8	49.9	50.1
Q9	47.8	52.2
Q10	53.7	46.3
Q11	52.2	47.8
Q12	51.0	49.0
Q13	51.9	48.1
Q14	45.7	54.3
Q15	51.9	48.1

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Descriptive statistics of practice scores by demographic variables Mean practice scores remained relatively stable across age groups (7.07–7.59), with the 25–30 years cohort achieving the highest (7.59 ± 1.83). Mid-experience groups (5–15 years) outperformed others (7.68–7.75), while scores declined slightly for those with >20 years (7.00 ± 1.41). Minimal differences were noted by gender (males 7.56 vs females 7.47) or qualification (GNM 7.54 vs B.Sc 7.44).

Discussion

The present study demonstrates a striking discordance between high theoretical knowledge (92.7% good scores, mean 78.9%), overwhelmingly positive attitudes (97.4%) and suboptimal practice (mean 49.9%, only 6.5% good) among staff nurses regarding the VIP Scale. This theory-practice gap aligns closely with findings from multiple Indian and international studies[1–6,18–22]. Prasuna and Rao (2019) reported 70 per cent awareness but only 40 per cent consistent application in a South Indian tertiary hospital, attributing the discrepancy to inadequate reinforcement and workload pressures[23]. Nair and Joseph (2020) documented knowledge scores below 50 per cent in Kerala, with particular confusion in grading early versus advanced phlebitis signs[24].

The moderate positive correlation between knowledge and practice ($r=0.326$, $p<0.001$) observed here is consistent with broader KAP literature in infection prevention, where knowledge predicts behaviour but is moderated by environmental and organisational factors[7,9,25]. Ray-Barruel *et al.* (2019) in their systematic review of 43 studies noted similar moderate correlations (r=0.2–0.4), emphasising that while education improves awareness, translation to practice requires supportive systems such as checklists and audits[26]. In the present cohort, the novice-heavy sample (79.8% with 0–5 years experience) likely benefited from recent curriculum emphasis on evidence-based tools, explaining the high knowledge scores (mean 19.72), yet lacked the practical reinforcement needed for consistent application[11,27].

Absence of significant associations between practice scores and demographic variables (all $p>0.05$) challenges traditional assumptions linking experience or qualification to better performance[8,28]. Sharma and Raj (2021) in a North Indian teaching hospital similarly found no strong demographic predictors, instead identifying time constraints and lack of formal training as primary barriers[29]. The near-significant age trend ($p=0.058$), with the 25–30 years group showing higher mean practice (7.59), may reflect a balance of recent education and moderate clinical exposure, though systemic issues such as high nurse-to-patient ratios (often exceeding 1:10) and limited supervision appear more influential in high-volume tertiary settings[11,30].

Item-wise analysis revealed consistent weaknesses in documentation (45.7%) and advanced interventions despite strengths in routine monitoring (53.7%), mirroring patterns reported by Tzolos and Salawu (2014) in an oncology ward where compliance rose from <30 per cent to 100 per cent only after targeted Plan-Do-Study-Act cycles and visual reminders[31]. Kaur *et al.* (2018) demonstrated a reduction in phlebitis incidence from 43 per cent to 18 per cent in Punjab ICUs following structured training, underscoring the potential impact of simulation-based and refresher programmes[32]. Pappu and Gnanarani (2023) in Chennai similarly reported improved

performance and reduced complications after focused education on VIP and infiltration scales[33].

The 18.5 per cent poor practice rate observed here is particularly concerning given the high patient volumes and complex cases managed in Delhi/NCR tertiary hospitals, where undetected phlebitis can escalate to CRBSIs with significant morbidity[11]. Mandal and Mondal (2020) reported comparable practice deficiencies contributing to elevated phlebitis rates in Indian settings[3]. The findings also align with global data: Webster *et al.* (2017) in their Cochrane review noted that clinically indicated rather than routine resiting guided by VIP scoring reduces complications without unnecessary interventions[34], while Alexandrou *et al.* (2014) and Marsh *et al.* (2015) confirmed lower phlebitis rates with standardised VIP use across multi-site studies[35],[36].

Limitations The single-centre design limits generalisability. Self-report bias in questionnaires and potential Hawthorne effect during observations may have inflated scores. Training exposure was inferred from experience rather than directly measured. The cross-sectional nature precludes assessment of longitudinal changes.

Interpretation & conclusions High knowledge and positive attitudes among nurses contrast sharply with suboptimal practice, revealing a critical theory-practice gap driven by systemic barriers rather than demographic factors. Targeted interventions—mandatory checklists, simulation training, mentorship programmes and policy-mandated resource allocation—are urgently required to translate knowledge into consistent practice. Implementation of these measures can reduce phlebitis incidence by 20–40 per cent, aligning with global infection prevention standards and improving patient outcomes in resource-constrained tertiary care settings.

Acknowledgments

We thank hospital administration and participants for support. No funding declared. Conflicts: None.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of Interest

There are no conflicts of interest.

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