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Nurturing critical thinking in surgical nursing: experience-level differences and the role of mentorship in Indian hospitals

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Abstract
Background: Critical thinking (CT) is a core competency in surgical nursing, essential for timely decision-making, patient safety, and effective teamwork. While global literature underscores the role of mentorship and experience in strengthening CT, limited evidence exists from Indian clinical contexts.
Objective: This study investigated differences in CT among surgical nurses across experience levels and examined the influence of mentorship and reflective practice in Indian tertiary hospitals.
Methods: A sequential explanatory mixed-methods design was employed. In phase one, 135 surgical nurses from two teaching hospitals in Chhattisgarh were surveyed using the California Critical Thinking Skills Test (CCTST). Participants were stratified into novice (<1-year, n=42), competent (1–5 years, n=48), and expert (>5 years, n=45) groups. Regression analysis assessed predictors of CT. In phase two, 24 semi-structured interviews explored experiences of mentorship and reflection.
Results: CT scores increased significantly with experience: novices (M=14.6, SD=2.9), competent nurses (M=18.2, SD=3.1), and experts (M=21.3, SD=3.4), $F=42.56$, $p<0.001$, $\eta^2=0.39$. Mentorship exposure strongly predicted higher CT scores ($\beta=0.41$, $p<0.001$), with mentored nurses scoring on average 3.2 points higher. Qualitative findings highlighted mentorship as a catalyst for decision-making, reflection as a tool for clinical anticipation, and systemic barriers (e.g., workload, staffing shortages) that constrained mentoring opportunities. Integrated analysis confirmed that mentorship and reflection accelerated CT growth, particularly in early career stages.
Conclusion: Critical thinking in surgical nursing develops progressively with experience and is significantly enhanced by mentorship and reflective practice. Strengthening structured mentorship programs and integrating reflective debriefing into clinical routines could accelerate CT development, improve decision-making, and enhance patient safety in Indian hospitals.

Keywords: Critical thinking, surgical nursing, mentorship, reflective practice, nursing education

Introduction

Critical thinking (CT) in nursing is widely recognized as a core competency that enables practitioners to analyze complex situations, interpret clinical data, and make sound judgments under pressure. Defined as a disciplined, self-directed process of reasoning and reflection, CT encompasses both cognitive skills and dispositions that support safe and effective clinical decision-making [1]. In the nursing profession, CT extends beyond technical knowledge, requiring nurses to evaluate evidence, challenge assumptions, and integrate experiential learning into practice [2].

The demand for CT becomes especially pronounced in high-stakes surgical environments where patient conditions often change rapidly. Surgical nurses must anticipate complications, prioritize interventions, and collaborate effectively with interdisciplinary teams [3]. Research has demonstrated that strong CT skills are associated with improved patient outcomes, enhanced job performance, and greater confidence in decision-making under stress [4]. Conversely, inadequate CT has been linked to delays in recognizing deterioration and suboptimal care delivery [5].

International scholarship has explored CT development extensively, particularly in relation to mentorship and experience levels. Studies in perioperative nursing, for example, highlight how mentoring programs strengthen reflective practice and clinical competence [6, 7]. Evidence also shows that as nurses progress from novice to expert, their reliance on intuition and contextual judgment increases, indicating a developmental trajectory of CT capacity [8]. While these insights are valuable, much of the evidence originates from Western contexts or generalized nursing populations, limiting applicability to specific healthcare systems.

In India, few studies have directly examined CT among practicing surgical nurses. Available literature often focuses on curriculum design or student learning [9], with only emerging work on mentorship-enhanced training in clinical settings [10]. This leaves a critical research gap: the absence of stratified assessment of CT across nursing experience levels in surgical wards, and a lack of exploration into mentorship and reflection as developmental catalysts. Addressing this gap is essential to strengthen surgical nursing practice and ensure patient safety in the Indian healthcare context.

Global Evidence: Critical Thinking and Nursing Outcomes

The role of critical thinking (CT) in nursing has been consistently linked to improved clinical outcomes, patient safety, and professional performance. Shin *et al.* [11] compared CT ability among students in different nursing programs and found that stronger CT skills were associated with higher levels of clinical competence and safer care

practices. Similarly, Lee *et al*. [12] demonstrated that teaching methods which reinforce analytical reasoning—such as concept mapping—positively influence CT development and contribute to improved learning outcomes, which indirectly enhance patient safety. These findings reinforce the argument that CT is not merely an academic skill but a clinical necessity, essential for navigating the complexities of patient care, particularly in high-risk environments.

Pedagogical Approaches: Simulation, AR/VR, and Reflection

Globally, nursing education has explored diverse strategies to strengthen CT, moving beyond didactic learning. Simulation-based education has received considerable attention as a way to create safe, realistic learning environments. A meta-analysis by Shin, Park, and Kim [13] confirmed that simulation significantly improves CT and clinical judgment compared to traditional instruction. The growing role of virtual simulation and augmented reality is equally notable. Foronda *et al*. [14], in a systematic review covering two decades, concluded that VR/AR technologies consistently enhance decision-making and CT, particularly in scenarios where hands-on clinical exposure is limited. In addition, structured reflective practices and case-based learning approaches have been shown to consolidate CT by encouraging learners to evaluate assumptions and integrate theory with clinical evidence. Chan [15] emphasized that reflection-based teaching strategies consistently nurture CT, indicating that the deliberate integration of reflection into pedagogy has long-term benefits for nursing performance.

Indian Studies: Limited Focus on Students

In the Indian context, empirical work on CT has largely focused on nursing students rather than practicing professionals. Sharma and Nasa [16] examined CT disposition among Indian undergraduate nursing students and reported moderate levels, highlighting the need for targeted educational strategies. Similarly, Bansal and Pandey [17] evaluated the effectiveness of concept mapping interventions and found measurable improvements in students' CT skills. However, both studies are limited to academic settings and do not extend into professional practice or clinical environments such as surgical wards. This leaves an important gap in understanding how CT manifests and develops among practicing nurses, particularly in high-stakes clinical domains where decision-making is critical to patient outcomes.

Methodology

This study employed a sequential explanatory mixed-methods design, integrating quantitative and qualitative approaches (QUAN → QUAL). In the first phase, a quantitative survey was conducted to measure critical thinking (CT) levels among nurses across different experience groups. In the second phase, semi-structured qualitative interviews were undertaken to explore the role of mentorship and reflective practice in fostering CT within clinical settings. The mixed-methods approach was chosen to ensure that statistical patterns could be complemented and explained by the lived experiences of nurses.

The study was conducted in the surgical wards of two accredited tertiary-care teaching hospitals located in Chhattisgarh, India. These hospitals were chosen because they provide high-volume surgical care and employ nurses with diverse experience levels, thereby offering a representative context for the study objectives. Participants were stratified according to professional experience and categorized as novice (<1 year), competent (1–5 years), and expert (>5 years). For the quantitative phase, the target sample size was 120–150 nurses, with approximately 40–50 participants recruited in each experience group. In the qualitative phase, 24–25 participants (eight from each group) were purposively selected from among survey respondents to provide deeper insights into mentorship and reflective practices.

A proportionate stratified sampling strategy was used in the quantitative phase to ensure representation across the three experience categories. Given the practical challenges of scheduling in busy surgical wards, convenience-based recruitment was also applied where necessary to achieve target numbers. For the qualitative phase, purposive sampling ensured inclusion of nurses with varied exposure to formal and informal mentorship, as well as those actively engaging in reflective practices.

Data collection involved the use of validated instruments. Critical thinking was assessed using the California Critical Thinking Skills Test (CCTST), an internationally recognized tool for measuring core CT domains such as analysis, evaluation, inference, and reasoning. A structured demographic and professional profile questionnaire was also administered to gather background information on age, gender, education, and years of surgical experience. In the qualitative phase, a semi-structured interview guide was developed to explore participants' experiences of mentorship, reflective learning, and decision-making in high-stakes surgical environments.

Result and Discussion

This study employed a sequential explanatory mixed-methods design, and the findings are presented in two phases. The quantitative phase reports on critical thinking (CT) scores across experience groups and the influence of mentorship, followed by regression analyses to identify predictors of CT. The qualitative phase provides deeper insights into nurses' experiences of mentorship, reflection, and barriers in surgical practice. Finally, integrated results are presented through a joint display, combining statistical outcomes with thematic interpretations to provide a comprehensive understanding of critical thinking in surgical nursing.

Participant Characteristics

A total of 135 surgical nurses participated in the quantitative survey (response rate: 90%). Of these, 42 (31.1%) were classified as novices (<1 year of experience), 48 (35.6%) as competent (1–5 years), and 45 (33.3%) as experts (>5 years). The mean age was 29.6 years (SD = 5.8), and the majority were female (78.5%). Educational qualifications included B.Sc. Nursing (64%), Diploma in Nursing (25%), and Postgraduate Nursing (11%).

Table 1: Demographic and Professional Profile of Participants (n = 135)

Variable	Novice (n=42)	Competent (n=48)	Expert (n=45)	Total (n=135)
Mean Age (years, SD)	23.4 (2.1)	28.7 (3.6)	35.1 (4.2)	29.6 (5.8)
Female (%)	83.3	77.1	75.6	78.5
B.Sc. Nursing (%)	52.4	70.8	68.9	64.0
Diploma (%)	40.5	22.9	13.3	25.0
Postgraduate (%)	7.1	6.3	17.8	11.0

Critical Thinking Scores

Mean CT scores, measured using the California Critical Thinking Skills Test (CCTST), increased with experience. Novice nurses scored M = 14.6 (SD = 2.9), competent nurses M = 18.2 (SD = 3.1), and expert nurses M = 21.3 (SD = 3.4). One-way ANOVA showed a significant difference across groups ($F(2,132) = 42.56$, $p < 0.001$, $\eta^2 = 0.39$). Post-hoc Tukey tests confirmed significant pairwise differences ($p < 0.01$) between all groups.

Table 2: Mean Critical Thinking Scores by Experience Group

Experience Level	n	Mean CT Score (SD)
Novice (<1 year)	42	14.6 (2.9)
Competent (1–5 yrs)	48	18.2 (3.1)
Expert (>5 yrs)	45	21.3 (3.4)
Total	135	18.1 (3.9)

Influence of Mentorship

Regression analysis revealed that mentorship exposure significantly predicted CT scores ($\beta = 0.41$, $p < 0.001$, $R^2 = 0.24$). Nurses reporting active mentorship scored on average 3.2 points higher on the CCTST than those without mentorship. Education level also emerged as a smaller but significant predictor.

Table 3: Regression Analysis of Predictors of Critical Thinking Scores

Predictor Variable	Beta (β)	t-value	p-value
Age	0.12	1.76	0.08
Gender	-0.05	-0.74	0.46
Education Level	0.18	2.48	0.01*
Mentorship Exposure	0.41	5.62	<0.001***

* p < 0.05, **p < 0.01, ***p < 0.001

Qualitative Findings

Twenty-four nurses participated in semi-structured interviews (8 novices, 8 competent, 8 experts). Four key themes emerged

1. **Mentorship as a Catalyst for Decision-Making**
   - "During my first year, I often froze in emergencies. My senior guided me step by step, which helped me develop confidence." (Novice, 1 yr)
2. **Reflection as a Learning Tool**
   - "After every surgery, I reflect on what went well and what could be improved. This habit makes me sharper in anticipating complications." (Expert, 9 yrs)
3. **Experience-Level Differences in Critical Thinking**
   - "Novices are task-focused; experts look at the whole patient picture." (Competent, 3 yrs)
4. **Systemic Barriers to Mentorship**
   - "We want to mentor juniors, but patient loads are so high that there's hardly any time." (Expert, 12 yrs)

Integrated Findings

Integration of quantitative and qualitative findings revealed a consistent pattern: CT scores significantly increased with experience, and mentorship exposure was a strong predictor of higher CT levels. Interviews provided explanatory depth, showing that mentorship and reflective practice were perceived as key drivers of CT growth, while systemic barriers limited mentorship opportunities.

Table 4: Joint Display of Quantitative and Qualitative Findings

Research Focus	Quantitative Findings	Qualitative Themes	Integrated Interpretation
Experience-level differences in CT	ANOVA: Experts > Competent > Novices ($p < 0.001$, $\eta^2 = 0.39$).	"Novices rely on protocols; experts anticipate complications."	CT grows progressively with experience and reflective judgment.
Mentorship influence	Regression: Mentorship predicts CT (+3.2 points; $\beta=0.41$, $p < 0.001$, $R^2=0.24$).	"Mentorship gave me courage to make decisions."	Mentorship accelerates CT growth, especially in early career stages.
Reflection in practice	(Not measured quantitatively).	"Reflection after surgery sharpens anticipation."	Reflection emerges as a qualitative driver; future studies should measure it quantitatively.
Barriers to mentorship	(Not measured quantitatively).	"Workload prevents effective mentoring."	Barriers explain variability in mentorship's effect on CT.

Discussion

The present study examined critical thinking (CT) among surgical nurses across different experience levels, with particular attention to the role of mentorship and reflective practice. Quantitative findings demonstrated significant differences in CT between novice, competent, and expert nurses, while mentorship emerged as a strong predictor of higher CT scores. Qualitative insights complemented these results by highlighting how mentorship and reflection shaped decision-making in high-stakes environments and revealed systemic barriers that limit consistent mentorship support. Together, these findings provide a nuanced understanding of how CT develops in the Indian surgical nursing context.

The findings of this study demonstrate clear experience-level differences in critical thinking (CT) among surgical nurses in Chhattisgarh, with novices scoring significantly lower than competent and expert counterparts. This progression aligns with Benner's "Novice to Expert" framework (Benner, 2001) [18], which posits that experiential learning and reflective practice contribute to advanced clinical reasoning. The quantitative evidence from this study

strengthens this claim by showing a statistically significant increase in CT scores with experience, supported by a large effect size ($\eta^2 = 0.39$). Similar results have been reported in international contexts, where CT levels have been shown to improve with years of practice and exposure to complex decision-making environments (Shin *et al*., 2015; Morgan *et al*., 2018) [23].

Mentorship emerged as a particularly strong predictor of CT scores in this study, with mentored nurses demonstrating significantly higher scores than those without mentorship exposure. This finding resonates with global literature emphasizing mentorship as a facilitator of critical thinking, clinical competence, and professional socialization (Nowell *et al*., 2017; Zhang *et al*., 2019) [21]. The qualitative themes reinforce this statistical association, with novices frequently attributing their ability to act decisively under pressure to the guidance of senior colleagues. However, systemic barriers such as workload intensity, staffing shortages, and hierarchical constraints were consistently identified, reflecting challenges unique to resource-constrained health systems like India's.

Reflection also emerged as a key mechanism for developing CT, especially among expert nurses who routinely engaged in self-evaluation after critical surgical events. Internationally, reflective practices—supported through structured debriefings, simulation, and case-based learning—have been shown to improve CT and clinical judgment (Chan, 2013; Forneris & Peden-McAlpine, 2007) [19]. In India, however, research on reflection remains largely focused on nursing students rather than practicing professionals (Sharma & Nasa, 2014). This highlights a gap in both education and practice: while reflection is valued globally, it remains underutilized and under-researched in Indian surgical wards.

The integration of quantitative and qualitative results underscores the complementary role of mentorship and reflection in fostering CT development. Experts consistently described how reflective habits and mentorship relationships enhanced their ability to anticipate complications and manage crises effectively. At the same time, novices expressed reliance on protocols and highlighted the absence of formal mentorship programs as limiting their growth. These insights suggest that mentorship and reflective practices are not only beneficial but essential for developing CT in high-stakes surgical environments.

Conclusion

This study demonstrated clear experience-level differences in critical thinking (CT) among surgical nurses, with significant progression from novice to expert. Mentorship emerged as a strong predictor of CT, while reflective practices were consistently reported as mechanisms for anticipating complications and refining decision-making. Together, these findings underscore the importance of embedding structured mentorship and reflective learning into surgical ward practice. While systemic barriers such as high patient loads and limited time constrain mentorship opportunities, the results indicate that even informal guidance from senior nurses can substantially enhance CT. For Indian healthcare settings, strengthening formal mentorship programs, creating time for reflective debriefings, and training senior staff as mentors may be effective strategies to accelerate CT development. Future research should examine longitudinal effects of mentorship interventions and explore scalable models suited to resource-constrained environments.

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