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Evolving knowledge-sharing practices among clinical practitioners: A decade of trends (2015–2025) and experience from a tertiary-care teaching hospital in North India

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Abstract: *Background:* Teaching hospitals function as hubs of clinical learning, where structured and unstructured knowledge-sharing processes shape clinical competence, patient safety, and organizational performance. Over the past decade (2015–2025), knowledge-sharing modalities among clinical practitioners have evolved significantly due to technological advances, accreditation pressures, and growing emphasis on patient safety. *Objectives:* This study synthesizes global evidence on knowledge-sharing practices among clinicians in teaching hospitals and integrates institutional insights from a tertiary-care teaching hospital in North India. The aim is to map evolving trends, identify enablers and barriers, and propose actionable strategies for strengthening collaborative learning systems. *Methods:* A systematic review was conducted following PRISMA 2020 guidelines across PubMed, Scopus, and Google Scholar. Studies published between January 2015 and May 2025 were included. JBI Critical Appraisal Tools were used for quality assessment. Data from institutional learning activities (January–June 2025) were incorporated. Narrative synthesis was complemented with conceptual meta-analytic interpretation. *Results:* A total of 28 studies were included. Four major shifts were identified: (1) transition from traditional CME to hybrid and digital learning; (2) rise of inter-professional collaboration; (3) formation of virtual communities of practice; and (4) alignment of knowledge-sharing with accreditation and patient-safety programs. Institutional data showed high acceptance of case-based learning, safety rounds, and learning-from-error sessions. *Conclusion:* Knowledge-sharing practices in teaching hospitals have become increasingly collaborative, technology-enabled, and safety-oriented. Leadership, culture, structured evaluation, and digital infrastructure remain critical determinants of sustained improvement.

Keywords: Knowledge sharing, Medical education, Teaching hospitals, Communities of practice, Patient safety, Hybrid learning.

Introduction

Teaching hospitals play a central role in developing the competencies, attitudes, and professional behaviors of clinical practitioners. They operate not only as centers of patient care but also as active academic environments where formal teaching and informal learning take place simultaneously. Beyond routine CME and classroom-based instruction, these institutions function as learning ecosystems where explicit knowledge such as clinical guidelines, protocols, SOPs, digital repositories, and structured curricula and tacit knowledge gained through hands-on experience, mentorship, clinical judgment, reflective practice, and inter professional collaboration come together in daily patient care [1-3]. In modern academic medical centers, the continuous interaction between explicit and tacit knowledge forms the foundation of effective clinical reasoning, sound decision-making, ongoing professional growth, high-quality patient outcomes, clinical excellence, and strengthened patient-safety practices [4-7].

Between 2015 and 2025, knowledge-sharing practices in academic medical centers evolved rapidly due to a confluence of global, technological, and organizational changes, shaped by:

Digital transformation in Clinical Education: The most significant change was the

expansion of digital learning platforms, including virtual CMEs, online case discussions, digital repositories, asynchronous e-learning, and cloud-based knowledge systems. Digital technologies enhanced accessibility, promoted self-directed learning, and enabled continuous professional development despite time constraints [8-9]. As Singh et al. reported, digital CME modalities became essential during COVID-19 and remained widely adopted post-pandemic due to convenience, scalability, and cost-effectiveness [10].

Hybrid Learning Systems: Hybrid education models blending physical learning spaces with synchronous and asynchronous virtual components became a dominant modality after 2020. These models improved participation rates and provided flexibility for clinicians managing intense patient-care responsibilities [9, 11-12]. Hybrid systems also allowed institutions to invite external experts at minimal logistical cost and to archive sessions for later review [1, 9-10, 12-13].

Rise of Communities of Practice (CoP): Communities of practice (CoPs), widely studied by Li et al. and others, emerged as powerful vehicles for exchanging tacit knowledge, sharing difficult cases, and building shared clinical mental models [14-16]. CoPs strengthened cross-disciplinary collaboration, supported reflective practice, and helped clinicians internalize new evidence. In surgical, critical-care, and emergency settings, CoPs facilitated rapid troubleshooting of complex scenarios and improved role clarity in team-based environments [13, 17-18].

Organizational Leadership and Learning Culture: The role of leadership and institutional culture became increasingly recognized as a major determinant of successful knowledge-sharing [6-7,14,19]. Leadership behaviors that foster psychological safety such as openness, transparency, supportive supervision, and non-punitive communication strongly predicted clinician engagement in structured learning [7]. Hospitals with strong academic leadership and learning-oriented cultures demonstrated higher participation in interprofessional meetings, improved communication, and more consistent implementation of learning-based initiatives [6, 20].

Integration with Patient-Safety and Accreditation Frameworks: Accreditation frameworks such as NABH and JCI aligned knowledge-sharing with patient-safety goals through structured governance mechanisms including morbidity and mortality (M&M) meetings, root cause analysis (RCA) reviews, incident reporting systems, and safety rounds [6, 19, 21]. These platforms reinforced systems thinking, increased transparency, and facilitated dissemination of lessons learned from adverse events. Studies demonstrated that accreditation-linked learning processes significantly improved safety culture, compliance with protocols, and error reporting [8,13].

Hybrid and online learning platforms expanded dramatically following COVID-19, which acted as a catalyst for institutional digital transformation. Virtual CMEs, digital CoPs, tele-rounds, and remote simulation debriefings allowed clinicians to sustain learning while ensuring continuity of patient care [2, 4-5, 9]. These digital practices persisted beyond the pandemic due to increased familiarity, institutional investment, and perceived educational value [9,10,12,13, 21].

Theoretical frameworks, particularly the *SECI Model* (Socialization–Externalization–Combination–Internalization) [3], help explain how knowledge is continually generated and transformed within clinical environments. This model emphasizes that knowledge is socially constructed and emerges through interaction, reflection, and shared clinical experience [22]. The model has been widely applied in hospital education research to explain how clinicians convert personal experiential knowledge into organizational learning [3, 15-17].

Communities of practice (CoP) have also played an increasingly pivotal role in healthcare learning systems, facilitating tacit knowledge exchange, collaborative problem-solving, and reflective practice among clinicians [14, 16]. These are particularly important in multidisciplinary, high-stakes environments such as surgery, anesthesia, and emergency care [4,15,20,23].

Despite these advances, several barriers persist. *Traditional hierarchical* structures may inhibit open communication, especially among junior staff [4,17]; *Inconsistent documentation practices* limit institutional memory and limit the transferability of lessons learned [21]; and *Time constraints* and workload pressures reduce participation in structured learning sessions [17-18]; *Digital inequity* inadequate training, infrastructure variability, and inconsistent adoption affects hybrid learning effectiveness [11-12]; *Low psychological safety* limits error reporting and discussion of diagnostic uncertainties [7, 13]. Additionally, varying levels of digital readiness across institutions influence the uptake of hybrid learning approaches [15, 19]. These persistent challenges echo findings from safety culture literature, which emphasize that learning will not flourish without supportive leadership, adequate resources, and transparent governance [6, 4, 20].

Given rapid shifts in clinical learning environments and ongoing challenges, there is a need to synthesize how knowledge-sharing practices have evolved globally over the past decade and to understand how these patterns align with real-world institutional practices in India.

The objectives of this study are therefore:

1. *To analyze global trends* in knowledge-sharing practices in teaching hospitals between 2015 and 2025.
2. *To integrate and contextualize these findings* using institutional data from a tertiary-care teaching hospital in North India.

Material and Methods

Study Design: A systematic review was conducted in accordance with PRISMA 2020 guidelines to examine evolving knowledge-sharing practices among clinical practitioners in teaching hospitals between 2015 and 2025 [15-16]. Given the diversity of study designs, interventions, and outcome measures, a narrative synthesis approach was chosen to integrate findings across qualitative, cross-sectional, and quasi-experimental studies [5].

Search Strategy: A comprehensive search of PubMed, Scopus, and Google Scholar was carried out for studies published between January 2015 and May 2025. The following keywords and Boolean operators were used:

- "knowledge sharing" AND "teaching hospital"
- "collaborative learning" AND clinicians
- "communities of practice" AND healthcare
- "continuing medical education" AND hospital"

Digital learning, collaborative education models, and communities of practice were included based on their relevance to modern knowledge-sharing frameworks [8-10 14,16].

Inclusion criteria were:

1. Studies involving clinicians or allied health professionals in teaching hospitals,
2. Studies published in English, and
3. Studies reporting any form of knowledge-sharing intervention, educational activity, or collaborative learning behavior.

Editorials, commentaries, conference abstracts, and non-healthcare studies were excluded.

Study Selection and Data Extraction: Two independent reviewers screened studies in three phases:

1. Title screening
2. Abstract review
3. Full-text evaluation

Disagreements were resolved through consensus. Data extraction included: author details, setting, intervention type, sample characteristics, outcomes, and limitations. For quality appraisal Joanna Briggs Institute (JBI) Critical Appraisal Tools were applied. Qualitative studies were assessed using the 10-item checklist. Cross-sectional and quasi-experimental designs were assessed using 8- and 9-item checklists, respectively. Only studies rated as moderate-to-high quality were synthesized.

Institutional Dataset: Institutional observational data were collected from a tertiary-care teaching hospital in North India between January and June 2025, reflecting local knowledge-sharing practices aligned

with hybrid learning, CoP activities, CME participation, and patient-safety initiatives [8-9,13,17].

Data sources included:

- Departmental attendance registers,
- Satisfaction scores measured using a standardized five-point Likert scale,
- Feedback from structured learning sessions.

Learning activities included:

- Case-based CME sessions
- Safety rounds
- Peer-led workshops
- Learning-from-errors seminars
- Digital newsletters circulated institution-wide

Statistical Methods: Data were analyzed descriptively. Frequencies, percentages, and mean attendance values were calculated using Microsoft Excel. Inferential statistics were not applied, as the dataset was observational and descriptive in nature [6, 19].

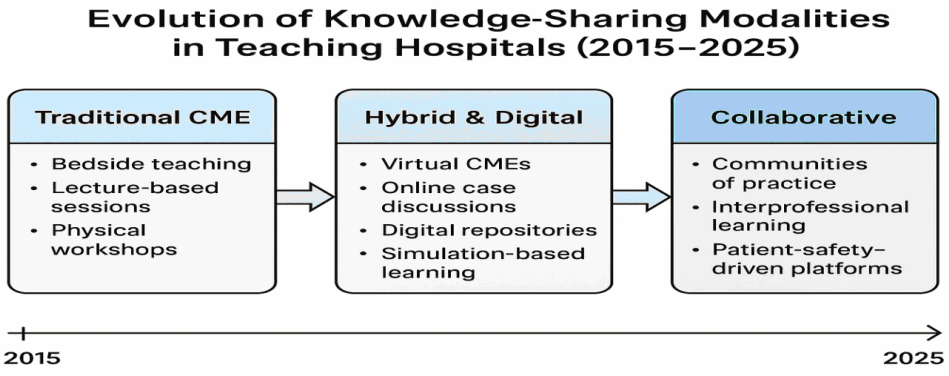
Results

Search Outcomes: A total of 642 studies were identified through PubMed, Scopus, and Google Scholar. After removal of duplicates and application of predefined inclusion and exclusion criteria, 28 studies met the eligibility criteria for final synthesis. The included studies represented diverse geographic settings, including India, Saudi Arabia, the UK, Australia, Malaysia, and the United States. Study designs consisted of qualitative research (n = 12), cross-sectional surveys (n = 10), and quasi-experimental studies (n = 6). Analysis of these studies, along with findings from the institutional dataset, revealed five major themes:

Theme 1: Transition from Traditional CME to Hybrid Learning: Earlier literature predominantly described classroom-based CME, bedside teaching, and face-to-face academic sessions. Beginning in 2020, particularly with the onset of the COVID-19 pandemic, hybrid educational models combining in-person learning with virtual platforms (such as Zoom-based CMEs, WhatsApp learning groups, and LMS-hosted modules) became the dominant approach [10-11,23].

Across multiple studies, hybrid learning was associated with enhanced participation, accessibility, and flexibility, enabling clinicians to engage with specialty experts across institutions and time zones [1-2, 4, 10]. The expansion of virtual platforms further supported real-time case discussions, online journal clubs, and peer-learning forums, contributing to continuity of medical education during periods of restricted physical interaction [12, 22].

Fig-1: Evolution of Knowledge-Sharing Modalities



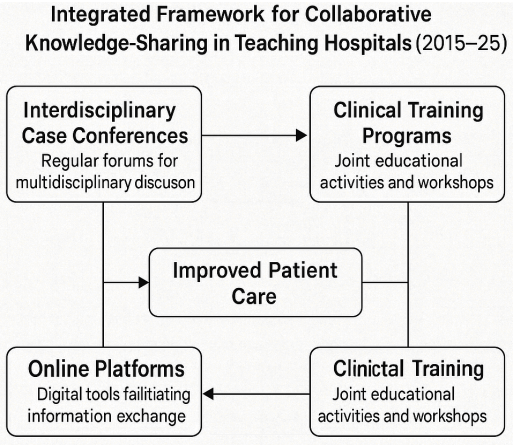
Theme 2: Strengthened Inter-Professional Collaboration: Inter-professional collaboration has emerged as a central pillar of effective knowledge-sharing within teaching hospitals. Interdisciplinary learning formats such as joint grand rounds, combined CME sessions, collaborative case reviews, and cross-departmental morbidity and mortality (M&M) meetings significantly improve communication between surgical, medical,

emergency, anesthesia, and nursing teams [5, 15]. These structured forums enhance shared understanding of clinical priorities, reduce miscommunication, and help clinicians align assessments during complex patient encounters [5, 15, 24].

A consistent body of research shows that inter-professional educational activities strengthen shared decision-making by integrating diverse clinical perspectives into patient management plans [8, 15, 24]. For instance, multidisciplinary trauma reviews enable emergency physicians, anesthesiologists, and surgeons to coordinate interventions more effectively, while nursing contributions provide essential bedside insights that refine diagnostic and therapeutic decisions [9]. This collaborative approach minimizes fragmentation of care and enhances continuity across the patient journey.

Multiple studies also highlight that inter-professional learning environments foster psychological safety, allowing clinicians to question decisions, express uncertainty, and discuss diagnostic dilemmas without hierarchical barriers [6-7, 14]. Such openness is especially crucial in high-stakes units including intensive care, emergency medicine, and preoperative services, where rapid, accurate information exchange is vital for patient safety. Overall, strengthened inter-professional collaboration transforms isolated clinical units into cohesive care teams, enhances communication quality, promotes shared mental models, and directly contributes to improved patient-safety outcomes and clinical performance [4, 20].

Fig-2: Integrated Framework for Collaborative Knowledge Sharing in Teaching Hospitals



Theme 3: Increased Adoption of Communities of Practice (CoP): Communities of practice (CoP) have increasingly become a core component of tacit knowledge-sharing systems in teaching hospitals. These clinician-driven peer networks provide a structured yet flexible space where professionals come together to discuss complex cases, troubleshoot diagnostic or management challenges, exchange experiential insights, and develop shared mental models of patient care [14-15]. By enabling clinicians to articulate and reflect on their experiences, CoPs play a key role in transforming individual tacit knowledge into shared organizational learning [3].

CoPs also enhance reflective practice, psychological safety, and collective problem-solving, which makes them powerful platforms for strengthening clinical reasoning, promoting interdepartmental coordination, and ensuring the uptake of best practices across units [8-9,14]. Through regular dialogue, simulation-based activities, and reflective group sessions, CoPs support both technical skill refinement and cognitive aspects of decision-making [18, 23].

These models are especially valuable in high-acuity clinical areas such as emergency medicine, anesthesia, surgery, and critical care where timely information exchange and shared situational awareness are critical for safe and effective patient care [17-18]. In these settings, CoPs help bridge specialty silos, streamline communication, and create a culture of continuous learning and mutual support.

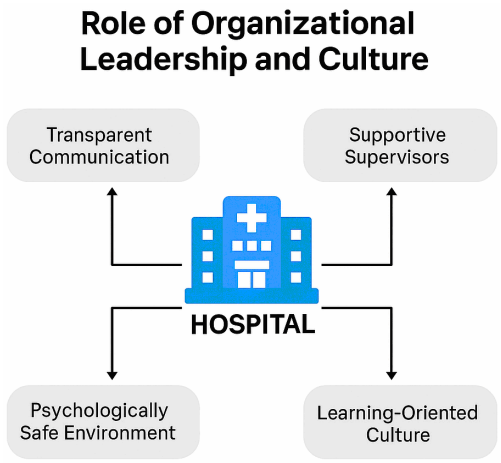
Fig-3: Adoption of Communities of practice (CoP)

Theme 4: Role of Organizational Leadership and Culture: Organizational leadership and institutional culture are critical determinants

of effective knowledge sharing in teaching hospitals. Institutions that foster transparent, non-hierarchical communication, provide supportive supervision, and promote strong academic leadership consistently demonstrate higher levels of clinician engagement in structured learning activities [6, 19,]. Leadership directly shapes participation by allocating resources, recognizing contributions, and cultivating psychologically safe environments in which clinicians can discuss errors, raise concerns, and share experiential insights without fear of blame [7].

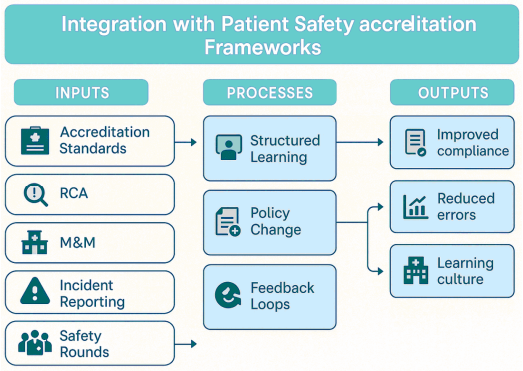
A learning-oriented culture further reinforces knowledge-sharing behaviors by encouraging continuous feedback, promoting peer-to-peer teaching, and embedding educational activities within daily clinical workflows. Such cultures help normalize reflective practice, strengthen inter-professional relationships, and integrate learning into routine patient-care processes [6-7, 19]. Hospitals that actively support these cultural attributes are more likely to sustain collaborative learning systems and achieve improvements in patient safety, communication, and clinical performance.

Fig-4: Role of Organizational Leadership and Culture



Theme 5: Integration with Patient Safety and Accreditation Frameworks: Accreditation standards such as NABH and JCI increasingly emphasize structured learning processes as part of clinical governance. Mechanisms like mortality and morbidity (M&M) meetings, root cause analysis (RCA) discussions, incident reviews, and safety rounds function both as quality assurance tools and as knowledge-sharing platforms [15, 19]. These processes create formal opportunities for clinicians to analyze adverse events, propagate corrective actions, and strengthen systems-based thinking. Studies showed positive impacts on error reporting, compliance with protocols, and transparency [6, 19].

Fig-5: Integration of Patient Safety and Accreditation Frameworks in Teaching Hospitals



Institutional educational records from January to June 2025 were examined to assess the breadth and engagement of knowledge-sharing activities within the tertiary-care teaching hospital. Activities included fortnightly case-based CME sessions, patient-safety rounds, departmental peer workshops, digital newsletters, and structured clinical discussions [1,5,9,10,24]. Attendance logs, participation patterns, and feedback scores (five-point Likert scale) were analyzed, and all data were aggregated and de-identified for confidentiality.

Across the six-month period, a total of 45 educational events were conducted, generating more than 1,000 staff engagements across clinical and non-clinical units. Participation was particularly strong in case-based CMEs and interdisciplinary workshops, consistent with global findings on effective hybrid and collaborative learning formats [1,9-10,25]. The mean satisfaction score was 4.5/5, indicating high acceptance of these structured learning initiatives.

Qualitative feedback highlighted improvements in interdepartmental communication, faster escalation pathways, and enhanced documentation quality, aligning with evidence that collaborative learning strengthens clinical coordination and

reflective practice [5,15,24]. Patient-safety rounds contributed to a measurable rise in near-miss reporting, reflecting greater psychological safety and transparency [6-8, 14].

Table-1: Summary of Knowledge-Sharing Activities and Outcomes (Jan–Jun 2025)

Learning Activity	Frequency (n)	Average Attendance	Departments Involved	Mode	Observed Outcomes	Supporting References
Fortnight Case-based CME Sessions	24	100	Medicine, Surgery, Pathology, Nursing	Hybrid/ Online	Improved protocol adherence, enhanced clinical reasoning	[1,9-10,25]
Patient-Safety Rounds	12	50	Quality, Nursing, Anesthesia, Radiology, Laboratory	In-person	Increase in near-miss reporting; stronger safety culture	[6-8,14]
Departmental Peer Workshops	3	100	Hospital Administration, Nursing, Clinical Departments, Pharmacy, Microbiology	In-person	Standardized SOPs; improved documentation	[5,15,24]
Learning-from-Errors Seminars	– (integrated across rounds)	30–40	Multidisciplinary teams	In-person	Reinforced reflective practice; collective learning	[16,18]
Digital Newsletters	6 (monthly)	300 readers	All units	Email	Increased awareness of updates and policies	[12-13]
Structured Clinical Discussions	Multiple (informal/departmental)	Variable	Clinical Units	Mixed	Better interdepartmental communication; faster escalation	[15,24]

Discussion

This study synthesizes a decade of developments in knowledge-sharing practices among clinical practitioners and integrates real-world institutional insights from a tertiary-care teaching hospital in North India. The findings highlight a clear evolution in learning environments, marked by a transition from traditional lecture-based CME toward hybrid and digitally enabled formats. This shift accelerated dramatically during the COVID-19 pandemic, which normalized remote participation, broadened access to expert faculty, and facilitated more flexible learning pathways [1, 9-10].

Inter-professional collaboration emerged as a consistent theme across both the global literature and institutional experience. Collaborative learning formats enhanced communication across specialties and improved the quality of clinical decision-making. Evidence demonstrates that interdisciplinary learning reduces medical errors, strengthens teamwork, and contributes to greater professional satisfaction [2, 4, 15]. These benefits were particularly notable in high-acuity settings such as surgery, anesthesia, and emergency medicine—where coordinated decision-making is essential [4, 20, 23].

The increasing adoption of communities of practice (CoP) reflects a deeper shift toward continuous, reflective, and experience-based learning. CoPs provide a psychologically safe environment where clinicians can examine complex cases, share undocumented experiential insights, and refine their clinical reasoning [3, 5, 14, 16]. Engagement observed in learning-from-errors seminars and

interdisciplinary workshops within the institution reinforces the value clinicians place on shared experience and open dialogue. These findings align with the broader literature demonstrating the role of CoPs in strengthening reflective practice, interdepartmental coordination, and dissemination of tacit knowledge [17-18].

Accreditation and patient-safety frameworks also played a key role in institutionalizing structured learning. Mechanisms such as safety rounds, incident reviews, and root cause analysis (RCA) discussions have become embedded components of clinical governance. These platforms promote transparency, standardize accountability, and reinforce a culture of safety [6, 8, 19, 21]. Institutional data showing increased near-miss reporting further underscore the positive influence of safety-driven learning processes on psychological safety and open communication. Despite significant progress, persistent challenges remain. Heavy clinical workloads limit clinicians' ability to participate in structured education. Hierarchical norms may inhibit junior staff from freely contributing to discussions, while varying levels of digital readiness and infrastructure influence the effectiveness of hybrid learning approaches. These challenges mirror trends reported globally, highlighting the need for leadership-driven strategies that integrate learning into everyday clinical workflows rather than treating it as an additional task [14, 7, 17].

A key insight from the synthesis is the need for more robust evaluation systems that directly link learning interventions to patient outcomes. Although many studies report high engagement, improved satisfaction, or better communication, fewer quantify changes in clinical performance, protocol adherence, or error reduction [25]. Future research should prioritize measurable outcomes to strengthen evidence-based educational practices. Overall, this study demonstrates that teaching hospitals are steadily evolving into learning organizations supported by digital tools, collaborative structures, and a strong emphasis on patient safety. The institutional dataset reinforces this trajectory through high clinician participation, improved communication pathways, enhanced documentation practices, and increased transparency in incident reporting. Sustaining these gains will require a balanced integration of technology, supportive leadership, a culture that promotes psychological safety, and structured evaluation systems capable of linking learning activities with measurable improvements in patient outcomes [6-7, 9-10, 12, 25].

Conclusion

This study demonstrates significant evolution in knowledge-sharing practices within teaching hospitals over the past decade. Digital and hybrid CME formats expanded rapidly, particularly during the pandemic, improving flexibility, accessibility, and engagement [1, 9-10]. Inter-professional collaboration and communities of practice further enhanced teamwork, communication, and shared clinical reasoning [2, 4-5, 14-16], while the integration of patient-safety and accreditation frameworks institutionalised structured learning and strengthened organizational transparency and systems thinking [6, 8, 19, 21].

Institutional data from a tertiary-care hospital in North India mirrored global trends, showing high participation in educational activities and improvements in near-miss reporting, documentation, and interdepartmental communication features associated with psychologically safe learning environments [7, 14, 18].

To sustain progress, teaching hospitals must continue investing in supportive leadership, digital infrastructure, and non-hierarchical cultures that promote psychological safety and continuous learning [6-7,17]. Interdisciplinary learning and communities of practice remain essential for deepening clinical reasoning and shared accountability [5, 15-16]. Future research should focus on rigorous evaluation systems that directly link educational interventions to measurable patient outcomes, addressing an existing gap in outcome-based evidence [25]. Emerging tools such as simulation, AI-enabled learning, and digital communities of practice offer promising avenues for advancing collaborative and experiential learning [11, 16, 23].

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