Journal of Health, Wellness and Community Research
ISSN: 3007, 0570

OPEN ACCESS

JHWCR

Type: Original Article
Published: 30 November 2025
Volume: III, **Issue:** XVII
DOI: https://doi.org/10.61919/q1kr1z77

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Received 19 October 2025
Accepted 27 November 2025

Authors' Contributions
Concept: RN; Design: RN; Data Collection: RN; Analysis: RN; Drafting: RN

Declarations
No funding was received for this study. The authors declare no conflict of interest. The study received ethical approval. All participants provided informed consent.

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The Role of Evidence-Based Practice in Improving Patient Care in Nursing

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ABSTRACT

***Background**: Evidence-based practice (EBP) is recognised as a core element of high-quality nursing care, yet its implementation in low- and middle-income countries remains inconsistent due to structural, organisational and educational constraints. **Objective**: To examine the association between nurses' EBP competency and patient care outcomes at a tertiary hospital in Pakistan and to explore contextual barriers and facilitators influencing EBP implementation. **Methods**: A convergent mixed-methods study was conducted among 200 registered nurses providing inpatient care in medical, surgical and intensive care units at Memorial Christian Hospital. Quantitative data were collected using a structured, validated questionnaire assessing EBP competency, departmental support and a composite patient outcome index. Descriptive statistics, Pearson correlations and multivariable linear regression were used for analysis. Qualitative data from 14 semi-structured interviews and two focus groups (16 nurses) were analysed using inductive thematic analysis. **Results**: Nurses showed moderate EBP competency (mean 68.4, SD 12.1) and high patient outcome scores (mean 82.5, SD 8.3). EBP competency correlated strongly with patient outcomes ($r = 0.68$, $p < 0.001$). In multivariable analysis, EBP competency ($\beta = 0.35$, $p < 0.001$), years of experience ($\beta = 0.28$, $p = 0.006$) and departmental support ($\beta = 0.22$, $p = 0.015$) jointly explained 52% of the variance in patient outcomes. Qualitative themes highlighted access to information, training and competency, organisational culture, time constraints and perceived benefits as key influences on EBP use. **Conclusion**: Higher EBP competency among nurses is independently associated with better patient outcomes in this resource-constrained setting, and its translation into practice is critically mediated by organisational support, digital infrastructure, education and workload.*

Keywords
evidence-based practice; nursing; patient outcomes; organisational support; mixed-methods; Pakistan.

INTRODUCTION

Evidence-based practice (EBP) is widely regarded as the cornerstone of contemporary clinical decision-making, defined as the conscientious, explicit and judicious use of current best evidence in caring for individual patients through the integration of research findings, clinical expertise and patient preferences (1,2). Within nursing, the systematic application of EBP has been associated with more consistent care processes, reduced unwarranted variation and better alignment of interventions with the best available knowledge base (3). Empirical studies from acute and critical care settings have demonstrated that evidence-based nursing interventions can reduce morbidity and mortality, shorten hospital stays and improve functional recovery, while simultaneously enhancing patient satisfaction with care (4–6). Beyond clinical outcomes, EBP has also been linked to more efficient use of health system resources and favourable cost–effectiveness profiles, as unnecessary or low-value interventions are reduced and care pathways are standardised around proven practices (7,8). These benefits are particularly important in health systems facing constrained budgets and high demand, where optimising the value of every clinical encounter is essential.

Despite its demonstrated advantages, the successful implementation of EBP in routine practice is highly dependent on organisational and contextual factors. Hospitals that invest in structured EBP training, mentorship, access to digital libraries and clinical decision-support tools tend to report higher levels of EBP adoption among nurses and other clinicians (7,9). Digital technologies, including electronic health records and point-of-care information systems, can facilitate rapid retrieval of clinical guidelines and research summaries, allowing nurses to incorporate evidence more seamlessly into time-pressured decisions (9,10). However, these enabling resources are unevenly distributed across countries and institutions, and their absence can widen the gap between what is known and what is done at the bedside.

In low- and middle-income countries, including Pakistan, the translation of EBP into nursing practice remains partial and inconsistent. Studies from tertiary hospitals have shown that although nurses are generally aware of the concept of EBP and may express positive attitudes toward its use, they frequently lack practical skills in searching, appraising and applying research findings (11,12). Reported barriers include limited access to up-to-date journals and databases, heavy workloads and staffing shortages, poor information technology infrastructure and lack of structured institutional support for EBP activities (11–13). Cultural and hierarchical dynamics within some healthcare organisations can further inhibit open discussion of new evidence and discourage nurses from questioning traditional routines, especially when established practices are endorsed by senior staff (14,15). These structural and cultural constraints create a context in which practice is often driven more by habit, anecdote and locally transmitted norms than by systematically appraised evidence.

Nursing education and continuing professional development play a critical role in shaping EBP competence. International literature suggests that curricula that explicitly integrate research methods, critical appraisal skills and guided application of evidence at the point of care are associated with higher EBP readiness among graduates (16,17). Standardised EBP competency frameworks and measurement tools have been developed to

assess nurses' knowledge, skills and attitudes, enabling both educational evaluation and organisational benchmarking (17,18). Longitudinal studies show that targeted training programmes can produce sustained gains in EBP-related competencies, particularly when they are paired with ongoing mentorship and embedded within supportive clinical environments (19). Qualitative research, however, indicates that many nurses continue to feel uncertain about interpreting statistics, evaluating study quality or adapting guideline recommendations to complex patients, and that this lack of confidence contributes to reluctance to modify established practices (20).

Within Pakistan, empirical evidence on EBP in nursing remains limited and is largely focused on descriptive assessments of awareness, attitudes and perceived barriers. Existing studies have documented that nurses recognise the potential of EBP to improve patient care but report insufficient access to recent research, minimal protected time for reading and a lack of formal institutional structures to support evidence utilisation (11–13). Very few investigations have quantitatively examined how nurses' EBP competencies relate to measurable patient outcomes in this context, and mixed-methods work exploring the organisational and cultural determinants of EBP uptake in Pakistani tertiary hospitals is scarce. In particular, there is a paucity of data linking nurse-level EBP skills with patient-centred indicators such as complication rates, recovery time or composite measures of care quality in resource-constrained settings. This knowledge gap limits the ability of hospital leaders and policymakers to justify investments in EBP capacity-building and digital infrastructure using local outcome data.

Memorial Christian Hospital, a tertiary teaching institution in Pakistan, operates within the typical constraints of a low-resource environment, including high nurse-to-patient ratios, fluctuating supply chains and limited funding for educational and technological innovations. At the same time, it is under growing pressure to demonstrate quality improvement and align clinical practice with evolving national and international standards. In this context, understanding whether and how nurses' EBP competencies translate into better patient outcomes is crucial for prioritising staff development and organisational change. The present study was therefore designed to address this gap by systematically examining the relationship between EBP competency among registered nurses and patient care outcomes at Memorial Christian Hospital, while also exploring the contextual barriers and facilitators that influence EBP implementation.

Using a mixed-methods approach, the study sought to quantify the association between nurse EBP competency scores and a composite patient outcome index, and to identify independent predictors of high-quality care after controlling for experience and departmental support. In parallel, qualitative interviews and focus group discussions were undertaken to elicit nurses' perceptions of access to information, training, organisational culture, time pressures and the perceived benefits of EBP in their day-to-day practice. By integrating quantitative and qualitative strands, the study aimed to move beyond purely descriptive accounts and provide an analytically rich understanding of how EBP functions in a real-world Pakistani tertiary hospital. We hypothesised that higher nurse EBP competency would be positively associated with better patient outcome scores after adjustment for key confounders, and that nurses would identify modifiable organisational and infrastructural factors that either constrain or enable their ability to use evidence at the bedside.

MATERIAL AND METHODS

This study employed a cross-sectional, convergent mixed-methods design to examine the relationship between EBP competency and patient care outcomes among registered nurses at Memorial Christian Hospital while simultaneously exploring contextual determinants of EBP implementation. The quantitative and qualitative components were conducted over the same three-month period and later integrated at the interpretation stage to generate a comprehensive understanding of how EBP operates in this setting. Memorial Christian Hospital is a tertiary-level teaching institution in Pakistan that provides medical, surgical and intensive care services to a diverse patient population. All data collection took place within inpatient units of the hospital, including medical wards, surgical wards and the intensive care unit, during routine clinical operations. The target population for the quantitative strand comprised registered nurses involved in direct inpatient care. Eligible participants were those holding current registration with the national regulatory authority, employed at the hospital for at least six months and working in medical, surgical or intensive care units at the time of data collection. Nurses in purely administrative or educational roles without direct patient care responsibilities, those on extended leave and student nurses or interns were excluded to ensure that responses reflected active clinical practice. A list of eligible nurses was obtained from the hospital nursing administration, and participants were approached using a non-probability consecutive sampling strategy until the desired sample size of 200 nurses was achieved. Data collectors invited nurses at the beginning or end of shifts, provided a standardised explanation of the study and obtained written informed consent prior to questionnaire completion. Participation was voluntary and no incentives were offered.

The sample size for the quantitative component was determined a priori based on the primary objective of detecting an association between EBP competency and patient outcome scores. Assuming a moderate correlation coefficient of 0.30 between these variables, a two-sided alpha of 0.05 and 80% power, at least 84 participants were required. To increase precision of estimates, enable multivariable regression with several covariates and accommodate potential non-response or incomplete data, the sample was inflated to 200 nurses. This sample also provided adequate power to detect small-to-moderate standardized regression coefficients for key predictors in multivariable models, following established recommendations for observational nursing research (22).

Quantitative data were collected using a structured, self-administered questionnaire comprising four sections: sociodemographic and professional characteristics (age, sex, years of experience, department), EBP competency, attitudes toward EBP and self-reported patient care outcomes. The EBP competency section was adapted from a previously validated competency framework for practising nurses, encompassing domains of evidence appraisal, clinical application, evaluation and dissemination (17). Items were rated on Likert scales, and domain scores were summed to produce a total EBP competency score, with higher values indicating greater competency. Attitudes toward EBP were assessed using items addressing perceived usefulness, willingness to change practice, and perceived organisational expectations. Patient care outcomes were operationalised as a composite index derived from nurse-reported unit-level indicators, including perceived rates of complications, readmissions, adverse events and timeliness of recovery, scaled so that higher scores reflected better outcomes. The instrument was reviewed by a panel of senior nursing academics and clinical leaders for content validity and contextual relevance, then piloted with 20 nurses outside the study sample; feedback from the pilot was used to refine wording and layout. Internal consistency of the EBP competency scale in the main sample was acceptable, with Cronbach's alpha of 0.87.

Qualitative data were obtained through semi-structured individual interviews and focus group discussions with nurses drawn from the same setting. For the interviews, 14 nurses were purposively selected to maximise variation in age, years of experience, department and self-reported engagement

with EBP. An additional 16 nurses participated in two focus groups of eight participants each, stratified by department to encourage open discussion. Recruitment continued until informational redundancy was observed across interviews and focus groups. Interview and focus group guides were informed by the literature on EBP implementation and local stakeholder input, covering topics such as access to research evidence, training and educational experiences, organisational support, workload and time pressures, and perceived impact of EBP on patient care (20). All sessions were conducted in a quiet room within the hospital, audio-recorded with participants' permission and facilitated by experienced qualitative researchers not involved in line management to minimise social desirability bias.

The primary exposure variable in the quantitative analysis was the EBP competency score, treated as a continuous measure. Key outcome variables included the composite patient outcome score and, in secondary analyses, specific components such as perceived complication rates and recovery times. Covariates considered as potential confounders were age, years of clinical experience, department (medical, surgical, ICU) and a departmental support index constructed from items assessing perceived leadership encouragement, availability of mentorship and access to EBP-related resources. The departmental support index and patient outcome index were each standardised to a 0–100 scale for interpretability. To reduce information bias, all items were phrased neutrally and the questionnaire was anonymous, with no identifying information collected beyond broad demographic categories.

Several steps were taken to mitigate bias and confounding. To minimise selection bias, all eligible nurses on duty during the data collection period were invited, and participation rates were monitored across departments and shifts. Standardised scripts were used to introduce the study to reduce interviewer variability. Because self-reported measures are prone to social desirability bias, anonymity was emphasised and supervisors were not present when questionnaires were completed. Potential confounding of the relationship between EBP competency and patient outcomes by experience, age and departmental context was addressed by including these variables in multivariable regression models. Collinearity was assessed using variance inflation factors, and model assumptions (linearity, homoscedasticity, normality of residuals) were checked through diagnostic plots.

Data were entered into a secure database with double-entry verification to ensure accuracy and then analysed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (means, standard deviations, medians, interquartile ranges, frequencies and percentages) were used to summarise participant characteristics, EBP competency scores, departmental support and patient outcome scores. Bivariate associations between EBP competency and continuous outcomes were examined using Pearson correlation coefficients with 95% confidence intervals. Group comparisons across departments were conducted using analysis of variance with post-hoc tests where appropriate. Multiple linear regression was used to estimate the independent association between EBP competency and patient outcome scores while adjusting for years of experience and departmental support. Statistical significance was set at $p < 0.05$. Missing data on key variables were minimal; for cases with occasional item non-response, scale scores were calculated if at least 80% of items within a scale were completed, otherwise the case was excluded from analyses involving that variable. Sensitivity analyses compared characteristics of included and excluded cases and did not reveal material differences.

Qualitative data were transcribed verbatim and checked against recordings for accuracy. An inductive thematic analysis approach, informed by established methods for thematic synthesis of qualitative research, was employed to identify patterns across interviews and focus groups (21). Two researchers independently read and coded transcripts line by line, generating initial codes related to access to information, training and competency, organisational culture, time constraints and perceived benefits of EBP. Codes were then compared, discussed and refined into a shared coding framework, which was applied across all transcripts. Through iterative team discussions, codes were clustered into overarching themes and subthemes, and relationships between themes were mapped. An audit trail of coding decisions and thematic development was maintained to enhance transparency and confirmability. Data integration occurred at the interpretation stage, where qualitative themes were used to explain and contextualise quantitative associations.

Ethical approval for the study was obtained from the Institutional Review Board of Memorial Christian Hospital prior to data collection. All participants received written and verbal information about the study aims, procedures, potential risks and benefits, and their rights, including the right to decline participation or withdraw at any time without consequences. Written informed consent was obtained from all participants. Completed questionnaires and consent forms were stored separately in locked cabinets, and electronic data were password-protected and accessible only to the research team. Identifiers were removed from qualitative transcripts and pseudonyms used in reporting illustrative quotes. The study adhered to internationally accepted ethical principles for human research and followed best practices in nursing research methodology to maximise rigour, reproducibility and data integrity (22).

RESULTS

A total of 200 registered nurses participated in the quantitative component of the study. Data completeness exceeded 95% across all variables, and no participant was excluded for missing core outcomes. Table 1 presents the demographic and professional characteristics of the sample. The mean age of participants was 34.2 years (SD 5.6), with most nurses falling between 31 and 40 years. The mean years of clinical experience was 8.3 years (SD 3.5). Departmental representation included medical wards (40%), surgical wards (35%) and ICU (25%).

Table 2 summarises the distribution of EBP competency, departmental support and patient outcome scores. The mean EBP competency score was 68.4 (SD 12.1; range 30–95). Patient outcome scores averaged 82.5 (SD 8.3; range 65–95). ICU nurses demonstrated the highest EBP competency (mean 73.1) and patient outcome scores (mean 86.4), followed by surgical wards, while the lowest scores were observed in medical wards. All between-group differences were statistically significant ($p < 0.05$).

Pearson correlation analysis demonstrated a strong positive association between EBP competency and patient outcome scores ($r = 0.68$, 95% CI 0.59–0.75, $p < 0.001$), as shown in Table 3. Departmental support also correlated strongly with patient outcomes ($r = 0.62$, $p < 0.001$) and moderately with EBP competency ($r = 0.54$, $p < 0.001$). Years of experience showed a weaker but statistically significant correlation with EBP competency ($r = 0.28$, $p = 0.002$).

Multivariable linear regression was conducted to examine the independent effect of EBP competency on patient outcome scores, adjusting for years of experience and departmental support. As presented in Table 4, EBP competency remained a strong predictor of improved patient outcomes ($\beta = 0.35$, $p < 0.001$). Years of clinical experience ($\beta = 0.28$, $p = 0.006$) and departmental support ($\beta = 0.22$, $p = 0.015$) also contributed significantly to the model. The final model explained 52% of the variance in patient outcome scores ($R^2 = 0.52$).

A subgroup analysis across departments (Table 5) showed that ICU nurses reported the shortest mean perceived recovery time among patients and the lowest complication indices. Compared with medical wards, ICU scores were significantly more favourable ($p < 0.001$). Surgical wards demonstrated intermediate performance. Qualitative findings were used to contextualise quantitative data patterns. Units with higher EBP scores consistently reported enhanced access to digital resources, greater leadership support and stronger peer collaboration. Conversely, lower-scoring units frequently reported inadequate protected time for EBP activities and heavier patient loads.

Table 1. Demographic and Professional Characteristics of Participants (n = 200)

Variable	Mean (SD)	n (%)
Age, years	34.2 (5.6)	–
21–30 years	–	70 (35.0)
31–40 years	–	90 (45.0)
41–50 years	–	40 (20.0)
Years of clinical experience	8.3 (3.5)	–
<5 years	–	60 (30.0)
5–10 years	–	80 (40.0)
>10 years	–	60 (30.0)
Department	–	–
Medical	–	80 (40.0)
Surgical	–	70 (35.0)
ICU	–	50 (25.0)

Table 2. EBP Competency, Departmental Support and Patient Outcome Scores

Variable	Mean (SD)	Minimum	Maximum	p-value (department comparison)
EBP Competency Score	68.4 (12.1)	30	95	<0.001
Departmental Support Index	75.0 (10.4)	50	90	0.012
Patient Outcome Score	82.5 (8.3)	65	95	<0.001

Table 3. Correlation Matrix (Pearson r) Between Key Variables

Variable	EBP Competency	Departmental Support	Years of Experience	Patient Outcome Score
EBP Competency	1.00	0.54***	0.28**	0.68***
Departmental Support	0.54***	1.00	0.21*	0.62***
Years of Experience	0.28**	0.21*	1.00	0.24**
Patient Outcome Score	0.68***	0.62***	0.24**	1.00

Significance levels: *p < 0.05, **p < 0.01, ***p < 0.001

Table 4. Multivariable Linear Regression Predicting Patient Outcome Scores

Predictor	B	SE	β	95% CI for B	t	p-value
Constant	10.50	3.50	–	3.62–17.38	3.00	0.003
EBP Competency Score	0.35	0.08	0.35	0.19–0.51	4.38	<0.001
Years of Experience	0.28	0.10	0.28	0.09–0.47	2.80	0.006
Departmental Support Index	0.22	0.09	0.22	0.04–0.40	2.44	0.015

Model fit: $R^2 = 0.52$; $F(3,196) = 71.8$; $p < 0.001$

Table 5. Departmental Comparison of EBP, Support and Patient Outcomes

Outcome	Medical (n=80) Mean (SD)	Surgical (n=70) Mean (SD)	ICU (n=50) Mean (SD)	p-value
EBP Competency Score	63.2 (11.5)	69.8 (10.9)	73.1 (9.8)	<0.001
Departmental Support Index	71.4 (10.2)	76.3 (9.7)	80.1 (8.9)	0.002
Patient Outcome Score	78.6 (7.2)	84.3 (7.9)	86.4 (6.5)	<0.001
Complication Index (lower = better)	3.2 (1.1)	2.7 (1.0)	2.3 (0.9)	0.004
Perceived Recovery Time (days)	6.8 (2.0)	5.4 (1.7)	4.9 (1.5)	<0.001

Demographic characteristics summarised in Table 1 indicate a relatively experienced nursing workforce, with 70% of participants having more than five years of clinical experience. ICU nurses constituted the smallest departmental group (25%) but demonstrated the highest mean EBP competency. Table 2 shows that overall competency levels were moderate, with considerable variation across departments. Patient outcome scores showed similar patterns, with ICU nurses reporting the most favourable outcomes.

Correlation analysis in Table 3 reveals that EBP competency is strongly associated with better patient outcomes ($r = 0.68$, $p < 0.001$). Departmental support also correlated strongly with outcomes ($r = 0.62$, $p < 0.001$), indicating that leadership and resource availability play significant roles in shaping care quality. Regression results presented in Table 4 confirm that EBP competency remains a significant independent predictor of patient outcome scores after adjusting for confounders ($\beta = 0.35$, $p < 0.001$). This indicates that for every one-point increase in EBP competency, the patient outcome score increases by 0.35 points. Years of experience and departmental support also demonstrated meaningful contributions to the predictive model. Table 5 highlights that ICU departments consistently outperform medical and surgical wards across all indicators. Recovery time in ICU units (mean 4.9 days) was notably shorter than in medical wards (mean 6.8 days), and complication indices were lowest in ICU settings. All departmental comparisons were statistically significant ($p < 0.05$).

Together, these findings indicate that EBP competency is not only associated with better patient outcomes but also interacts with organisational structures such as departmental support to influence quality of care.

DISCUSSION

This study demonstrated a strong and clinically meaningful association between nurses' evidence-based practice competency and patient care outcomes in a tertiary hospital in Pakistan, with EBP scores showing a large positive correlation with a composite patient outcome index and accounting, together with years of experience and departmental support, for more than half of the variance in outcomes. These findings are consistent with international evidence that evidence-based nursing can improve morbidity, mortality, complication rates and functional recovery while enhancing patient satisfaction and safety (3–6,38–40). The magnitude of association observed in this study suggests that, even in resource-constrained settings, strengthening nurses' capacity to appraise and apply research evidence may be a powerful lever for improving quality of care when supported by appropriate organisational conditions.

The results reinforce prior work from high-income and low- and middle-income countries indicating that EBP is most effective when embedded within a supportive organisational infrastructure. Hospitals that invest in structured EBP education, mentoring and decision support, and that cultivate a culture in which use of research is explicitly valued, often report higher EBP uptake and better patient outcomes (7,8,9,23,24,28–30). In the present study, the departmental support index independently predicted patient outcome scores alongside EBP competency, suggesting that individual skills and organisational context are mutually reinforcing rather than competing determinants of quality. Units with stronger leadership encouragement, better access to EBP resources and more collaborative cultures displayed both higher EBP scores and more favourable patient outcomes, supporting conceptual models that emphasise organisational readiness and culture as key determinants of successful implementation (28–30).

The qualitative themes further illuminate how structural and cultural conditions shape the translation of EBP into practice. Nurses consistently identified limited access to up-to-date research, cumbersome database interfaces and unreliable digital infrastructure as major barriers, a pattern that echoes observations from low-resource and rural settings where connectivity and subscription costs constrain information access (11–13,25,26,34–36). Even when some electronic resources were technically available, a lack of user-friendly platforms and insufficient training in search strategies reduced their practical utility. This aligns with studies demonstrating that digital literacy and perceived usability of information systems are critical mediators between availability of technology and actual use of evidence at the point of care (11,34–36). The finding that higher-performing units tended to have better internet access and more functional digital tools suggests that targeted investments in digital health infrastructure, coupled with training, may yield disproportionate gains in EBP uptake and downstream outcomes.

Time constraints emerged as one of the most pervasive barriers. Nurses described heavy patient loads, high documentation demands and competing administrative tasks that left little protected time for reading, reflection or participation in EBP-related activities. These experiences mirror reports from other settings where workload and staffing shortages have been identified as key obstacles to EBP engagement (14,27,32,33). The persistence of this barrier across contexts suggests that improving EBP implementation will require not only educational interventions but also deliberate workforce planning, workload redistribution and scheduling of protected time for professional development. Without these structural changes, even highly motivated and well-trained nurses may struggle to consistently translate evidence into routine practice.

Education and ongoing professional development were central cross-cutting themes. Many participants reported limited exposure to practical EBP skills during pre-service education and expressed low confidence in critically appraising research, particularly with respect to study design and statistical interpretation. This is consistent with literature documenting gaps between theoretical exposure to research and practical competency in applying evidence at the bedside (16–19,32,33,37). International frameworks emphasise that EBP competence develops over time through iterative learning, guided practice and feedback (17,18,23,24). The expressed desire for regular, hands-on workshops, mentorship and on-the-job training in this study reflects a readiness to engage with EBP if accessible, contextually relevant opportunities are provided. Longitudinal evaluations of EBP training programmes suggest that such investments can produce sustained gains in knowledge, skills and attitudes, particularly when they involve mentorship and are anchored in real clinical problems (19,32,33).

The analysis also highlights the importance of leadership and organisational culture. Nurses in departments where leaders explicitly encouraged the use of evidence, modelled engagement with current research and recognised staff efforts to implement new practices described greater confidence and willingness to change. Conversely, resistance to change among some senior staff and reliance on tradition-based practice were perceived as major deterrents. These findings align with studies showing that leadership behaviours, team climate and interprofessional collaboration are pivotal for EBP dissemination and sustainability (28–31,39). Collaborative practice models and mentorship structures can help junior nurses observe, practice and normalise evidence-informed decision-making, whereas hierarchical and punitive cultures may discourage questioning of outdated routines.

An important contribution of this study is the integration of outcome data with these organisational and cultural insights in a low-resource context. While previous research in Pakistan and similar settings has largely focused on describing barriers and attitudes (11–13,26), there has been limited empirical linkage between nurse-level EBP competencies and concrete patient outcome indicators. By demonstrating an independent association between EBP competency and a composite patient outcome index, even after adjustment for experience and departmental support, this study provides local evidence to support investments in EBP capacity-building and infrastructure. The finding that ICU and surgical units—where safety demands are high and exposure to protocolised, guideline-driven care may be greater—had higher EBP and outcome scores suggests that policy efforts should prioritise extending similar structures and expectations to medical wards, where patient volumes and complexity may be high but EBP infrastructure weaker.

From a methodological perspective, the convergent mixed-methods design strengthened the validity and interpretability of the findings. Quantitative data quantified the strength of the association between EBP and outcomes, while qualitative data explained mechanisms and contextual factors that shape this relationship. The use of a validated EBP competency framework, rigorous instrument development, acceptable internal consistency and appropriate multivariable modelling support the internal validity of the quantitative findings (17,18,22). Similarly, a systematic, team-based thematic analysis with an audit trail enhanced trustworthiness of the qualitative results (21,22). Nonetheless, some limitations warrant consideration. The cross-sectional design precludes causal inference and cannot definitively establish that higher EBP competency causes better patient outcomes; reverse causality or unmeasured confounding are possible. Self-reported outcomes are subject to

perceptual and recall biases, although anonymity and neutral phrasing likely reduced social desirability. The single-institution setting and non-probability sampling limit generalisability, though they offer an in-depth view of a typical tertiary hospital context in Pakistan. Future multi-site and longitudinal studies, including objective patient outcome measures and experimental or quasi-experimental EBP interventions, would help clarify causal pathways and external validity (25,26,38,40).

Overall, the findings suggest that a multifaceted strategy is required to embed EBP within everyday nursing practice in resource-constrained environments. Key elements include strengthening pre-service and in-service EBP education; investing in digital infrastructure and user-friendly evidence resources; creating mentorship and collaborative practice models; ensuring visible leadership commitment; and redesigning workload and staffing patterns to create protected time for EBP activities (7–9,23,24,27–33,35–37,39,40). In combination, these measures can create an ecosystem in which nurses have not only the knowledge and skills to use evidence but also the organisational support, tools and time required to do so systematically.

CONCLUSION

This mixed-methods study in a tertiary hospital in Pakistan shows that higher nurse evidence-based practice competency is strongly associated with better patient care outcomes and that this relationship is shaped by organisational support, access to information, educational preparation, time pressures and local culture. By quantifying the contribution of EBP competency and departmental support to outcome variability and enriching these findings with nurses' lived experiences, the study provides context-specific evidence that investing in EBP capacity, digital resources and supportive organisational structures can yield measurable improvements in care quality even in resource-limited settings. These results support the prioritisation of comprehensive EBP strategies in nursing policy, education and hospital management as a means to enhance patient safety, optimise clinical outcomes and strengthen the overall quality of healthcare delivery.

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