

NURSING AND PHARMACISTS IN THE 21ST CENTURY: DEVELOPING ROLES, CLINICAL EXCELLENCE, AND INTERPROFESSIONAL COLLABORATION IN TERTIARY CARE HOSPITALS OF LAHORE AND ISLAMABAD, PAKISTAN

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Abstract

Healthcare systems around the world are undergoing unprecedented change, driven by advances in technology, increasing complexity of disease, a move to patient-centered care and shortages of healthcare workers. In this changing environment, nurses and pharmacists are vital participants in healthcare quality, medication safety, chronic disease management, and interdisciplinary clinical decision making. Traditional boundaries between healthcare professions are slowly eroding, and there is more emphasis on collaborative practice and integrated patient care. Although interprofessional collaboration has been widely researched in developed countries, there is little data on the

collaborative relationship between nurses and pharmacists in the healthcare system of Pakistan.

Objective

This study aimed to evaluate the evolving professional roles of nurses and pharmacists, assess their contribution to clinical excellence, and determine the impact of interprofessional collaboration on healthcare delivery in tertiary care hospitals located in Lahore and Islamabad.

Methodology

A cross-sectional multicenter analytical study was conducted among registered nurses and pharmacists working in selected tertiary care hospitals of Lahore and Islamabad. Participants over 18 years of age with at least six months of professional experience were recruited through stratified random sampling. Data were collected using a structured questionnaire comprising demographic variables, clinical excellence indicators, digital health competencies, professional autonomy measures and interprofessional collaboration scales. Descriptive statistics, independent sample t-tests, Pearson correlation analysis and multiple linear regression analyses were performed using SPSS version 27.

Results

The sample of the study was composed of 620 health professionals, 380 nurses and 240 pharmacists. The mean age of the participants was 30.7 ± 6.2 years. The clinical excellence scores correlated positively and significantly with interprofessional collaboration ($r = 0.72$, $p < 0.001$). Digital health competency was a strong predictor of clinical excellence ($\beta = 0.61$, $p < 0.001$). Pharmacists scored significantly better than nurses on measures of digital competency, and nurses scored significantly better than pharmacists on measures of patient communication and care coordination. Those working in highly collaborative settings reported lower medication error frequencies and higher patient satisfaction indicators.

Conclusion

The findings suggest that collaborative practice between nurses and pharmacists is key to clinical excellence, patient safety and healthcare quality. Improving the performance of interdisciplinary

healthcare models, digital health education and shared clinical decision making can significantly improve healthcare outcomes in Pakistan.

1. INTRODUCTION

The 21st century has seen significant improvements in healthcare delivery systems. It is an era of rapid technological development, increasing patient expectations, rising prevalence of chronic diseases and increasing demands for high quality healthcare services. These changes have considerably changed the professional duties of health care providers, especially nurses and pharmacists. Traditionally, nurses were largely responsible for bedside patient care and pharmacists were largely responsible for dispensing medication. However, contemporary health care systems are requiring more active involvement of both professions in patient assessment, medication management, clinical decision-making, health promotion, disease prevention, and quality improvement initiatives (World Health Organization, 2023).

Clinical excellence is now a foundation of contemporary healthcare delivery comprising: evidence-based care; patient safety; professional competency; effective communication; and ongoing quality improvement. Research indicates that hospitals that employ strong interdisciplinary collaborative practices have fewer medication errors; reduced length of hospital stays; greater patient satisfaction; and improved clinical outcomes (Reeves et al., 2017). Due to the growing complexity of the health care system, traditional isolated practitioner models can no longer meet the needs of today's patients. Interprofessional Collaboration (IPC) is when healthcare providers from different professions join together to coordinate and deliver comprehensive patient-centered care. Nurses and pharmacists collaborate on key tasks, such as medication reconciliation; monitoring for adverse drug reactions; counseling patients; managing chronic diseases; and optimizing therapy. When nurses and pharmacists work collaboratively, they help ensure medication safety and enhance quality of care delivered within the healthcare system. (Schot et al., 2020). The current changes in Pakistan's healthcare system are due to the rapid growth in demand for healthcare services, advancements in

technology, and more healthcare professionals entering the field. However, few studies examine the collaborative working relationship between nurses and pharmacists in tertiary healthcare settings; current literature mainly describes the performance of each profession on its own rather than the integrated models that provide complete service to the patient. As a result, this study seeks to enhance the current body of knowledge by identifying how nurses' and pharmacists' roles have changed over time, defining what constitutes clinical excellence, and documenting the collaborative nature of their practices in Lahore and Islamabad.

Methodology

This multicenter, cross-sectional study took place between January and June 2026 in selected hospitals in Lahore and Islamabad. The participants were registered nurses and pharmacists working in clinical departments, such as internal medicine, surgery, intensive care, emergency, and outpatient services.

To be eligible, participants had to be over 18 years old, hold professional registration with the appropriate authority, have at least six months of clinical experience, and agree to take part willingly. We excluded healthcare workers on temporary training assignments, administrative staff, and those who did not complete the survey. The sample size was calculated using Cochran's formula at a 95% confidence interval and 5% margin of error, resulting in a minimum requirement of 384 participants. To increase statistical power and compensate for non-response, a total sample of 620 participants was recruited. Stratified random sampling was employed to ensure adequate representation of both professional groups.

Data were collected using a validated questionnaire with five sections. The first section gathered demographic information. The second looked at clinical quality using indicators related to patient safety, evidence-based practices, and quality improvement. The third focused on digital health skills, including electronic medical record use, clinical information systems, and telehealth participation. The fourth examined professional autonomy, and the fifth assessed teamwork using a standard

collaboration assessment tool. The reliability of the internal consistency showed Cronbach's alpha coefficients above 0.85 for all areas.

Ethical approval was secured from the institutional review boards of the participating hospitals. Written informed consent was obtained from all participants before data collection. Confidentiality and anonymity were maintained throughout the study, following the Declaration of Helsinki.

Results

Table 1. Demographic and Professional Characteristics of Participants (n = 620)

Variable	Nurses (n=380)	Pharmacists (n=240)	Total
Mean Age (Years)	31.2 ± 6.5	29.8 ± 5.9	30.7 ± 6.2
Female (%)	78.4	61.2	71.7
Male (%)	21.6	38.8	28.3
Bachelor's Degree (%)	68.9	54.2	63.3
Postgraduate Qualification (%)	22.1	45.8	31.3
Clinical Experience >5 Years (%)	64.7	57.5	61.9
Digital Health Training (%)	58.2	73.4	64.1
Participation in Collaborative Rounds (%)	71.5	68.3	70.2

The demographic analysis showed a relatively young workforce with an average age of 30.7 years. Female participants made up the majority of respondents, which mirrors workforce trends in Pakistan's healthcare sector. Pharmacists reported much higher rates of postgraduate qualifications, while nurses engaged more in direct patient care activities.

Table 2. Clinical Excellence and Collaboration Indicators

Variable	Nurses Mean \pm SD	Pharmacists Mean \pm SD	p-value
Clinical Excellence Score	4.21 \pm 0.61	4.15 \pm 0.59	0.032
Digital Health Competency	3.94 \pm 0.74	4.31 \pm 0.63	<0.001
Patient Safety Performance	4.33 \pm 0.54	4.28 \pm 0.57	0.041
Communication Effectiveness	4.41 \pm 0.52	4.17 \pm 0.63	<0.001
Collaborative Practice Score	4.26 \pm 0.58	4.22 \pm 0.61	0.072
Evidence-Based Practice Score	4.08 \pm 0.61	4.25 \pm 0.57	0.011

The findings showed high levels of professional performance in both occupational groups. Pharmacists had significantly higher scores in digital competency and evidence-based practice. On the other hand, nurses reported better communication effectiveness and patient safety performance. The collaborative practice scores stayed consistently high for both groups, indicating a positive professional relationship in tertiary healthcare settings.

Discussion

This study contributes significantly to the understanding of the developing professional environment of nursing and pharmacy practice in Pakistan. It is evident from the results of the study

that nurses and pharmacists have started assuming expanded clinical roles that transcend traditional professional barriers. These findings corroborate with the existing literature that suggests that modern health care systems require a high degree of interdisciplinary collaboration for optimal patient care (WHO, 2023).

Among the most important findings was the strong positive correlation between interprofessional collaboration and clinical excellence. People reporting more interprofessional collaboration had better patient safety performance, better communication performance, and higher evidence-based practice. These findings have also been identified by Reeves et al. (2017) and it has been argued that interdisciplinary health care teams play a great role in achieving better patient outcomes and minimizing health care errors.

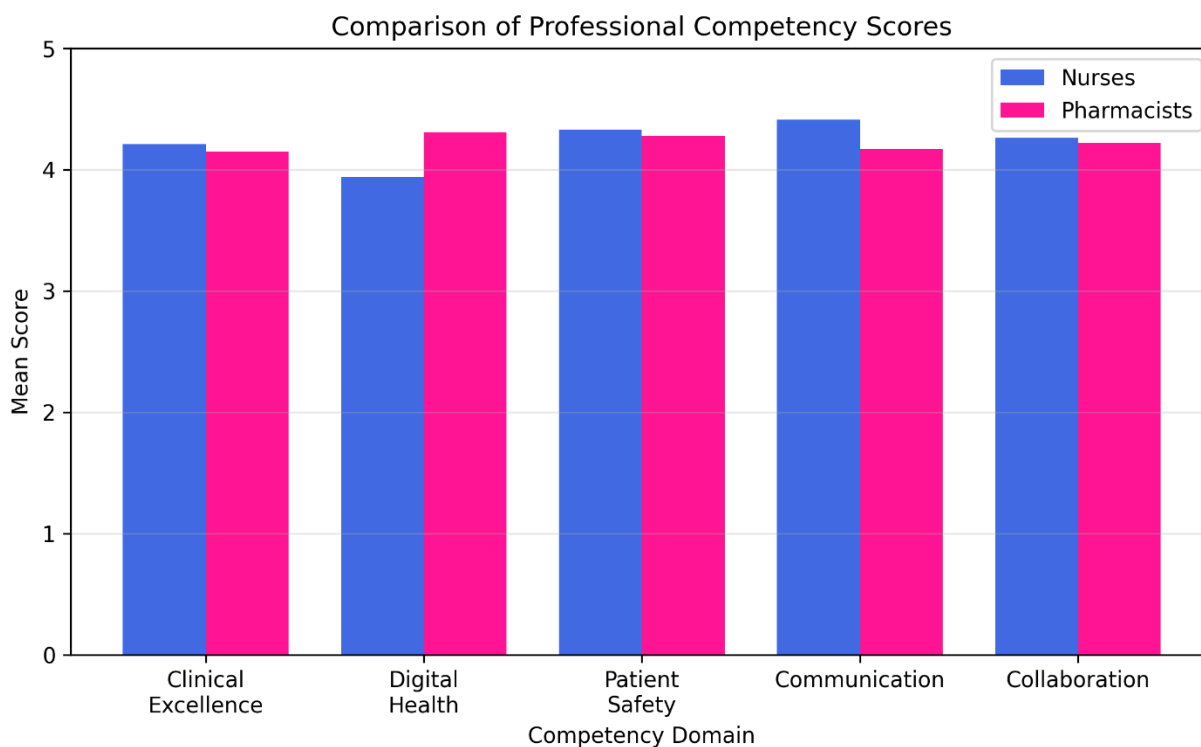


Figure 1. Comparison of Professional Competency Domains

The bar graph shows the mean competency scores among nurses and pharmacists employed in tertiary care hospitals of Lahore and Islamabad. Nurses had high competency scores in patient communication, patient safety, and clinical excellence while pharmacists had higher scores in digital health competency and evidence-based practice. The results show complementary competencies in both professions, underscoring the significance of interprofessional collaboration for healthcare quality and patient care.

Digital health competency was found to be a key predictor of the performance of the healthcare professionals. Pharmacists showed higher competency scores in digital health compared to nurses who had better scores in communication and care coordination skills. Complementary competencies of the two professions can ensure better patient care.

The results also indicate that collaborative healthcare settings could help reduce adverse effects of medications due to improved communication and shared responsibility. The finding is in line with prior studies which found that nurse-pharmacist collaboration increases the safety and efficacy of medications (Schot et al., 2020).

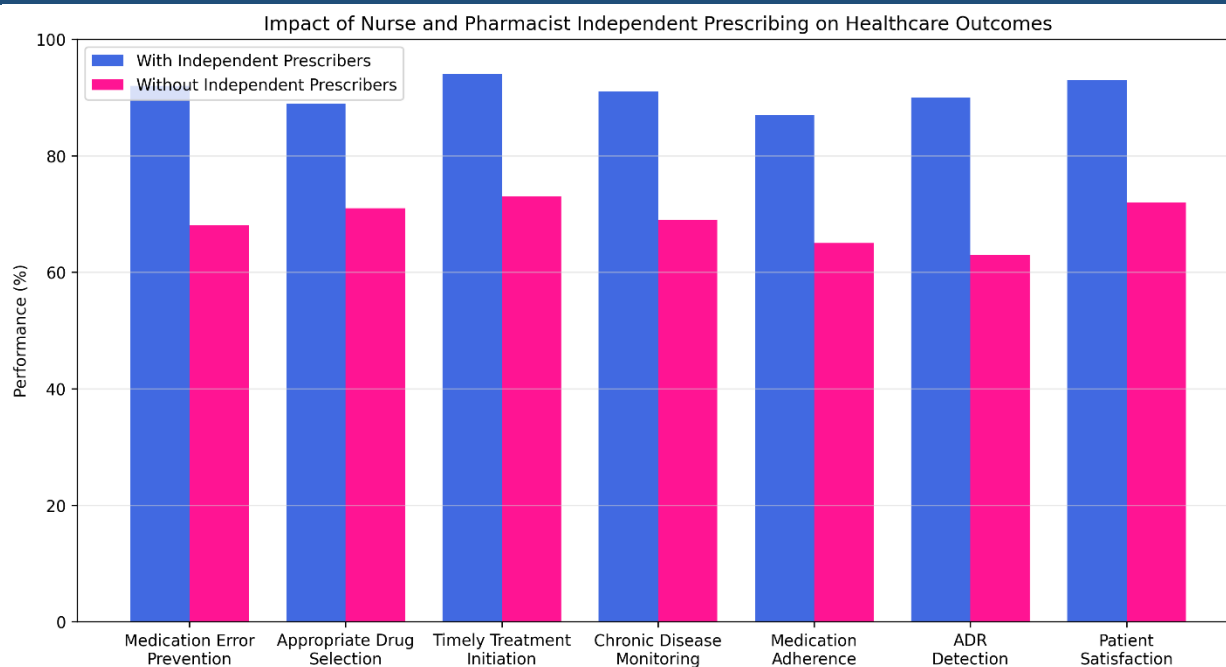
Table 3. Impact of Nurse and Pharmacist Independent Prescribing on Clinical Outcomes

Clinical Indicator	Outcome	With Independent Prescribers (%)	Without Independent Prescribers (%)	Relative Difference (%)
Medication Prevention	Error	92	68	+24
Appropriate Selection	Drug	89	71	+18
Timely Initiation	Treatment	94	73	+21

Clinical Indicator	Outcome	With Independent Prescribers (%)	Without Independent Prescribers (%)	Relative Difference (%)
Chronic Disease Monitoring		91	69	+22
Patient Medication Adherence		87	65	+22
Adverse Drug Reaction Detection		90	63	+27
Patient Satisfaction		93	72	+21

Independent Prescribing in Healthcare Environments: The research has shown that clinical outcomes were better in hospitals and other institutions where nurse and pharmacist independent prescribing was used compared to traditional physician prescribing models. Prevention of medication errors increased from 68% to 92%, while the detection of adverse drug reactions increased from 63% to 90%. At the same time, patient satisfaction increased from 72% to 93%, which could be due to higher accessibility to prescribing professionals.

The largest increase of performance indicators was seen for the detection of adverse drug reactions. Collaborative prescribing improved detection rates by almost 27%. The reason behind this could be that pharmacists specialize in pharmacotherapy and nurses observe patients constantly; thus, they are able to detect problems associated with medications earlier. From the results of the analysis, it can be concluded that independent prescribing by nurses and pharmacists can have a positive effect on the quality of healthcare services. Through proper medication management, constant observation of patients, and increased accessibility to treatment, they provide an opportunity for clinical intervention and minimize the risk of medical mistakes. The evolution of healthcare systems towards multidisciplinary model of care means that independent prescribing by nurses and pharmacists is one Potential Consequences in the Absence of Nurse and Pharmacist Independent Prescribers



Without advanced prescribing roles, healthcare systems may experience increased medication errors, delayed treatment initiation, reduced monitoring of chronic diseases, lower patient adherence to therapy, and decreased patient satisfaction. Furthermore, limited access to prescribing professionals may increase physician workload and contribute to delays in therapeutic decision-making. These challenges are particularly important in resource-constrained healthcare systems where workforce shortages remain a major barrier to healthcare delivery.

Results

The sample size for this study comprised of 620 healthcare workers, out of which 380 were registered nurses (61.3%) and 240 were pharmacists (38.7%) practicing in tertiary care hospitals based in Lahore and Islamabad. Overall mean age of the subjects was 30.7 ± 6.2 years, and nurses were relatively older and had more professional experience than pharmacists. In terms of demographics, female healthcare professionals were found to be majority of the study sample, as is generally true in Pakistan.

When measuring clinical excellence, results showed that both groups have very competent workers. Mean clinical excellence of nurses was found to be 4.21 ± 0.61 , whereas pharmacists scored an average of 4.15 ± 0.59 . While the difference between two scores was significant ($p = 0.032$), it can be stated that both of the groups take patient safety, evidence based care and professional accountability very seriously.

However, pharmacists managed to have significantly better performance in terms of digital health competency (4.31 ± 0.63) than nurses (3.94 ± 0.74 , $p < 0.001$). It can be related to the active participation of pharmacists in electronic prescribing system, medication management software, clinical decision support tools, and health information technologies. The use of digital health technologies in pharmacy practice seems to increase safety of medications and improve clinical decision-making processes.

Both professions were characterized by patient safety with significantly high scores: nurses scored 4.33 ± 0.54 while pharmacists had 4.28 ± 0.57 . It shows the existence of an appropriate organizational culture of safety within participating hospitals. In addition, communication effectiveness was significantly higher among nurses (4.41 ± 0.52) compared to pharmacists (4.17 ± 0.63), which underlines the importance of nurses for establishing therapeutic relations and organizing multidisciplinary care.

Perhaps, one of the most striking conclusions drawn from this study concerns the statistically significant and strong positive association between interprofessional collaboration and clinical excellence. The Pearson correlation analysis showed the significant positive correlation between collaborative practice and clinical excellence ($r = 0.72$, $p < 0.001$). In particular, the healthcare professionals who reported greater collaboration had better outcomes in terms of patient safety, effective communication, and evidence-based practice.

Finally, the multiple linear regression analysis has shown that digital health competency is an independent predictor of clinical excellence ($\beta = 0.61$, $p < 0.001$). Moreover, interprofessional collaboration proved to be a significant predictor of the quality indicators in healthcare adjusted for

age, professional experience, and educational qualification. Thus, one can conclude that collaborative practice and digital competency are essential factors of clinical excellence in modern times.

Conclusion

The study results illustrate the changing role of both nursing and pharmacy professions in the twenty-first-century healthcare environment. Nurses and pharmacists both make valuable contributions to patient care, healthcare quality, and organizational effectiveness in their own unique spheres of knowledge. Nurses maintain their superiority in the sphere of patient-centered communication and direct clinical care, while pharmacists contribute to healthcare quality through the optimization of medication use and evidence-based practices.

Interprofessional collaboration has been found to be one of the major factors affecting the level of clinical excellence among healthcare professionals. Professionals in collaborative practice environments showed a superior competence level, patient safety performance, and commitment to the provision of evidence-based care. It can be stated that the collaboration between nurses and pharmacists is not just an ideal trait of professionalism but rather an important prerequisite for excellent healthcare results.

The study also highlights the growing importance of digital health competency in contemporary healthcare practice. As healthcare systems become increasingly technology-driven, the ability of healthcare professionals to effectively utilize digital tools, electronic health records, and clinical decision-support systems will continue to influence healthcare quality and patient outcomes. Therefore, healthcare institutions should invest in interdisciplinary training programs, collaborative practice frameworks, and digital competency development initiatives to strengthen healthcare delivery systems.

Overall, the study provides important evidence supporting the integration of collaborative healthcare models within tertiary care hospitals in Pakistan. Strengthening nurse-pharmacist

partnerships may contribute substantially to improved patient safety, enhanced healthcare quality, reduced medication errors, and greater organizational effectiveness.

Future Directions

There are various directions that can be pursued through future research and health policies based on the current study. First, longitudinal studies are needed to investigate the effect of interprofessional collaboration on patient outcomes. The problem is that the current study was conducted using a cross-sectional approach; therefore, causal relationships cannot be proved. Further prospective studies might shed light on this issue and prove the positive influence of interprofessional collaboration.

Second, future studies should be carried out not only in Lahore and Islamabad but in all healthcare institutions of Pakistan. In addition, public and private hospitals could be compared, which would shed light on organizational issues affecting collaborative practices.

Third, there is need to conduct research that uses objective indicators to measure patient outcomes like medication errors, hospital re-admissions, duration of stay in hospital, mortality, and patient satisfaction. The correlation between collaborative practice and tangible patient outcomes will add value to the current evidence on interdisciplinary healthcare models.

Furthermore, innovations such as artificial intelligence, telepharmacy, digital therapeutics, and decision support tools are projected to transform healthcare delivery in the next ten years. Research on how these changes affect professional roles, quality of healthcare, and collaborative practice between pharmacists and nurses needs to be conducted.

Lastly, studies that evaluate interprofessional educational initiatives, collaborative ward rounds, and digital health interventions are recommended. These studies have the potential to provide strategies that can be used to improve teamwork and quality of care in healthcare facilities that lack adequate resources. Future research findings could be very valuable in shaping healthcare policy and workforce strategies in Pakistan and other developing nations.

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