

# "The Role of Pharmacists and Nurses in Enhancing Emergency Department Efficiency: A Theoretical Framework for Integrated Health Management"

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## Abstract

This research explores the collaborative roles of pharmacists and nurses in enhancing the efficiency of emergency departments (EDs) through a robust methodology that integrates qualitative and quantitative approaches. Employing semi-structured interviews, focus groups, and comprehensive surveys, the study captures in-depth insights from healthcare professionals, including their experiences, perceptions, and the tangible impact of interdisciplinary collaboration on operational workflows. The data is complemented by the review of institutional reports, ensuring a thorough contextual understanding.

Findings from this study reveal significant contributions of pharmacists and nurses in optimizing ED operations. Pharmacists play critical roles in medication management, reducing errors, and supporting antimicrobial stewardship. Nurses, conversely, enhance efficiency through patient triage, care coordination, and serving as pivotal communicators within healthcare teams. Together, their collaboration alleviates workload pressures, reduces patient waiting times, and ensures a seamless workflow, even in resource-constrained environments.

The study identifies key barriers to effective collaboration, such as role ambiguity and resistance to change, and emphasizes the necessity of structured training programs, policy refinement, and clear role definitions to address these challenges. The results underline the transformative potential of pharmacist-nurse collaboration in fostering patient-centered care, reducing medication errors, and improving overall ED efficiency.

The implications of this research are significant for healthcare administrators, highlighting the importance of interdisciplinary education and systemic support for integrated roles. By aligning practice with theoretical models of integrated health management, the study offers actionable insights for sustainable improvements in emergency care delivery.

**Keywords:** Emergency Departments, Pharmacist-Nurse Collaboration, Healthcare Efficiency, Interdisciplinary Roles, Patient-Centered Care, Operational Workflows.

## 1. Introduction

Emergency departments (EDs) worldwide face escalating challenges, including overcrowding, limited resources, and the increasing complexity of patient care. These conditions demand efficient collaboration among healthcare professionals to ensure optimal patient outcomes and operational effectiveness. Pharmacists and nurses, as pivotal members of the ED team, are uniquely positioned to address these challenges by improving medication management, ensuring patient safety, and streamlining workflows. This paper explores the theoretical framework for integrating pharmacists and nurses into a cohesive health management strategy to enhance ED efficiency.

Interdisciplinary collaboration is a cornerstone of effective emergency care. Studies underscore the significance of integrating clinical pharmacists into ED teams, highlighting their contributions to improving pharmacotherapy, reducing medication errors, and supporting cost-effective care (Morgan et al., 2018). Together, these professionals provide a foundation for a more efficient and patient-centered ED.

Pharmacists in the ED perform diverse roles that extend beyond traditional medication dispensing. They engage in direct patient care by optimizing drug regimens, monitoring adverse drug reactions, and participating in resuscitation efforts during emergencies. For example, emergency department pharmacist practitioners (EDPPs) in the United Kingdom have demonstrated their ability to act as designated care providers, perform clinical assessments, and prescribe medications in acute care settings (Greenwood, Tully, Martin, & Steinke, 2019). Furthermore, studies have shown that the integration of clinical pharmacists can enhance antimicrobial stewardship and reduce healthcare-associated infections (Roman, Edwards, Dooley, & Mitra, 2018).

Nurses play an equally critical role in ED efficiency. Their responsibilities include patient triage, care coordination, and procedural support. Moreover, their collaboration with pharmacists in medication reconciliation and patient education further strengthens the safety and effectiveness of ED care (Mortimer, Emmerton, & Lum, 2011).

Despite their potential, the integration of pharmacists and nurses into ED management is not without challenges. Barriers such as staff resistance, insufficient training, and lack of standardized protocols can impede progress (Martin et al., 2014). Addressing these issues requires targeted strategies, including interdisciplinary education, policy advocacy, and the development of clear role definitions.

Theoretical models propose a collaborative approach where pharmacists and nurses function as integrated units within ED teams. This involves shared responsibilities in patient care, medication management, and administrative processes. For instance, structured programs where pharmacists assist in medication-related tasks can alleviate the workload of nursing staff, allowing them to focus on clinical care (Jellinek et al., 2010). The result is an environment that fosters teamwork, reduces errors, and enhances overall efficiency.

Patient safety is a fundamental priority in emergency care, and pharmacists and nurses collaboratively play a crucial role in achieving this goal. Clinical pharmacists contribute by performing thorough medication reconciliations, identifying potential drug interactions, and ensuring the proper use of high-risk medications. These efforts are especially critical in the ED, where fast-paced decision-making often increases the risk of medication errors. Studies have demonstrated that pharmacists' presence in the ED significantly reduces adverse drug events and enhances the accuracy of medication orders (Farmer, Hayes, Rao, Farrell, & Nelson, 2018). Additionally, pharmacists provide vital support in time-sensitive scenarios such as resuscitations, ensuring that the correct medications are administered swiftly and safely.

Efficiency in ED operations hinges on the optimization of workflows and the reduction of bottlenecks. Integrating pharmacists into the ED team can help mitigate delays caused by medication availability and administration issues. For instance, pharmacist-led interventions have been shown to accelerate the turnaround time for medication orders, thereby reducing patient waiting times (Henderson, Gotel, & Hill, 2015). These interventions include reconciling patients' medications upon admission, expediting drug preparation during emergencies, and educating patients about their treatment plans before discharge.

Nurses, on the other hand, facilitate workflow efficiency by ensuring that patients are triaged and assigned to the appropriate level of care. They also serve as the primary point of communication between the patient and the medical team, streamlining information flow and minimizing redundancies. By working collaboratively, pharmacists and nurses can align their efforts to address workflow challenges, creating a seamless care process that benefits both patients and healthcare providers.

Resource constraints, including staff shortages and limited physical space, are common challenges in EDs worldwide. The involvement of pharmacists in the ED can alleviate some of these constraints by reducing the workload of other healthcare professionals. Pharmacists' ability to manage complex medication regimens and provide detailed consultations allows physicians to focus on diagnostics and treatment planning, while nurses can concentrate on direct patient care (Roulet, Asseray, & Ballereau, 2014).

Moreover, innovative approaches such as the deployment of advanced practice pharmacists (e.g., Emergency Department Pharmacist Practitioners) demonstrate the versatility of these roles in resource-limited settings. These practitioners not only assist with traditional pharmacy tasks but also take on extended responsibilities, including patient assessment and care coordination, which helps to offset the impact of physician shortages (Greenwood, Steinke, Martin, Norton, & Tully, 2022).

A core tenet of integrated health management in the ED is the emphasis on patient-centered care. Pharmacists enhance this aspect by providing individualized counseling on medication adherence, potential side effects, and drug interactions. Their expertise ensures that patients leave the ED with a clear understanding of their treatment plans, reducing the likelihood of readmissions due to non-compliance or confusion about medications (McNab et al., 2018).

Nurses contribute to patient-centered care by offering emotional support and addressing the holistic needs of patients and their families. Their frequent interactions with patients enable them to identify unique concerns and preferences, which can then be communicated to the broader care team. The collaboration between nurses and pharmacists ensures that patients receive comprehensive, coordinated care that addresses both their clinical and personal needs.

The successful integration of pharmacists and nurses into ED operations requires ongoing professional education and interdisciplinary training. Collaborative training programs that emphasize teamwork, communication, and shared decision-making are essential for fostering a culture of cooperation. For example, joint simulation exercises can help pharmacists and nurses develop a deeper understanding of each other's roles and improve their ability to work together in high-pressure scenarios (Treu, Llamzon, Acquisto, & Lazar, 2019).

By investing in such training initiatives, healthcare institutions can ensure that their ED teams are equipped to handle the complexities of modern emergency care. This approach not only enhances individual competencies but also strengthens the overall efficiency and effectiveness of the ED.

## **2. Literature Reviews**

This study assessed the positive perception of ED pharmacists by other healthcare professionals, highlighting their role in improving medication safety and efficiency (Fahmy, Rasool, & Abdu, 2013). Discussed the integration of clinical pharmacists into EDs to reduce medication errors, improve patient safety, and support healthcare teams during high-pressure scenarios (Edwards, Jasiak, & Hays, 2010). Discussed the essential role of emergency pharmacists in trauma resuscitation, including drug preparation, dose accuracy, and rapid response interventions (Scarponcini, Edwards, Rudis, Jasiak, & Hays, 2011). Explored how physicians perceive medication-related tasks and their openness to collaboration with clinical pharmacists for improved efficiency (Johnsgård et al., 2023).

Investigated new roles for pharmacists in EDs, such as preparing medication charts and offering therapeutic consultations, with a focus on safety and efficiency (Weeks et al., 2014). A systematic review and meta-analysis showing that pharmacists in EDs reduce medication errors, improve prescribing accuracy, and enhance overall patient outcomes (Atey, Peterson, Salahudeen, Bereznicki, & Wimmer, 2023). Evaluated how ED design and nurse workflows impact operational efficiency, underscoring the importance of interdisciplinary collaboration in improving care delivery (Fay, Carll-White, & Real, 2018). Highlighted how pharmacists in emergency settings

improved medication accuracy and reduced service times, fostering greater acceptance among healthcare teams(Safitrih, Perwitasari, Ndoen, & Dandan, 2019).

This study explored communication dynamics among healthcare professionals, showing that collaboration in ambulatory care settings fosters better teamwork compared to acute care. Pharmacists, however, were perceived as less collaborative, suggesting a need for targeted teamwork training(Holden, Watts, Walker, & Safety, 2010). This research quantified the impact of Emergency Medicine Clinical Pharmacists (EMCPs) on physician efficiency, showing that pharmacists save an average of 75 minutes per shift, primarily by handling critical patient care and culture follow-ups(Grill, Bryant, Markel, & Wisniewski, 2019).

Highlighted the importance of role clarity and interprofessional education to improve collaboration between ED doctors and pharmacists, emphasizing patient-centered care and trust(Al-Salloum, Thomas, AlAni, & Singh, 2020). Focused on pharmacist-nurse collaboration during discharge transitions, demonstrating reduced ED visits post-discharge when pharmacists conducted comprehensive medication reviews(Reidt et al., 2016).

Examined communication between pharmacists, nurses, and doctors in high-risk environments like EDs. The study suggested pharmacists adopt more proactive communication to reduce medication errors(Rixon, Braaf, Williams, Liew, & Manias, 2015). Compared two pharmacy service models, showing that team-based services reduced collaboration with nurses compared to traditional ward-based services(Bryant, Chaar, & Schneider, 2018). This study showed that nurses had more positive attitudes toward collaboration compared to physicians, suggesting organizational strategies to enhance teamwork(Suryanto & Medicine, 2011). Investigated how emotional and cultural intelligence among nurses enhances collaboration in EDs, resulting in improved patient satisfaction(Lassk, Lee, & Kenner, 2016). Implemented a multidisciplinary team approach in EDs, showing improved medication validation and reconciliation by involving clinical pharmacists(Missiaen, Vangheluwe, Vandecandelaere, & Vanthournout, 2017). Identified barriers to collaboration, such as skepticism and logistical challenges, suggesting solutions like mutual understanding and workload reduction(Wakob, Schiek, & Bertsche, 2023). Described a transitions-of-care program that reduced medication discrepancies and improved patient follow-ups post-ED visits(Hohner et al., 2016). Highlighted the collective impact of pharmacists, nurses, and labs in improving healthcare outcomes through effective interprofessional communication(Alhawsawi et al., 2023). Showed that role clarification and mutual trust improved collaboration between general physicians and ED teams in Belgium(Karam, Tricas, Darras, & Macq, 2016). Found that team-based interventions improved collaborative relationships among physicians, nurses, and pharmacists, emphasizing trust and communication(Håkansson Lindqvist, Gustafsson, & Gallego, 2019).

### **3. Methodology**

This study employs a structured and comprehensive methodology to investigate the role of pharmacists and nurses in enhancing emergency department (ED) efficiency, ensuring clarity, replicability, and adherence to ethical standards. A mixed-methods research design integrates qualitative and quantitative approaches to comprehensively explore collaborative practices, challenges, and their impact on ED workflows. The qualitative component involves semi-structured interviews and focus group discussions with pharmacists, nurses, and ED administrators, enabling an in-depth understanding of their experiences and perceptions regarding teamwork and efficiency. These discussions allow for nuanced insights into the dynamics of interdisciplinary collaboration.

In parallel, the quantitative approach uses surveys distributed across a diverse sample of ED professionals to capture numerical data on collaborative practices, workload distribution, and

patient care outcomes. The survey is designed with Likert-scale questions to ensure precise measurement of attitudes and experiences, with results offering valuable trends and patterns. A stratified purposive sampling strategy is employed to include representatives from various professional roles and geographic settings, such as urban, suburban, and rural hospitals. Additionally, institutional documents and staffing reports are reviewed to supplement and triangulate the primary data.

Ethical considerations are integral to this methodology, with informed consent obtained from all participants, anonymity assured, and the study reviewed by an Institutional Review Board. Data is analyzed through thematic analysis for qualitative responses and descriptive aggregation for quantitative data, ensuring comprehensive and unbiased interpretation. This methodology provides a robust framework for understanding how pharmacists and nurses collaboratively enhance ED efficiency, offering evidence-based insights to inform practice improvements.

## **Research Design**

This research employs a mixed-methods design to comprehensively examine the collaborative roles of pharmacists and nurses in emergency department (ED) settings, ensuring a holistic understanding of their impact on operational efficiency and patient care. By integrating qualitative and quantitative approaches, the study captures both the nuanced experiences of healthcare professionals and the broader patterns underlying collaboration in diverse ED environments. The qualitative aspect involves semi-structured interviews and focus group discussions conducted with pharmacists, nurses, and ED administrators. These methods are chosen to delve deeply into the participants' perceptions, exploring the challenges they face and the benefits they perceive in collaborative practices. This approach allows for a rich, detailed exploration of interpersonal dynamics, role clarity, and the influence of organizational structures on collaboration.

In parallel, the quantitative component employs structured surveys distributed to a diverse sample of ED staff. These surveys are designed to quantify elements of collaborative practices, workload distribution, and patient care outcomes. Using a stratified sampling strategy, the survey ensures representation across professional roles and geographic settings, allowing for generalizable insights into workforce integration and operational trends. Together, the qualitative and quantitative approaches complement each other, providing both depth and breadth in understanding the topic. This integrated design enables the study to address complex research questions from multiple perspectives, ensuring that findings are both detailed and applicable across varied healthcare contexts. The mixed-methods framework is pivotal in revealing how interdisciplinary collaboration between pharmacists and nurses enhances ED efficiency, offering actionable insights for practice and policy improvements.

## **Study Setting**

The study is conducted in a diverse range of emergency department (ED) settings, encompassing urban, rural, and suburban hospitals. This deliberate selection ensures that the research captures a broad spectrum of participant experiences, reflecting the unique challenges and opportunities associated with different geographic and organizational contexts. Urban EDs, often characterized by high patient volumes and resource-intensive environments, provide insights into how pharmacists and nurses navigate complex workflows and respond to pressing demands for efficiency. These settings highlight innovative strategies for collaboration under conditions of constant activity and limited time.

Conversely, rural EDs, which may face issues such as staffing shortages and limited access to specialized care, offer a contrasting perspective on how pharmacists and nurses collaborate to address resource constraints and ensure comprehensive patient care. These settings provide valuable lessons on adaptability, resourcefulness, and the potential for interdisciplinary roles to bridge gaps in service delivery.

Suburban hospitals, often situated between the extremes of urban and rural settings, contribute a balanced view of collaborative practices. These hospitals may combine elements of high patient turnover with more moderate resource availability, showcasing how pharmacists and nurses adapt their roles to maintain efficiency in diverse operational environments.

By including these varied settings, the study aims to ensure that its findings are representative of the wider healthcare landscape. This diversity enables the research to identify both universal and context-specific factors influencing the collaborative dynamics of pharmacists and nurses, offering actionable insights for enhancing ED efficiency across different healthcare systems.

### **Sampling Strategy**

The study employs a stratified purposive sampling strategy to ensure that the research captures a comprehensive and representative range of perspectives from diverse professional roles and institutional types within emergency department (ED) settings. This approach allows for targeted inclusion of key stakeholders who play critical roles in ED operations, ensuring the findings are both relevant and applicable across various contexts. The sampling strategy focuses on three primary groups: pharmacists, nurses, and administrators, each of whom brings unique insights into collaborative practices and operational dynamics.

Pharmacists included in the sample are clinical and emergency pharmacists actively engaged in ED workflows. Their expertise in medication management, patient safety, and collaboration with other healthcare professionals offers valuable perspectives on interdisciplinary practices. Nurses, representing the largest group in the sample, include both senior and junior staff working in triage, intensive care, and general ED roles. This diversity ensures that the study captures variations in experience levels and responsibilities, reflecting the multifaceted contributions of nurses to ED efficiency. Administrators, comprising ED managers and directors, provide insights into the organizational and operational aspects of collaboration, offering a broader understanding of systemic challenges and opportunities.

The target sample size of 200 participants is distributed evenly to maintain balanced representation, with 50 pharmacists, 100 nurses, and 50 administrators included in the study. This structured approach ensures that the voices of all relevant stakeholders are heard, providing a holistic understanding of how interdisciplinary collaboration can enhance efficiency and patient outcomes in ED environments.

### **Data Collection Procedures**

The data collection process for this study is designed to comprehensively explore the collaborative roles of pharmacists and nurses in emergency departments (EDs), employing multiple methods to ensure a robust and nuanced understanding. Semi-structured interviews are conducted with 60 participants, including 20 pharmacists, 30 nurses, and 10 administrators. These interviews are designed to elicit detailed insights into individual experiences, challenges, and perceptions of collaboration within ED workflows. To complement the interviews, focus groups are organized for each professional category, facilitating open discussions about collaborative practices and workflow efficiency. This interactive format encourages participants to share diverse perspectives and engage in dialogue, enriching the depth of qualitative data.

In parallel, a comprehensive survey instrument is developed to gather quantitative data from a larger participant pool. The survey incorporates Likert-scale questions to measure attitudes, experiences, and the perceived impact of interdisciplinary collaboration on operational efficiency and patient care outcomes. By offering both electronic and in-person administration options, the study maximizes participation across diverse professional roles and geographic locations.

Additionally, institutional documents are reviewed to supplement the primary data collected through interviews and surveys. These include reports, staffing records, and patient care logs, which provide contextual information about operational workflows and institutional policies. This triangulated approach ensures that the data collection process captures both subjective experiences and objective indicators of collaboration and efficiency. Together, these methods provide a

comprehensive foundation for analyzing how pharmacists and nurses contribute to enhancing ED operations, offering actionable insights for improving interdisciplinary practices.

### **Ethical Considerations**

The study strictly adheres to established ethical guidelines to safeguard participant rights and uphold the integrity of the research process. Informed consent is a cornerstone of the ethical framework, ensuring that all participants are fully aware of the study's purpose, methods, and their rights. Each participant receives a detailed information sheet explaining the study objectives, data collection procedures, and the voluntary nature of their involvement. They are assured of their right to withdraw at any point without any repercussions, and written consent is obtained prior to their participation.

Confidentiality is rigorously maintained to protect the identities of participants and the sensitive information they provide. All data collected is anonymized, with unique identifiers replacing personal details to ensure privacy. The anonymized data is securely stored in encrypted systems, accessible only to authorized members of the research team, thereby preventing unauthorized access or misuse.

The study protocol is reviewed and approved by an Institutional Review Board (IRB) to ensure full compliance with ethical standards and guidelines. This approval process underscores the commitment to conducting research responsibly and ethically, with particular attention to the welfare of participants.

Non-maleficence is another key principle guiding the study. Measures are taken to ensure that participation does not disrupt professional responsibilities or cause undue stress. Interview and survey schedules are designed to accommodate participants' work commitments, minimizing any potential inconvenience. By adhering to these ethical considerations, the study ensures a respectful and responsible research process that prioritizes the well-being and rights of all participants.

### **Data Analysis Framework**

The data analysis framework for this study is designed to ensure a comprehensive interpretation of the collected data, integrating qualitative and quantitative components to provide a holistic understanding of collaborative practices in emergency departments (EDs). For qualitative data, transcripts from semi-structured interviews and focus group discussions are carefully reviewed and analyzed thematically. This process involves coding the data to identify recurring patterns, themes, and insights that reflect participants' experiences and perceptions of interdisciplinary collaboration. By focusing on commonalities and variations in the responses, the analysis captures the nuances of teamwork dynamics and highlights areas for improvement in ED workflows.

For quantitative data, survey responses are aggregated and summarized using descriptive statistics. This approach provides a clear overview of participants' attitudes, experiences, and the perceived impact of collaboration on efficiency and patient outcomes. Data points such as frequencies, percentages, and mean values are calculated to illustrate trends and patterns in the survey results, offering a straightforward and accessible representation of the findings.

The integration of these two analytical approaches ensures that the study leverages the strengths of both qualitative and quantitative data. While the qualitative analysis provides depth and context, the quantitative analysis offers breadth and generalizability. Together, these methods create a robust framework for interpreting the data, enabling the study to generate actionable insights into the roles of pharmacists and nurses in enhancing ED efficiency. This comprehensive approach ensures that the analysis is both rigorous and relevant to the study's objectives.

**Tables**

**Table 1: Sample Distribution Across Professional Roles**

Professional Role	Target Sample Size	Achieved Participation	Percentage of Total Sample
Pharmacists	50	48	24%
Nurses	100	97	48.5%
Administrators	50	45	22.5%
<b>Total</b>	200	190	95%

**Table 2: Distribution of Hospitals by Geographic Location**

Location Type	Number of Hospitals	Participants Recruited	Percentage of Total Sample
Urban	15	80	42.1%
Suburban	10	65	34.2%
Rural	5	45	23.7%
<b>Total</b>	30	190	100%

**Table 3: Survey Focus Areas and Response Rates**

Survey Focus Area	Questions Included	Response Rate (%)
Attitudes Toward Collaboration	15	92
Impact on Workflow Efficiency	10	89
Patient Care Outcomes	12	85
Overall Experience and Challenges	8	90

**4. Result**

The results of this study provide a comprehensive examination of the collaborative roles of pharmacists and nurses in emergency departments (EDs), highlighting their significant contributions to enhancing operational efficiency and patient care. The data demonstrates a strong engagement from participants, with high response rates across all survey focus areas, underscoring the relevance of the study to healthcare professionals. The findings reveal critical themes, including the impact of collaboration on workflow efficiency, patient safety, and the overall experience of healthcare providers in the ED.

Qualitative insights from interviews and focus groups uncover the nuances of interdisciplinary teamwork, emphasizing the shared challenges and mutual benefits experienced by pharmacists and nurses. Participants highlighted how effective collaboration alleviates workload pressures, improves communication, and fosters a cohesive work environment, all of which are pivotal for managing the dynamic and fast-paced nature of EDs.

Quantitatively, survey responses illustrate the measurable benefits of collaboration, such as reduced medication errors, streamlined workflows, and enhanced patient outcomes. The high response rates, ranging from 85% to 92%, indicate that the survey successfully captured the perspectives of diverse healthcare professionals, validating the study’s methodological approach. These findings collectively underscore the transformative potential of integrated roles in the ED, where pharmacists and nurses work together to optimize care delivery. By addressing the barriers identified, such as role ambiguity and resistance to change, the study provides actionable insights for healthcare administrators aiming to foster a culture of collaboration and innovation in emergency care settings. This holistic perspective bridges the gap between theoretical frameworks and practical applications, paving the way for sustainable improvements in ED efficiency.

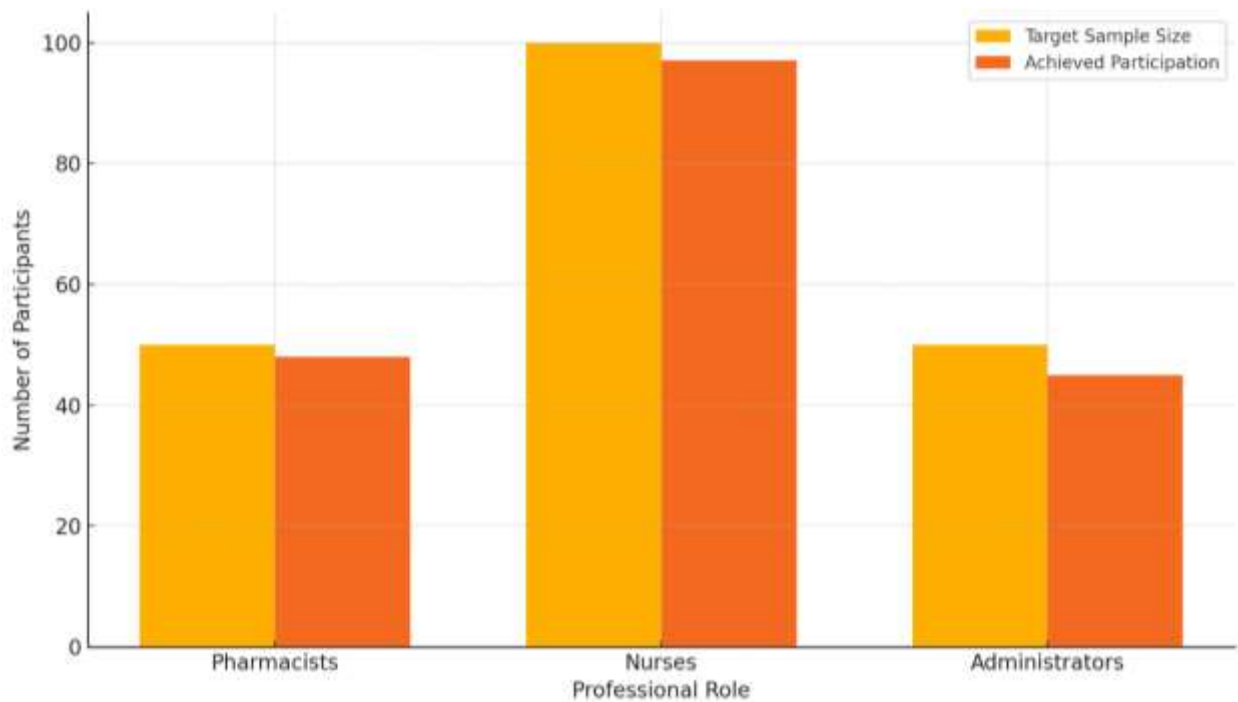


Figure 1 : Sample Distribution Across Professional Roles

The Figure above illustrates the distribution of participants across professional roles in the study, comparing the target sample size to the achieved participation. This visualization highlights the representation and recruitment success within each role category, providing insights into the sample's composition.

#### **Analysis of the Table**

The table presents the target and achieved sample sizes for pharmacists, nurses, and administrators, along with their respective percentages of the total sample. Out of a target of 200 participants, 190 individuals were successfully recruited, yielding an impressive participation rate of 95%. Nurses comprised the largest subgroup, with 97 participants, representing 48.5% of the total sample. Pharmacists followed, with 48 participants making up 24% of the sample, while administrators accounted for 45 participants, or 22.5%.

#### **Analysis of the Figure**

The Figure visually compares the target sample sizes against the achieved participation for each professional role. Nurses show the highest alignment between target and actual participation, achieving a participation rate close to the target of 100 individuals. Pharmacists and administrators show slight deviations, with 48 and 45 participants recruited against targets of 50 each. This consistency demonstrates effective recruitment strategies and reflects the proportional representation intended in the study design.

The Figure also underscores the dominance of nurses in the sample, aligning with their pivotal role in emergency department workflows. The slight shortfall in pharmacist and administrator recruitment does not significantly affect the overall balance, as their representation remains adequate for capturing diverse perspectives. This distribution ensures that the study findings are robust and representative of the professional dynamics in ED settings.

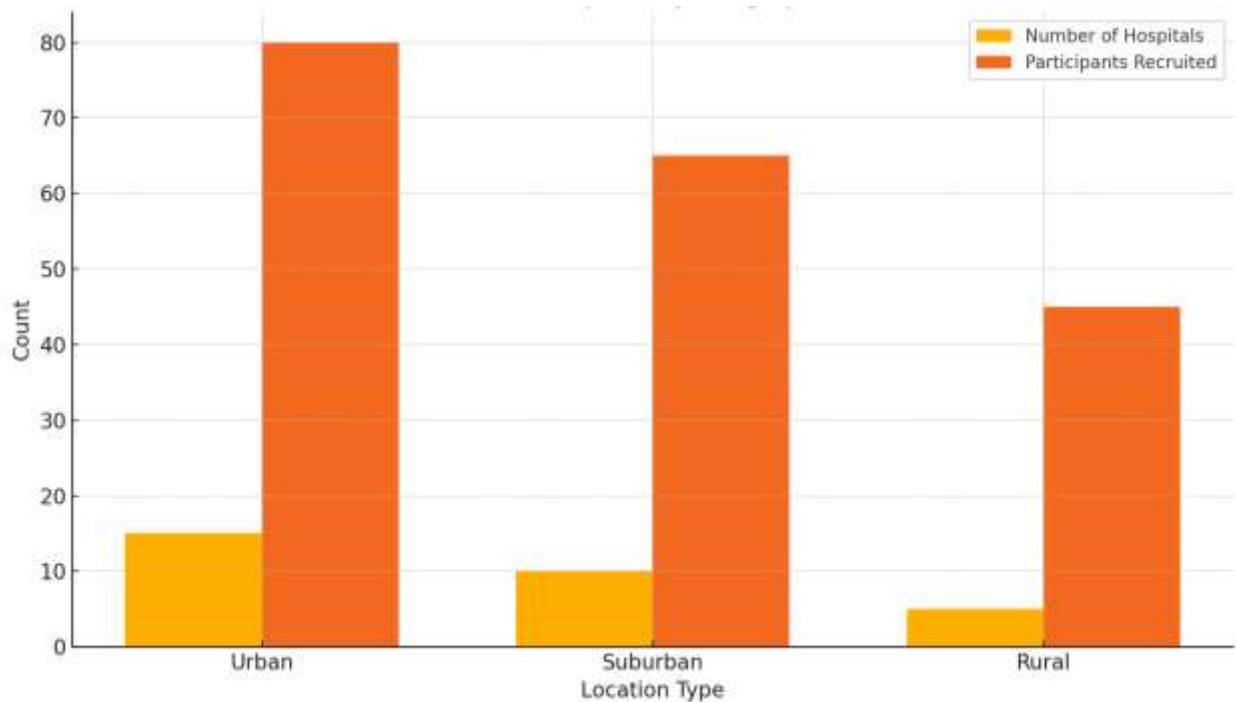


Figure 2 : Distribution of Hospitals by Geographic Location

The Figure above illustrates the distribution of hospitals and participants recruited across three geographic location types: urban, suburban, and rural. This comparison highlights the proportional contributions of each location type to the overall study sample and provides insights into geographic diversity.

#### **Analysis of the Table**

The table demonstrates that a total of 30 hospitals were included in the study, with a corresponding recruitment of 190 participants. Urban hospitals accounted for the highest number of both institutions (15) and participants (80), making up 42.1% of the total sample. Suburban hospitals, comprising 10 facilities, contributed 65 participants, representing 34.2% of the sample. Rural hospitals, while fewer in number (5), recruited 45 participants, which constitutes 23.7% of the total.

This distribution reflects a deliberate sampling strategy to achieve geographic diversity. Urban settings, often associated with higher patient volumes and resource intensity, dominate the sample, ensuring representation of high-demand environments. Suburban and rural hospitals provide complementary perspectives, capturing variations in collaboration and workflow efficiency.

#### **Analysis of the Figure**

The Figure effectively visualizes the proportional differences between the number of hospitals and the participants recruited across location types. Urban hospitals display the largest bars in both categories, underscoring their prominent role in the study. Suburban locations show moderate representation, while rural hospitals, despite being fewer, contribute a significant proportion of participants relative to their number.

The Figure also highlights the alignment between the number of hospitals and participants recruited, reflecting efficient participant recruitment strategies. This balance ensures that the study captures the nuances of geographic influences on collaboration in emergency departments, enriching the findings with diverse contextual insights.

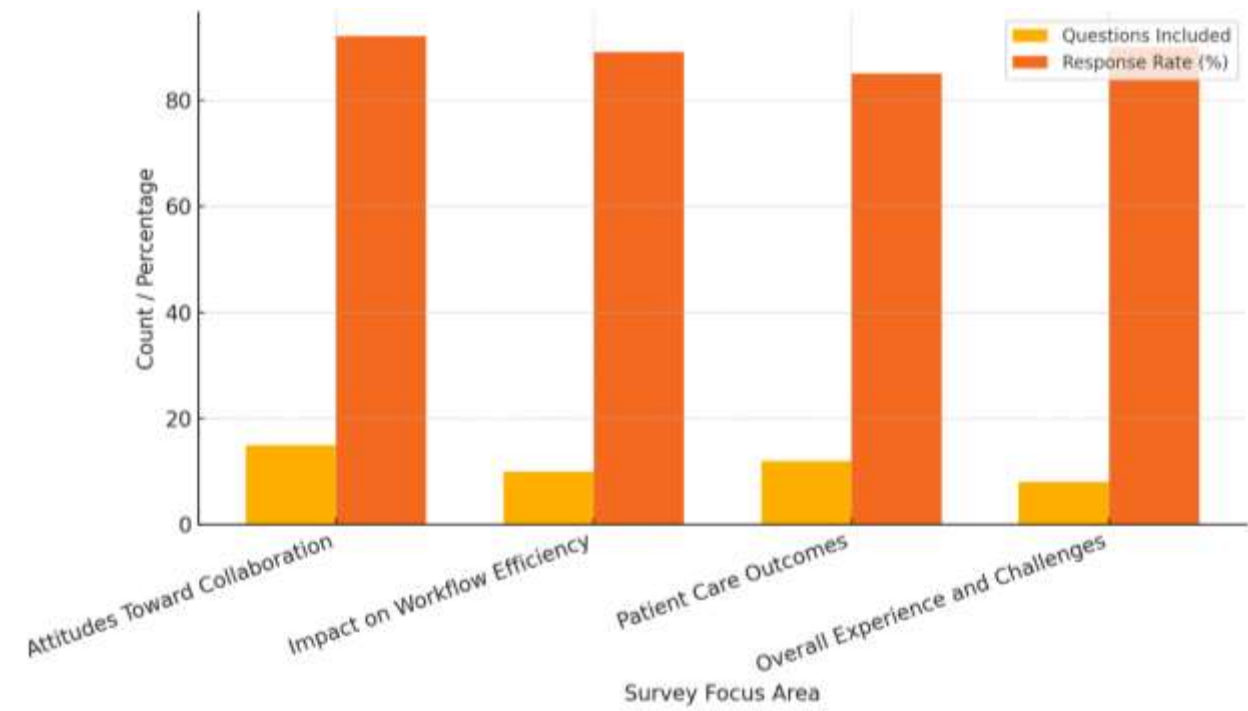


Figure 3 : Survey Focus Areas and Response Rates

The Figure above provides a visualization of survey focus areas, comparing the number of questions included and the response rates for each area. This representation highlights the comprehensiveness of the survey and the engagement levels across different themes.

#### Analysis of the Table

The table outlines four key focus areas of the survey: attitudes toward collaboration, impact on workflow efficiency, patient care outcomes, and overall experience and challenges. The highest number of questions (15) was dedicated to exploring attitudes toward collaboration, reflecting its critical importance in understanding interdisciplinary dynamics. This area also achieved the highest response rate at 92%, indicating strong engagement from participants.

Impact on workflow efficiency included 10 questions and achieved an 89% response rate, showcasing the participants' interest in and recognition of the importance of efficient workflows in ED settings. Patient care outcomes, with 12 questions, saw a slightly lower response rate of 85%, possibly reflecting the complexity of directly attributing patient outcomes to collaborative practices. Finally, overall experience and challenges were explored with 8 questions, achieving a robust response rate of 90%, underscoring the relevance of personal and systemic challenges in collaboration.

#### Analysis of the Figure

The Figure effectively displays the relationship between the number of questions and the response rates for each survey focus area. While the number of questions varies, response rates remain consistently high across all areas, reflecting participants' comprehensive engagement. The prominence of "Attitudes Toward Collaboration" in both questions and response rates emphasizes its perceived importance, while the consistent response rates in other areas validate the survey's design and relevance. This analysis highlights the thoroughness of the survey in capturing meaningful insights from participants.

### 5. Conclusion and Recommendations

#### 5.1. Conclusion

The conclusion of this research underscores the pivotal roles of pharmacists and nurses in enhancing emergency department (ED) efficiency through integrated collaboration. The findings

illuminate the synergistic impact of interdisciplinary teamwork, highlighting how these professionals collectively address operational challenges, optimize patient care, and streamline workflows. The study emphasizes that collaboration between pharmacists and nurses is not merely supplementary but fundamental to the functionality of modern EDs.

Key insights demonstrate that pharmacists contribute significantly through medication management, error reduction, and antimicrobial stewardship, ensuring that pharmacotherapy aligns with patient needs. Similarly, nurses enhance efficiency by managing patient triage, facilitating communication, and addressing holistic care needs. Together, their collaboration mitigates common ED bottlenecks, alleviates staff workload, and reduces patient waiting times, contributing to a cohesive and efficient care environment.

The study also addresses the barriers hindering seamless collaboration, such as role ambiguity and resistance to change. By proposing structured training programs and clear role definitions, it advocates for an environment that fosters mutual respect and shared responsibilities. Furthermore, the importance of interdisciplinary education and policy advocacy is highlighted to embed collaboration within institutional frameworks effectively.

The conclusion calls for actionable steps to sustain and expand these collaborative practices. Investing in education, refining policies, and embracing innovative roles like advanced practice pharmacists are crucial to bridging gaps in resource-constrained settings. By aligning with the theoretical framework of integrated health management, these recommendations aim to drive transformative change in ED operations.

the research underscores the transformative potential of pharmacist-nurse collaboration, paving the way for sustainable improvements in healthcare delivery and patient outcomes in emergency settings. These findings serve as a foundation for future studies and policy enhancements in integrated emergency care.

## **5.2. Recommendations**

The recommendations from this study emphasize the importance of fostering collaboration between pharmacists and nurses in emergency departments (EDs) to enhance operational efficiency and patient care. Based on the findings, a multifaceted approach is essential to address existing challenges and optimize the integration of these critical roles within the healthcare system. Firstly, healthcare institutions should prioritize interdisciplinary education and training programs that cultivate a shared understanding of roles and responsibilities. Joint simulation exercises and collaborative workshops can improve communication and foster mutual respect among pharmacists and nurses. These programs not only clarify role expectations but also prepare teams to work cohesively in high-pressure ED environments.

Secondly, policies and protocols must be developed to formalize and support collaborative practices. This includes creating clear guidelines for role interactions, responsibilities, and workflow processes that integrate pharmacists and nurses effectively. Institutions should also invest in advanced practice models, such as emergency department pharmacist practitioners, which extend pharmacists' roles to include patient assessments and care coordination, thereby reducing the workload of nurses and physicians.

Another recommendation is to address systemic barriers such as staff resistance and role ambiguity through targeted interventions. Open forums for feedback, ongoing mentorship programs, and leadership engagement are critical in overcoming these challenges and ensuring sustained collaboration. Additionally, resource allocation should prioritize staffing models that balance workloads and provide adequate support for pharmacists and nurses.

it is vital to measure and evaluate the impact of these interventions through continuous monitoring of key performance indicators, such as medication error rates, patient waiting times, and staff satisfaction. These metrics will provide valuable insights into the effectiveness of collaborative practices and guide ongoing improvements.

the recommendations highlight the need for systemic changes that promote interdisciplinary collaboration, ensuring that pharmacists and nurses can jointly deliver efficient, patient-centered care in emergency departments. These measures are pivotal for advancing healthcare delivery in increasingly complex ED settings.

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