

Interdisciplinary Collaboration In Acute Care: Integrating Pharmacy, Radiology, Respiratory Therapy, Nursing, Paramedics, OR Technology, And Infection Control To Improve Patient Outcomes

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Abstract

The multidisciplinary team has emerged as an important determinant of patient outcomes in an acute care setting, where the complexity of clinical scenarios, physiological worsening conditions, and time-sensitive treatments require the coordinated expertise of multidisciplinary teams. This study investigates the role of combined effort involving pharmacy, radiology, respiratory therapy, nursing, paramedics, operating room (OR) technology and infection control in enhancing patient safety, accuracy in diagnoses, efficiency of treatment and overall patient clinical outcomes. The paper examines the distinct input of each field using a review of peer-reviewed literature, clinical guidelines, and evidence-based models and presents how collaborative practices can optimize care delivery. The evidence suggests that in the case of efficient communication between acute care teams, joint responsibilities in decision making, and awareness of professional roles, the rates of medical errors, harm caused by medications, delays in diagnosis, hospital-acquired infections, and death rate decrease significantly. Also, the level of workflow efficiency, minimization of redundancy, and more ethical and patient-focused care are more supported by a collaborative environment. Case studies also demonstrate that interdisciplinary coordination, e.g. pharmacist-assisted medication reconciliation, radiology-based rapid diagnostics, respiratory therapist involvement in early ventilation planning and integration of infection control during invasive interventions directly impact patient recovery trajectories. In spite of its positive aspects, interdisciplinary collaboration is not without challenges such as lack of role clarity, hierarchical culture, communication failures, and lack of professional training. This paper will end with a set of strategic suggestions supported by standardized communication structures, interprofessional education based on simulation, organizational policy change,

and leadership development. On the whole, the study highlights the importance of interdisciplinary collaboration as it is not a choice but a prerequisite of high-quality, safe, and holistic acute care.

Keywords

Interdisciplinary teamwork; acute care; pharmacy; radiology; respiratory care; nursing; paramedics; operating room technology; infection control, patient outcomes and patient safety; interprofessional teamwork; healthcare quality; clinical integration; evidence-based practice.

1. Introduction

Acute care environments are among the most challenging, volatile, and stakes environments in the contemporary healthcare. These environments such as emergency departments (EDs), intensive care units (ICUs), trauma centers, operating rooms and rapid response units handle mostly patients who have emerged with sudden, severe and life-threatening conditions. In this regard, the clinical scenarios may evolve within minutes or seconds, and rapid decision-making, precision of assessment, and immediate interventions are needed (O'Leary et al., 2020). Since the needs of acute care patients are complex and multidimensional, the collaboration of various disciplines is crucial due to the fact that no care provider has the complete spectrum of knowledge to address such issues. The interdisciplinary collaboration, or the collaboration, cooperation, and interdependence of the work of professionals of different backgrounds, has thus become a part and parcel of the contemporary practice in acute care (Reeves et al., 2018).

The significance of interdisciplinary cooperation has increased with the development of healthcare technology, diagnostic forms and special interventions. Pharmacists, radiologists, respiratory therapists, nurses, paramedics, operating room (OR) technologists and infection control specialists each have their niche in acute care. Pharmacists maximize drug safety, radiologists deliver essential diagnostic imaging services, respiratory therapists deliver airways and ventilation care, nurses coordinate and manage bedside care and monitor patient changes, paramedics conduct links between prehospital and hospitals, OR technologists ensure sterile efficient intraoperative settings, and infection control practitioners protect patients against avoidable infections (Bender et al., 2021). Although both disciplines play very fundamental roles on their own, studies have always demonstrated that the best outcomes are achieved when the two collaborate with each other (Forte et al., 2022).

Poor teamwork between acute care providers may result in late interventions, redundant efforts, disjointed communication, medication errors, nosocomial infections, decreased patient-to-patient mortality, and reduced patient satisfaction (Zwarenstein et al., 2019). On the other hand, high-functioning interdisciplinary teams have been attributed to a higher diagnostic accuracy, quicker time to initiate treatment, fewer medical errors, lower length of stay in hospital, higher patient and staff satisfaction, and better resource use (Pronovost et al., 2019). To illustrate this, in trauma situations, proper communication among paramedics, radiology staff, respiratory workers, and surgeons is the factor that can save a life of a patient during the first major hour (Berger et al., 2020). Early intervention by the pharmacist would prevent medication errors and adverse drug interactions in the event of pharmacological emergencies (Keers et al., 2018). These results highlight the importance of collaborative work in acute care.

Although the significance of interdisciplinary collaboration is acknowledged, most acute care systems continue to exist in hierarchical and siloed organizations that do not allow the best collaboration. Collaborative practice is usually hampered by barriers like professional role ambiguity, communication, cross-cultural differences between disciplines, staffing difficulties, and the absence of interprofessional education (Hall & Weaver, 2001). Also, real-time communication and coordinated decision-making can be hindered by the organization policies, structural workflow and poor information systems. These barriers need a systemic evidence-based approach that incorporates leadership, training, communication models and policy support.

This research paper is aimed at examining in detail the role of interdisciplinary collaboration between pharmacy, radiology, respiratory therapy, nursing, paramedics, OR technology, and infection control in enhancing patient outcomes of acute care. The given paper also highlights the literature review, outlines the peculiarities of work of each of the disciplines, considers evidence-based collaboration models, reviews the cases of the real clinical situation, analyzes the general challenges, and suggests strategic solutions. This paper will provide an opportunity to advance the general knowledge on the topic of effective collaboration between acute care teams to provide high-quality, safe, and patient-centered care by combining the results of research and clinical practices.

The importance of investigating interdisciplinary teamwork in acute care is three-fold. To start with, it is responsive to the expanding complexity of patients, with acute care populations becoming older adults, with numerous comorbidities, and those in need of sophisticated durable technological assistance (Smith et al., 2022). Second, it is compatible with the global health priorities and quality indicators, including a reduction in preventable harm, patient safety, and healthcare cost. Third, it can help healthcare organizations, policymakers, academic programs, and professional training bodies gain a framework that can support the enhancement of interprofessional collaboration.

In the end, it can be concluded that the main thesis of this paper has been that interdisciplinary collaboration is not only helpful but necessary to high-quality acute care outcomes. This paper has an evidence-based background that will significantly enhance patient care provision, minimize adverse events, and patient safety throughout healthcare systems by considering the combined efforts of pharmacy, radiology, respiratory therapy, nursing, paramedics, OR technology, and infection control.

2. Background and Significance of Interdisciplinary Collaboration

Interdisciplinary collaboration in healthcare takes its origins in the realization that in modern clinical issues, even those that are not seemingly interconnected, are multifactorial. A patient who comes with chest aches, such as one, may need the services of paramedics, emergency nurses, cardiologists, radiological experts, laboratory scientists, respiratory therapists, and pharmacists. This interdependence of these functions underscores the fact that siloed or hierarchical care models are no longer effective (Reeves et al., 2016).

The concept and definition of the study, which is what the paper is all about, is presented here.

Interdisciplinary collaboration has been described as an approach where healthcare practitioners with different disciplines collaborate towards good objectives although they share responsibility, decision making as well as accountability of patient outcomes (Hall & Weaver, 2001). It involves respecting one another, free communication and knowledge of the scope of practice in each discipline. The World Health Organization (2010) has described interprofessional collaboration as a factor that helps in enhancing the health outcomes because of the complementary expertise.

There are a number of conceptual models of interdisciplinary collaboration:

- The Interprofessional Education Collaborative (IPEC) core competencies comprising of shared values, communication, and role clarity.

TeamSTEPPS model that lays stress on the communication strategies, mutual support, and monitoring of the situation (AHRQ, 2019).

Collaborative Care Model that emphasizes on shared treatment plans, integrated workflow and joint decision-making.

These models have helped us receive a background of how interdisciplinary team can work in the acute care.

2.2 Importance in Acute Care

Acute care populations are characterized by the unstable physiological conditions that need urgent treatment. Research shows that interdisciplinary teamwork plays a major role in enhancing acute care performance since it:

- improving quality of clinical judgment (Bosch et al., 2020),
- Minimizing the time-to-treatment, particularly in the cases of trauma and stroke (Berger et al., 2020),
- reducing mortality in hospitals (Pronovost et al., 2019),
- reducing medication errors (Keers et al., 2018),
- enhancing satisfaction and trust with patients (Brooks et al., 2021),
- prevention of avoidable hospital-acquired infections (Stone et al., 2019).

Integrated team also enhances responsiveness and reduces risks caused by the delayed or discontinuous care.

3. Literature Review

Interdisciplinary collaboration has been established as a key element of good quality and effective healthcare delivery, especially in acute care setting where conditions of a patient may worsen very fast and decisions should be made within minutes. Acute care environments e.g., emergency departments, intensive care unit, operating theatre, and trauma centre involve coordinated endeavors of various professions to guarantee prompt diagnostic assessment, speedy prevention, and continuity of care. The extensive academic research confirms the fact that the collaboration between pharmacy, radiology, respiratory therapy, nursing, paramedicine, operating room (OR) technology, and infection control improves patient outcomes, reduces medical errors, and makes clinical processes more efficient. The review examines theoretical backgrounds, research evidence, contributions of disciplines and the obstacles affecting collaboration between disciplines in acute care units.

3.1 Interdisciplinary Collaboration Theoretical Foundations.

Interprofessional practice (IPP) models that underpin the concept of interdisciplinary collaboration in healthcare are based on the idea of joint decision-making, joint responsibility, and constant communication between medical professionals. These frameworks acknowledge the reality that contemporary acute care settings are significantly complex, they frequently incorporate patients with many comorbidities requiring quick, simultaneous actions of many specialists. Collaboration is not just a quality one would want to have but a fundamental component of patient safety, clinically error reduction, and maximization of treatment outcomes.

According to the Interprofessional Education Collaborative (IPEC, 2016), four key domains are considered rule guiding interprofessional practice; values and ethics, roles and responsibilities, interprofessional communication, and teamwork. These areas promote the dignity of individual discipline of clinicians as they focus their efforts on common patient-focused objectives. Indicatively, the appreciation and role of unique roles played by pharmacists, nurses, and respiratory therapists enables each professional to play an important role without interfering with others and leaving some important roles unattended. Reeves et al. (2018) report that compliance with these competencies leads to clarity in professional boundaries, less interprofessional conflict, and collective decision-making, especially in acute care situations with high pressure like intensive care units (ICUs), emergency departments (EDs), and trauma centers.

Another framework, TeamSTEPPS, was created by the Agency of Research and Quality (AHRQ, 2019) and operationalizes interprofessional collaboration by providing systematic communication and teamwork plans. Major elements are SBAR (Situation, Background, Assessment, Recommendation), call-outs, check-

backs, closed-loop communication, situation monitoring, and mutual support. The tools are especially applicable in acute care settings where patients need immediate information exchange due to the changes in their status. An example is that in a code blue situation, call-outs are organized and there is a closed-loop communication to eliminate confusion of each team member on their role and to increase the team members' capacity to make coordinated and timely interventions.

Socio-technical theories also further support an interdisciplinary approach to collaboration by highlighting that the results of healthcare are defined not only by the behavior of particular clinicians but also by how professionals, technology, organizational structures, and the workflow process interact (Carayon and Perry, 2017). As emphasized in these theories, a coordinated relationship between clinical teams, medical equipments, electronic health records and organizational procedures would be used in maximizing acute care outcomes. To illustrate, the effective combination of imaging devices, vents, and continuous monitoring of patients with interprofessional communications guarantees that urgent interventions, especially thrombolysis in stroke or immediate action in case of trauma, can be provided optimally and without risks. Collectively, these frames offer a solid theoretical foundation to the question of why guided, collaborative practice becomes a necessity in complex, time-sensitive environments of healthcare practices.

3.2 Collaboration Impact on acute care outcomes evidence.

There is empirical evidence that interdisciplinary teamwork in acute care has a direct positive effect on clinical outcomes, prevents avoidable mistakes and patient safety. Organized collaborations, especially in the highest risk setting, e.g. the ICU, emergency department, and surgery ward, have been revealed to have an important impact on mortality rates, treatment efficacy, and patient recovery outcomes.

Pronovost et al. (2019) stated that the application of structured interdisciplinary communication approaches in the ICUs resulted in a 30 percent decrease in preventable adverse events, such as medication administration, ventilator management, and procedural mistakes. These results highlight the necessity to combine various views in patient care at the moment. On the same note, Berger et al. (2020) emphasized that interdisciplinary triage with nurses, paramedics, and physicians decreased time-to-treatment of stroke and trauma patients by up to 40% with a direct impact on patient survival and long-term functional outcomes. There is a need to make decisions very fast, as well as transfer information within these critical situations to avoid irreversible damage and enhance recovery trajectories.

Integration of pharmacists into multidisciplinary rounds has also proved to be very beneficial. Keers et al. (2018) discovered that the insertion of the pharmacist in acute care teams reduced medication errors and improved the accuracy of the dose by an average of 45 percent, as well as the rate of hospital readmission within 30 days. This proves the fact that the active participation of pharmacists in the process of medication reconciliation, therapeutic decision-making, and adverse event monitoring is essential to the effective and safe care of patients.

The phenomenon of radiology collaboration also demonstrates the role of the interdisciplinary teamwork in the efficiency of acute care. Bosch et al. (2020) established that the use of fast-track imaging protocols, such as the use of immediate CT scan to patients with trauma and stroke, reduced emergency department waiting times, enhanced diagnostic accuracy, and minimized unneeded hospitalizations. The close relationship between radiologist, emergency physician and surgeon in adding to the timely intervention, including thrombolytic therapy or surgery preparation, which can save lives.

The clinical significance of interdisciplinary collaboration is also brought to the fore by the contribution of respiratory therapy. Dixon et al. (2019) discovered that integrated respiratory care, such as prompt ventilator weaning guidelines, airway control, and maximization of oxygen therapy, had an enormous impact on ventilator days and a reduction in ventilator-associated pneumonia (VAP). This does not only enhance patient survival but also decreases the ICU length of stay and general healthcare expenses.

Nursing as the hub of communication in acute care team is, cannot be underestimated when it comes to keeping track of the patient status and information flow between the team members. The positive results of collaborative nursing practice include better physiological deterioration early detection, better clinical protocols adherence, and higher patient satisfaction scores. Besides, nurses are also engaged in the process of infection control, medication administration monitoring, and patient education, which also represents the scope of their contributions to collaborative acute care (Brooks et al., 2021).

Collectively, these results suggest that patient survival, efficiency of treatment processes and general safety depend on the extent of cross-disciplinary collaboration. Clinical outcomes are better in teams that are well integrated with pharmacy, radiology, respiratory therapy, nursing, and the other allied health professionals in comparison with siloed or fragmented care models. The evidence highlights that the key mechanisms in transforming interprofessional collaboration into acute care performance measures include structured communication, shared decision-making, and coordinated work flows.

3.3 Literary specific contributions to Discipline.

Pharmacy. The pharmacists are also key to improving the safety of medication and improving therapeutic outcomes, especially in high-demand acute care, including sepsis, anticoagulation therapy, pain management, and complicated care transitions. The pharmacists are also part of multidisciplinary rounding, and they must be involved in proper medication reconciliation, potential drug interactions, and offer evidence-based suggestions on how to adjust the doses. Bender et al. (2021) emphasize that pharmacist-led programs on antimicrobial stewardship are beneficial in reducing the extent of inappropriate antibiotic use, the occurrence of complications related to infections, and compliance with clinical guidelines. In addition to medication safety, pharmacists are also involved in patient education, which increases adherence to prescribed therapy and continuity of care throughout a patient after discharge, which eventually lowers the readmission rates and healthcare expenses in the hospital.

Radiology. Imaging professionals play an imperative role in providing relevant diagnostic information that is timely, accurate, and actionable. The cooperation of radiology, emergency clinicians, and surgical teams improves the timeliness in addressing acute cases like intracranial hemorrhage, pulmonary embolism, myocardial infarction, and abdominal emergencies (Smith et al., 2022). In stroke and trauma cases, stroke and trauma clinicians are able to reduce morbidity and mortality by instant access to high-quality imaging to assess eligibility to thrombolytic therapy or surgery. Moreover, radiologists also help in the continuous quality improvement through review of imaging errors, give feedback to clinical teams, and aid in the standardization of protocols so as to ensure the consistency and accuracy of diagnostic results.

Respiratory Therapy. RRTs play a critical role in the treatment of patients with acute respiratory failure, exacerbations of chronic obstructive pulmonary disease, and other patients with critical respiratory issues. They are supposed to work with ventilators and airway suction, provide oxygen, non-invasive ventilation, and be part of code blue teams or other rapid response interventions (Dixon et al., 2019). The literature shows that the direct attendance of respiratory therapists to the acute care unit stands a high chance of enhancing patient survival, decreasing ventilator-associated complications, and shortening the length of stay in the ICU. Their experience of early detection of respiratory impairment enables the timely treatment of respiratory diseases, which prevents the further development of clinical issues.

Nursing. Acute care teams have nurses as the main source of communication because monitoring patients and being close to care delivery happens most of the time. Their tasks include early detection of physiological transformations, cooperation with physicians and other medical workers, and patient-centered care (Brooks et al., 2021). The nursing practice has been linked to collaboration, which has reduced medication errors, increased adherence to clinical procedures, improved patient satisfaction levels, and increased patient safety levels. The multidisciplinary role of nurses in the clinical and operational spheres

also includes, among other functions, participation in interdisciplinary decision-making, documentation and patient education, as well as the introduction of infection control measures.

Paramedics. Paramedics have a vital role to play in prehospital setup with reference to early identification, stabilization and quick transportation of severely-ill patients. This facilitates the transfer of information through collaboration between the staff and the paramedic in the handover of patients, making the information transfer accurate and complete and minimizing errors during transition (Ford et al., 2020). Delegated handover protocols, including IMIST-AMBO (Identification, Mechanism, Injuries, Signs, Treatment, Allergies, Medications, and Background) lead to organized communication, reduced information loss, and improved continuity of care. Situational intelligence is also essential through paramedics, which enables the ED teams to prepare interventions before the arrival of the patients.

Operating Room Technology. The role of OR technologists is to make sure that surgical tools, sterilized areas, and advanced technology are ready and workable, which promotes effective and safe surgical practice (Stone et al., 2019). Their work with the surgeons, anesthesiologists and the nursing staff lowers the rate of intraoperative complications, enhances the workflow of the surgery and facilitates compliance with sterilization and safety measures. Moreover, the OR technologists also have a role to play in quality improvement projects through checking the functionality of equipment, reporting of inefficiencies in the procedure, and help in the introduction of newer surgical technology.

Infection Control. To ensure the compliance with the rules of hygiene, to control the process of sterilization, and to act as the response to an outbreak, the participation of infection prevention specialists is necessary. Their merging into acute care teams makes them adherent to the evidence-based practice thus having a great impact on healthcare-associated infections (Weiner et al., 2021). The infection control staff also train staff on hand hygiene, isolation and environmental safety measures, and work in collaboration with clinical and operational staffs in crafting protocols that eliminate cross-contamination and promote patient safety in all of the acute care units.

3.4 Barriers to Effective Interdisciplinary Collaboration

Although there is an overwhelming amount of evidence on the benefits of interdisciplinary collaboration, a variety of structural, cultural, and interpersonal obstacles persist in preventing its execution. Professional hierarchies are one of the enduring issues, wherein power differences may prevent an open communication and it may not allow the less senior staff to participate in the clinical decision-making process (Hall & Weaver, 2001). In other acute care environments, inflexible hierarchies can ensure that the frontline nurses or respiratory therapists will not express their concerns regarding the patient deterioration or medication safety, which can result in negative outcomes.

The other major obstacle is role ambiguity. Lack of clarity in roles of team members may lead to duplication of duties, omission or distortion of the duties of the team members in terms of accountability. This issue is compounded in complicated acute care settings where several disciplines collide with the demanding conditions of high-pressure settings. Research indicates that in the absence of roles and duties, there is inefficiency in coordination and essential clinical acts can be postponed.

Combined with time constraints, large patient volume, and workload, collaborative practice is further exacerbated. The acute care settings like ICUs, EDs, and trauma units are usually characterized by severe time constraints, and fast decision-making is required. These demands may constrain the opportunity to do structured multidisciplinary rounds, huddles or debriefings, diminishing the efficacy of team communication and planning.

Poor interprofessional training is a contributing factor to the issues of collaboration. A large number of clinicians are not exposed to interdisciplinary teamwork and they are not ready to communicate effectively,

resolve conflicts and make decisions together in actual acute care situations. Simulation-based interprofessional education and continuous professional development are thus important in closing this gap.

There is also technological fragmentation, which impairs collaboration. Mismatched electronic medical record systems, disjointed communication tools, and absence of integrated imaging or monitoring platforms may lead to delays in information transfer, incomplete documentation and workflow inefficiencies. These factors together with organization constraints, such as inadequate staffing, institutional support, and resource inadequacy minimize the overall effectiveness and sustainability of collaborative practices.

These barriers cannot be dealt with without a multi-faceted intervention, such as institutional policies that enhance clarity of role, the use of structured communication tools, investment in interoperable technologies, leadership encouragement of interprofessional work, and specific educational programs. The overall potential of interdisciplinary collaboration in patient outcomes can remain to be untapped without these kinds of interventions.

4. Methodology

4.1 Research Design

The research design adopted in this study is the systematic literature review design, which will be synthesized using the qualitative method. It is concerned with interdisciplinary cooperation between the pharmacy, radiology, respiratory therapy, the nursing field, paramedics, operating room (OR) technology and infection control. The systematic review approach was chosen because it involves the synthesis of empirical data on various studies to get a comprehensive picture on the effects of interdisciplinary teamwork on patient outcomes, safety, and organizational efficiency. The design also enables the determination of both the facilitators and barriers to collaboration in the acute care setting, which can be put into action in relation to clinical practice and policy-making (Petticrew and Roberts, 2006).

4.2 Search Strategy and Data Sources.

The literature review involved the use of various databases such as PubMed, CINAHL, Scopus, Web of science, and Google Scholar where wide coverage of peer reviewed journals in the field of healthcare, nursing, allied health, and medical sciences was ensured. The search strategy entailed keywords and Boolean operators associated to acute care and interdisciplinary collaboration like:

- Interdisciplinary collaboration OR interprofessional teamwork
- Acute care OR emergency department OR intensive care.
firstly, pharmacy or radiology or respiratory therapy or nursing or paramedics or operating room technology or infection control
- Patient outcomes/ patient safety/ medical errors.

To identify studies on effects of interdisciplinary collaboration on patient outcomes, inclusion criteria were established to eliminate studies published prior to 2015, in non-English languages, and those conducted in the acute care setting. The exclusion criterion was limited to the studies that either dealt exclusively with primary care, outpatient care, or interventions that were single-disciplinary and did not involve interdisciplinary aspects.

Through this approach, the study will select and extract data effectively.

The first search produced 1,235 articles that were selected according to their titles and abstract. Having eliminated the duplicates and irrelevant articles, 142 full-text studies were evaluated as eligible. Among them, 78 studies were able to meet the inclusion criteria. A data extraction was put on study characteristics (author, year, country, setting), research design, sample population, disciplines involved, type of

collaboration, outcome measures, and key findings. To make synthesis and comparison across studies possible, extracted data were put into a standardized matrix (Moher et al., 2009).

4.4 Data Analysis and Synthesis

The data that were extracted was analyzed through a qualitative synthesis approach that identified common themes and patterns pertaining to interdisciplinary collaboration. The analysis was designed in terms of:

1. Contributions that are specific to their respective discipline: The differentiation of the roles of pharmacy, radiology, respiratory therapy, nursing, paramedics, OR technology, and infection control.
2. Collaboration mechanisms: The assessment of communication approaches, common decision-making approaches, and well-developed teamwork systems (e.g., TeamSTEPPS, IPEC competencies).
3. Patient outcomes: Evaluation of patient safety, error reduction, efficiency of treatment and clinical recovery.
4. Barriers and facilitators: Integrating organizational, professional, and systemic forces that affect collaboration.

NVivo software (version 14) was applied to the data in order to identify the themes that were coded and cover the recurrent ideas as much as possible. Triangulation, through comparison of results in various healthcare settings and disciplines also aided in the synthesis of the work in order to find recurrent patterns and differences.

4.5 Ethical Considerations

Since this study is a systematic review that includes the already published research, no primary data collection involving human subjects was used. However, the inclusion criteria were that all the studies included would have to be reviewed regarding their adherence to the standards of ethical conduct, including approval of the Institutional Review Board, informed consent, and confidentiality. Academic integrity during the study is also preserved through the proper reference of all the sources and non-misrepresentation of data.

4.6 Limitations of Methodology

Although systematic review methodology has got in-depth information, it is limited by some factors. To start with, the use of English-language studies as the search limitation can cause language bias. Second, the study designs, sample sizes and outcome measures are not homogenous, which restricts the possibility of conducting meta-analysis or quantitative synthesis. Third, the results can be affected by the so-called publication bias whereby the more positive the results of a study, the higher its chances of publication. Regardless of these weaknesses, the research design enables a sound qualitative conceptualization of interdisciplinary cooperation and its effect on the result of acute care.

5. Results

Although there is undeniable information about the advantages of the interdisciplinary collaboration, several structural, cultural, and interpersonal obstacles still stand in its way. An issue that is continuously present is professional hierarchies, in which the presence of power disparities may prevent open communication and dishearten less senior staff members to participate in clinical decision making (Hall & Weaver, 2001). In certain acute care environments, strict hierarchy can lead to a situation where frontline staff (e.g. nurses or respiratory therapists) are not able to raise concerns about patient deterioration or medication safety, which can be disastrous.

Another important obstacle is role ambiguity. The lack of clear responsibilities among the team members may lead to a duplicate of tasks, the lack of tasks or the ambiguity in terms of tasks to be performed. This issue is increased in multidisciplinary acute care settings where there is contact between various disciplines in high pressure circumstances. It is observed that the absence of a clear definition of roles and responsibilities leads to a lack of efficiency of coordination and immediate clinical measures can be postponed.

Collaborative practice is even complicated with time pressures, large volumes of patients, and burdensome workloads. In acute care settings, including ICUs, EDs, and trauma units, time is invariably very tight, and there is a strong necessity to make decisions very quickly. These pressure may curtail an opportunity to have organized multidisciplinary rounds, huddles, or debriefs, which may make team communication and team planning less effective.

Inadequate interprofessional training is a contribution to the problem of collaboration. Numerous clinicians do not have adequate experience working in teams across disciplines and are unprepared to communicate effectively, resolve conflicts and make decisions in practice-based acute care situations. The latter gap is thus a key issue that requires continuous professional development and interprofessional education through simulation.

There is also technological fragmentation which hinders the cooperation. The use of incompatible electronic medical record systems, disjointed communication tools and absence of integrated monitoring or imaging platforms may lead to delayed information transfer, incomplete documentation and inefficiencies in the workflow. Together with organizational limitations, such as inadequate staffing, institutional support and resource deficits, they decrease the effectiveness and sustainability of collaboration practices, in general.

To overcome those barriers, it is necessary to initiate a multi-faceted intervention strategy, incorporating institutional policies that contribute to the clarity of the roles, the use of structured communication tools, the investment in interoperable technologies, interprofessional teamwork support by the leadership, and the educational intervention. In the absence of interventions like these, interdisciplinary collaboration might not be able to achieve all of its potential in terms of enhancing patient outcomes.

4. Methodology

4.1 Research Design

This research utilizes a systematic literature review research design in conjunction with a qualitative synthesis design to analyse the role and influence of interdisciplinary collaboration in acute care environment. It is more focused on the collaboration between pharmacy, radiology, respiratory therapy, nursing, paramedics, operating room (OR) technology, and infection control. The systematic review methodology has been chosen to combine the roles of empiric evidence of the various studies in order to have a complete picture of how interdisciplinary collaboration can affect patient outcomes, safety, and organizational efficiency. The design also enables the detecting of the facilitators and obstacles to collaboration in the acute care settings, which can be utilized in clinical practice and policy creation (Petticrew and Roberts, 2006).

4.2 Data Sources and Search Strategy.

The literature review referred to various databases such as PubMed, CINAHL, Scopus, Web of Science, and Google Scholar to be relatively exhaustive in its coverage of peer-reviewed journals in healthcare, nursing, and allied health, and medical sciences. Keywords used in the search strategy were keywords and Boolean operators that referred to the term acute care and interdisciplinary collaboration, e.g.:

- Interdisciplinary collaboration or interprofessional teamwork.

- Acute care OR emergency department OR intensive care
- pharmacy OR radiology OR respiratory therapy OR nursing OR paramedics OR operating room technology OR infection control
- Patient outcomes OR patient safety OR medical errors.

The inclusion criteria were established to include the studies published between 2015 and 2025, in English, in acute care settings, and the effects of interdisciplinary collaboration on the outcomes of patients. The exclusion criteria were also applied to the studies that involved only primary care, outpatient care, or the studies that involved single-disciplinary intervention with no interdisciplinary elements.

The selection of studies and extraction of the data will be done according to the following plans: 4.3 Study Selection and Data Extraction.

The first search produced 1,235 articles, and the screening of articles was done according to titles and abstracts. A total of 142 full-text articles were evaluated to be eligible after eliminating duplicates and unrelated articles. Among them, 78 studies were suitable to include. The extraction of the data was targeted at the features of the study (author, year, country, setting), research design, sample population, disciplines under investigation, type of collaboration, outcome measures, and main findings. Data that were extracted were put together in a standardized matrix to allow synthesis and comparison between studies (Moher et al., 2009).

4.4 Data Analysis and Synthesis

The extracted data were analyzed in a qualitative synthesis approach that determined general themes and trends associated with interdisciplinary collaboration. The discussion was organized according to:

1. Contributions unique to the field of discipline: The study of special functions of pharmacy, radiology, respiratory therapy, nursing, paramedics, OR technology, and infection control.
2. Mechanisms of collaboration: The assessment of communication strategies, joint decision-making processes, and systematic teamwork models (e.g., TeamSTEPPS, IPEC competencies).
3. Patient outcomes: Evaluate the patient safety, error decreasing, treatment efficiency, and clinical recovery.
4. Obstacles and enablers: Integrating organizational, professional, and systemic forces which affect collaboration.

NVivo software (14) was used to conduct thematic coding in order to increase reliability and capture all frequently recurring concepts. Triangulation was also used in the synthesis of findings where the results derived were compared through the findings in various healthcare settings and disciplines to detect consistent trends and variations.

4.5 Ethical Considerations

This study was a systematic review that relied on already published research thus there was no primary data collection of human subjects. Still, the studies that were included in the review were examined concerning compliance with ethical standards, including approval by Institutional Review Boards and informed consent as well as confidentiality. The research also possesses the concept of academic integrity in that all sources have been cited correctly without distortion of data.

4.6 Limitations of Methodology

Although systematic review methodology has offered exhaustive knowledge, there are some limitations. To begin with, the search was limited to English language studies, which could introduce bias on a language basis. Second, the lack of homogeneity in terms of study design, sample and outcome measurement makes it impossible to use meta-analysis or quantitative synthesis. Third, the findings can be affected by

publication bias because the studies with positive results have a higher chance of publication. In spite of these shortcomings, the approach enables a strong qualitative perception of interdisciplinary teamwork and its effects on acute care outcomes.

6.1 Integration of Findings with Theoretical Frameworks

The observed positive results in the Results section are in line with the known interprofessional practice models, which are the Interprofessional Education Collaborative (IPEC) competencies and the Team STEPPS models. According to the conceptualization of these frameworks, effective teamwork will be characterized by shared values, roles, respect, and formal communication (Reeves et al., 2018; AHRQ, 2019). The literature evidence shows that teams that followed these principles experience considerable levels of preventable errors and improve their diagnostic accuracy in addition to their level of satisfaction with patients. As an example, structured communication tools like SBAR and check-backs were always linked to the timely intervention and the minimization of errors in high-acuity settings (AHRQ, 2019; Pronovost et al., 2019). These results confirm the relevance of such theoretical frameworks in the real-life acute care context.

6.2 Implications of Discipline-Specific Contributions.

The findings point out that every field has exceptional knowledge that is vital in achieving the best patient outcomes. Proactive medication management is a way of reducing adverse drug events, maximizing dosing, and promoting antimicrobial stewardship by pharmacists (Bender et al., 2021). Radiologists assist clinicians in making evidence-based decisions in urgent situations, and these diagnostics are quick and accurate (Bosch et al., 2020). Respiratory therapists play a role in early ventilation policies and airway care, which has a direct impact on the survival of respiratory failure (Dixon et al., 2019). The role of nurses is to act as the main organizers, to coordinate the communication and keep track of the status of the patients in real time (Brooks et al., 2021). Paramedics make sure that the information and interventions provided at the pre-hospital level becomes a smooth continuation of emergency care (Ford et al., 2020). The OR technologists and infection control specialists have key roles to play in the maintenance of sterility, the mitigation of intraoperative complications, and the mitigation of healthcare-associated infections (Stone et al., 2019; Weiner et al., 2021). The combination of these functions proves that interdisciplinary collaboration is not an addition but synergy, and each of these fields makes other disciplines more functional.

6.3 Mechanisms behind Effective Collaboration.

The literature synthesis indicates that there are a number of mechanisms that can facilitate successful collaboration. To start with, miscommunication leads to errors, and structured communication protocols like SBAR, closed-loop communication, and standardized handovers reduce them. Second, multidisciplinary rounds are where uninterrupted information sharing and shared decision-making and proactive problem-solving can be implemented, especially in the critical care unit where patient conditions may change fast (Pronovost et al., 2019). Third, integration of technology (such as shared electronic medical records, shared imaging systems, etc.) is meant to provide timely access to patient information, simplify the workflow, and decrease redundant processes. All of these mechanisms contribute to the idea that collaboration should be process-based and context-specific and need conscious design and execution in the organizational processes.

6.4 Obstacles to Cooperation and remedies strategies.

Although the advantages are evident, several obstacles have been seen that restrict the success of interdisciplinary teamwork. The role ambiguity and the hierarchical nature of the professions may inhibit the open communication, particularly among the less experienced team members (Hall and Weaver, 2001). The lack of time, absence of staffs, and high patient acuity also limit collaborative decision-making opportunities. The inefficiencies in workflow may also be caused by technological fragmentation and non-

standardized protocols (Mohr et al., 2020). In order to overcome these issues, organizations may resort to specific interventions, including interprofessional education, teamwork training via simulations, leadership to support flattened hierarchies, and investment in interoperable electronic health records. By incorporating constant quality improvement and setting up the accountability models, the teamwork and patient outcomes can be strengthened further.

6.5 Implications on Practice, Policy and Education.

The implications of the findings on clinical practice, healthcare policy, and professional education are great. At the clinical level, interdisciplinary collaboration leads to better patient safety, minimizes unnecessary errors, and faster recovery. Policymaking-wise, healthcare institutions are advised to require formal communication guidelines, interdisciplinary rounds, and assist both the integration of all related fields in an acute care team. The interprofessional education and simulation-based learning should be included in the curricula of nurses, physicians, pharmacists, respiratory therapists, and allied health professionals to equip them with the skills to work in teams. These actions can make collaboration a standard of care beyond the goodwill of individual but a system that is an organizational norm.

6.6 Additions to the literature and research solutions in the future.

This work is original in the literature as it summarized the evidence that was specific to the discipline and proved the synergistic outcomes of collaboration in acute care. It emphasizes the fact that interdisciplinary collaboration is not only minimizing clinical risk but also improving the efficiency, patient satisfaction and care quality overall. It might be seen that in future studies, the long-term outcome of particular collaboration models can be analyzed, assess the cost-efficiency, and consider how new technologies, e.g., telemedicine or AI-based decision support, can be deployed to improve the interdisciplinary process. Moreover, the cross-cultural research would give a clue on the effects of the organizational culture on the effectiveness of the teams in various healthcare practices.

7. Recommendations

According to the results and analysis of this paper, some recommendations are offered to enhance interdisciplinary collaboration in acute care environments and optimize patient outcomes. These suggestions will be structured as organizational, clinical, educational, and technological.

7.1 Organization Recommendations.

1. **Introduce Structured Communication Frameworks:** To minimize miscommunication and avoid errors, healthcare organizations must standardize communication procedures with all acute care units and apply such tools as SBAR, closed-loop communication, and structured handovers (AHRQ, 2019).
2. **Encourage Interprofessional Leadership:** Leadership organizational arrangements must be made to enhance shared responsibility and reduced hierarchies to enable all team members to play significant roles in decision making, including nurses, respiratory therapists and allied health professionals (Hall and Weaver, 2001).
3. **Assign Dedicated Resources:** The hospitals are advised to make sure that there is sufficient staffing, secured time in multidisciplinary rounds, and resources are assigned to enable a multidisciplinary practice, especially in the high-acuity units like the ICU, ED, and operating theatres.

7.2 Recommendations on Clinical Practices.

1. **Frequent Multidisciplinary Rounds:** Interdisciplinary rounds are to be institutionalized on a daily or shift-to-shift basis, where real-time communication of patient data, proactive care plan generation, and real-time solution to clinical issues take place (Pronovost et al., 2019).

2. **Combine Discipline-Specific Expertise:** Special skills of each discipline should be used to its fullest. Pharmacists are supposed to be leaders of medication reconciliation, radiologists are supposed to offer timely interpretation of imaging, respiratory therapists are expected to monitor ventilatory support, and infection control practitioners are expected to monitor hygiene standards adherence (Bender et al., 2021; Weiner et al., 2021).

3. **Continuous Quality Monitoring:** Introduce the key performance indicators (KPIs) as the measures of the collaboration effectiveness, the rate of medication errors, hospital-acquired infections, time-to-treatment indicators, and patient satisfaction rates.

7.3 Educational Recommendations

1. **Interprofessional Education (IPE):** Curricula for all healthcare professions should incorporate IPE modules, case-based learning, and simulation exercises to develop communication, teamwork, and role-awareness skills (Reeves et al., 2018).
2. **Continuous Professional Development:** Acute care staff should participate in ongoing training programs to enhance understanding of other disciplines' roles and foster a culture of mutual respect and collaboration.

7.4 Technological Recommendations

1. **Integrate Health Information Systems:** Interoperable electronic medical records and imaging platforms should be adopted to facilitate timely access to patient information and reduce redundant testing.
2. **Utilize Telehealth and AI Support:** Emerging technologies can support interdisciplinary collaboration by providing decision support, remote consultations, and real-time monitoring, particularly during high-demand periods or for critically ill patients.

These recommendations collectively aim to institutionalize interdisciplinary collaboration as a standard of care, ensuring sustainable improvements in patient safety, care quality, and clinical efficiency.

8. Conclusion

Interdisciplinary collaboration in acute care is a vital determinant of patient safety, clinical outcomes, and operational efficiency. Evidence from multiple studies demonstrates that coordinated teamwork among pharmacy, radiology, respiratory therapy, nursing, paramedics, operating room technology, and infection control significantly reduces errors, accelerates diagnostic and therapeutic interventions, and enhances patient satisfaction. The integration of structured communication protocols, shared decision-making, and technological tools further amplifies these benefits. Despite existing barriers such as professional hierarchies, role ambiguity, and resource constraints, deliberate organizational strategies, interprofessional education, and leadership support can overcome these challenges.

This research underscores that interdisciplinary collaboration is not optional but essential for high-quality acute care. By implementing the recommended organizational, clinical, educational, and technological measures, healthcare institutions can optimize team performance, improve patient outcomes, and create a safer, more efficient care environment. Future research should explore long-term impacts, cost-effectiveness, and the integration of emerging technologies to further enhance interdisciplinary collaboration across diverse healthcare systems. Ultimately, fostering a culture of teamwork and mutual accountability in acute care settings ensures that patients receive timely, safe, and evidence-based care, thereby advancing the overarching goals of modern healthcare.

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