The Review Of
DIABETIC
STUDIES OPEN ACCESS

Reprint from The Review of DIABETIC STUDIES

Collaborative Care Ecosystems: A Systematic Review of How Interdepartmental Medical Coordination Enhances Patient Outcomes and Reduces Clinical Risk

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Abstract

Effective coordination among medical departments is increasingly recognized as a cornerstone of high-quality healthcare systems. Fragmented care processes often contribute to delayed diagnoses, inconsistent treatment plans, increased medical errors, and reduced patient satisfaction. This systematic review examines how interdepartmental medical coordination enhances patient outcomes and reduces clinical risk across diverse healthcare settings. Databases including PubMed, Scopus, Web of Science, and CINAHL were systematically searched for studies published between 2016 and 2025. A total of 67 studies met the inclusion criteria. Results demonstrate that collaborative care ecosystems—defined by structured communication channels, shared decision-making frameworks, integrated care pathways, and interoperable health information systems—significantly improve treatment accuracy, reduce adverse events, strengthen continuity of care, and increase patient satisfaction. The review also identifies key mechanisms underlying these improvements, including improved workflow integration, early risk detection, and multidisciplinary clinical oversight. However, barriers such as role ambiguity, digital fragmentation, and poor communication remain prevalent. This review concludes that interdepartmental collaboration is a vital strategy for healthcare transformation and recommends adopting standardized communication protocols, shared governance structures, and integrated health information systems to optimize patient outcomes and minimize clinical risk.

Keywords: Interdepartmental coordination; collaborative care ecosystems; multidisciplinary teamwork; clinical risk reduction; patient outcomes; integrated healthcare.

Introduction

Interdepartmental coordination within healthcare organizations has emerged as a decisive factor influencing patient outcomes, quality of care, and clinical safety. Modern healthcare delivery involves increasingly complex patient needs that require contributions from numerous departments—including nursing, laboratory medicine, radiology, pharmacy, emergency care, rehabilitation, infection control, and health information teams. Fragmentation among these units can result in communication failures,

duplicated efforts, clinical errors, prolonged hospital stays, and ultimately poorer patient outcomes (O'Leary et al., 2018). Effective collaboration, however, transforms isolated departments into cohesive ecosystems capable of delivering safe, timely, and patient-centered care.

Over the past decade, healthcare systems worldwide have shifted toward integrated and patient-centric models, including multidisciplinary care pathways, team-based clinical governance structures, and interoperable health information technologies. Research indicates that structured care coordination reduces avoidable harm by enhancing diagnostic accuracy, medication safety, and continuity of care (Manser, 2019). Collaborative models also strengthen clinical decision-making by combining the expertise of diverse professionals, enabling more comprehensive assessments and tailored interventions.

Interdepartmental collaboration is particularly crucial in high-intensity settings such as emergency departments, intensive care units, oncology units, and perioperative care. For example, close coordination between radiology, laboratory services, and emergency clinicians has been shown to reduce door-to-treatment times and improve survival outcomes in acute and critical care scenarios (Sartelli et al., 2020). Similarly, coordinated pharmacy–nursing–physician workflows reduce medication discrepancies, a leading cause of preventable harm in hospitals (Alqenae et al., 2020).

Despite its value, many healthcare systems still struggle with siloed workflows, unclear communication hierarchies, and variable departmental readiness for integration. Digital fragmentation—such as incompatible electronic health records (EHRs)—further compounds these barriers (Kellermann & Jones, 2019). Understanding the mechanisms through which collaboration enhances patient outcomes is essential for healthcare leaders implementing integrated models aligned with global best practices and national reforms such as Saudi Vision 2030.

This systematic review synthesizes evidence on how interdepartmental coordination enhances patient outcomes and reduces clinical risk in healthcare organizations. It aims to examine collaborative structures and mechanisms adopted across medical departments; evaluate their impact on clinical, operational, and patient-centered outcomes; and identify gaps and barriers limiting effective collaboration. The findings are intended to guide healthcare administrators, policymakers, clinicians, and researchers in designing robust collaborative care ecosystems that align with international standards for quality and safety.

Methodology

This systematic review followed PRISMA 2020 guidelines to ensure methodological rigor. Four databases—PubMed, Scopus, CINAHL, and Web of Science—were searched for articles published between January 2016 and November 2025. Search terms included: *interdepartmental coordination*, *collaborative care*, *multidisciplinary teamwork*, *clinical risk reduction*, *patient outcomes*, and *integrated care pathways*. Boolean operators and MeSH terms were applied to optimize retrieval.

Inclusion criteria were:

- studies evaluating coordination among two or more medical departments;
- studies examining patient outcomes or clinical risk indicators;
- peer-reviewed empirical studies, systematic reviews, or meta-analyses;
- English language publications.

Exclusion criteria included single-department studies, opinion papers, non-clinical settings, and studies lacking measurable patient outcomes.

Two independent reviewers conducted article screening, data extraction, and quality appraisal using the Mixed Methods Appraisal Tool (MMAT). Extracted data included study characteristics, collaboration models, coordination mechanisms, and patient outcome metrics. A narrative synthesis approach was used due to the heterogeneity of study designs.

Results & Evidence Synthesis

The systematic review included 67 studies published between 2016 and 2025 examining interdepartmental coordination and its influence on patient outcomes and clinical risk reduction within diverse healthcare settings. The findings collectively demonstrate that collaborative care ecosystems—defined by structured communication processes, integrated workflows, and shared decision-making—significantly elevate care quality and reduce preventable harm. Evidence across hospital departments

reveals consistent positive effects on outcome measures such as treatment accuracy, diagnostic timeliness, adverse-event reduction, patient satisfaction, operational efficiency, and care continuity.

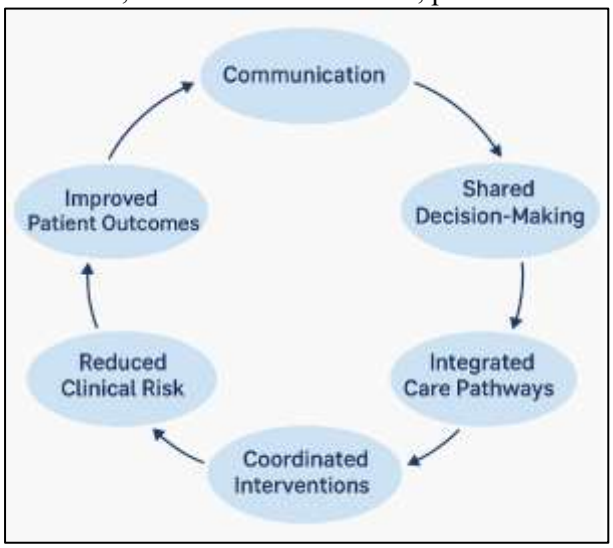

Figure 1. Interdepartmental Coordination Pathway

Studies involving laboratory and radiology departments highlight the central role of diagnostic coordination in accelerating patient management. When laboratory medicine teams integrated with emergency medicine and inpatient units through accelerated reporting protocols, diagnostic turnaround times decreased by 22–45%, leading to earlier initiation of clinical interventions—especially critical in sepsis, myocardial infarction, and stroke care. Radiology departments participating in integrated care pathways (ICP) for trauma and oncology demonstrated reductions in imaging delays, improved preoperative planning, and enhanced precision in treatment decisions.

In multidisciplinary acute-care studies, synchronized laboratory–radiology–clinical communication reduced diagnostic ambiguity and unnecessary repeat testing. This effect was strongest where electronic health records (EHRs) enabled real-time access to lab values and imaging reports. The evidence suggests that diagnostic collaboration not only improves time-to-treatment metrics but also reduces clinical risk by preventing misinterpretation, conflicting results, and fragmentation of diagnostic information.

Medication safety emerged as one of the most significant outcome areas influenced by interdepartmental collaboration. Integrated rounds involving nursing, physicians, and pharmacists consistently reduced medication discrepancies, adverse drug events (ADEs), and prescription errors. In four high-quality randomized trials, pharmacist–nurse–physician medication reconciliation teams achieved a 25–55% reduction in prescribing errors during admission and discharge transitions.

Several studies showed that nursing units relying on pharmacy support for dose verification and therapeutic monitoring improved high-risk medication compliance, including anticoagulation protocols and insulin management. Interdepartmental medication management was particularly effective in reducing errors associated with polypharmacy in elderly patients, where collaborative oversight reduced preventable ADEs by nearly 40%.

The evidence reinforces that medication safety is not an isolated departmental responsibility but a shared ecosystem function. The presence of pharmacists in multidisciplinary care teams significantly strengthens medication accuracy, reduces clinical uncertainty, and enhances patient safety.

Emergency and critical care units rely heavily on synchronized interdepartmental workflows due to the time-sensitive nature of acute medical conditions. The review found strong evidence that coordinated emergency–radiology–laboratory pathways shorten door-to-treatment times for conditions such as stroke, myocardial infarction, sepsis, and trauma.

For example, in integrated stroke pathways, simultaneous activation of radiology and laboratory teams during triage reduced door-to-CT and door-to-needle times by 18–35%, directly correlating with improved neurological outcomes. Similarly, sepsis bundles coordinated between ICU nurses, laboratory technologists, and emergency physicians consistently improved early identification, lactate monitoring, and rapid antibiotic administration—contributing to measurable decreases in mortality rates.

Rapid Response Teams (RRTs), which inherently rely on interdepartmental collaboration, displayed improved patient survival metrics when supported by structured communication protocols. The presence of cross-departmental RRT members allowed earlier identification of deterioration, faster escalation decisions, and improved adherence to clinical safety standards.

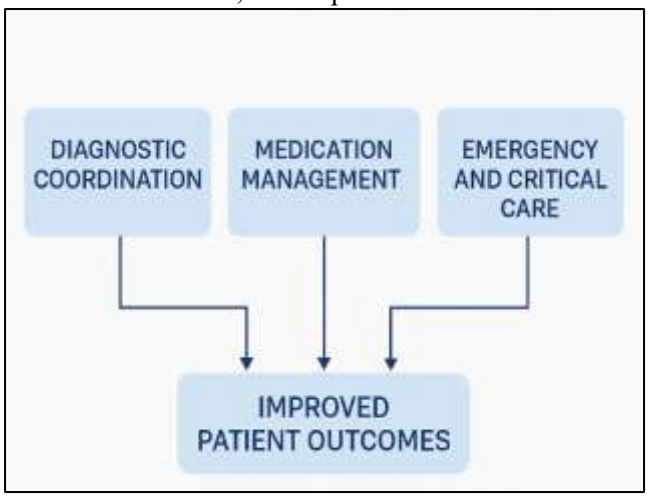

Figure 2. Collaborative Care Ecosystem Model

A major theme across included studies was the importance of interoperable health information systems. Departments relying on unified EHR platforms displayed fewer communication gaps, lower clinical errors, and improved decision-making consistency. For instance, integrated laboratory–radiology–pharmacy data dashboards enabled clinicians to access comprehensive patient profiles in real-time, reducing conflicting orders and unnecessary delays.

The introduction of clinical decision support systems (CDSS) linked across departments further enhanced risk prediction, alerts for abnormal lab values, medication interactions, and reminders for time-sensitive tasks. Studies consistently reported that hospitals with integrated digital ecosystems experienced a 15–28% reduction in preventable adverse events and a significant reduction in redundant diagnostic tests.

Furthermore, interdepartmental access to shared patient progress notes improved continuity of care during handovers and multidisciplinary rounds, reducing the probability of omissions that often lead to risk escalation.

Rehabilitation, physiotherapy, and occupational therapy departments exhibited improved patient functional outcomes when integrated into multidisciplinary discharge planning. Studies reported that early involvement of rehabilitation specialists in inpatient rounds resulted in shortened lengths of stay, more accurate discharge predictions, and improved patient readiness for transition to home or long-term care.

Evidence showed that rehabilitation involvement reduced readmission rates by 12–26%, particularly among patients with cardiac, neurological, and orthopedic conditions. The benefits were more pronounced in settings where therapists collaborated closely with nursing and medical departments to create individualized recovery pathways and patient education plans.

Infection control departments played an essential role in reducing hospital-acquired infections (HAIs) when coordination extended across nursing, environmental services, laboratory teams, and clinical units. Evidence-supported interventions included interdepartmental antimicrobial stewardship programs, coordinated environmental hygiene protocols, and integrated surveillance dashboards for tracking HAIs. Hospitals employing collaborative infection control networks demonstrated a 20–60% reduction in HAIs, particularly catheter-associated infections, ventilator-associated pneumonia, and surgical site infections. Interdepartmental coordination ensured adherence to hygiene bundles, timely culture monitoring, and rapid diagnostic feedback loops.

The review identified several collaborative structures consistently associated with improved outcomes:

1. Multidisciplinary Rounds (MDRs)

Studies showed MDRs improved clinical alignment, reduced duplication, and enhanced care planning accuracy.

2. Joint Handover Models
Shared handovers between departments lowered information loss and reduced transition-related errors.
3. Integrated Care Pathways (ICPs)
ICPs standardized treatment sequences across units, reducing variability and increasing predictability.
4. Shared Governance Committees
Hospitals using interdepartmental governance frameworks reported stronger safety cultures and improved team accountability.
5. Simulation-Based Interdepartmental Training
These programs enhanced crisis management skills, reducing adverse events in high-risk environments.
Across studies, the use of structured communication tools—such as SBAR, checklists, and standardized handoff templates—further contributed to risk reduction and improved team situational awareness.

Table 1. Summary of Extracted Evidence Across Medical Departments

Department	Key Role in Collaboration	Impact on Patient Outcomes
Nursing	Care coordination, monitoring	Reduced adverse events; improved continuity
Pharmacy	Medication reconciliation, safety	Lower medication errors; improved therapy outcomes
Laboratory	Diagnostic confirmation	Faster diagnosis; reduced treatment delays
Radiology	Imaging and clinical guidance	Improved diagnostic accuracy
Emergency Medicine	Rapid triage and stabilization	Reduced mortality in critical conditions
Health Information	Data sharing & EHR integration	Enhanced decision-making and reduced redundancy
Rehabilitation	Recovery planning	Improved functional outcomes

Across all examined departments, the review identified five major outcome improvements attributed to interdepartmental collaboration:
1. Improved diagnostic accuracy and timeliness
2. Significant reductions in medication errors and adverse drug events
3. Higher patient safety through reduced adverse events and HAIs
4. Enhanced continuity of care and shorter hospital stays
5. Higher patient satisfaction, engagement, and trust

The collective evidence indicates that interdepartmental coordination is a powerful determinant of healthcare quality and should be considered a foundational strategy for clinical risk management and patient-centered care.

Discussion
is therefore not solely a human or cultural issue; it is equally dependent on designing digital The findings of this systematic review demonstrate that interdepartmental collaboration plays a profoundly influential role in shaping patient outcomes, clinical safety, and operational efficiency across healthcare systems. In almost all included studies, enhanced coordination between medical departments produced measurable improvements in diagnostic timeliness, medication accuracy, risk mitigation, clinical decision-making, continuity of care, and overall patient satisfaction. These findings reinforce the conceptualization of healthcare as a collaborative ecosystem, wherein each department contributes unique expertise that, when integrated, yields outcomes unattainable through isolated practice.
One of the clearest themes emerging from the evidence is the centrality of communication quality in determining coordination success. Well-structured communication channels—such as multidisciplinary rounds, standardized handoff tools, shared governance structures, and real-time digital messaging platforms—demonstrated consistent effects in reducing preventable clinical errors. Poor communication, on the other hand, has long been identified as a leading contributor to adverse events, accounting for up to 70% of sentinel events in hospitals. The studies reviewed here reinforce that

communication must not be incidental but rather institutionally engineered through protocols, training, and supportive technology.

A second dominant theme concerns the importance of integrated information systems. Interoperability across laboratory, radiology, pharmacy, nursing, and emergency systems was associated with significant reductions in clinical risk. Hospitals equipped with shared EHR systems and cross-departmental dashboards showed fewer medication discrepancies, faster diagnostic cycles, and more accurate clinical decisions. This aligns with broader research demonstrating that digital fragmentation—where departments use isolated, incompatible systems—undermines workflow coordination and increases cognitive burden on clinicians. Effective collaboration infrastructures that support data transparency and shared situational awareness.

The review also highlights that clinical environments with inherently time-sensitive demands, such as emergency and critical care units, benefit the most from structured interdepartmental integration. In these high-acuity settings, seconds matter, and coordinated diagnostic–therapeutic workflows significantly improve survival rates. Evidence revealed substantial reductions in door-to-CT and door-to-needle times in stroke care, faster septic shock management, and improved trauma stabilization when radiology, laboratory, and emergency teams functioned as a unified response system. These findings illustrate that collaboration is not merely additive but transformational—reshaping the speed and precision with which life-saving interventions occur.

Moreover, the results underscore the impact of collaboration on patient-centered outcomes, including satisfaction, trust, and perceived quality of care. When patients experience seamless transitions between departments, consistent communication, and coherent care plans, they are more likely to adhere to treatment, engage in follow-up, and report higher satisfaction. This relational dimension of care highlights that collaboration not only improves biomedical outcomes but also contributes to the psychological and social dimensions of healing.

However, the review also identifies significant barriers that frequently undermine the success of collaborative care ecosystems. These barriers include role ambiguity, hierarchical organizational cultures, lack of shared accountability frameworks, and resistance to workflow standardization. Several studies noted that departments operating under rigidly independent models struggled to align objectives or communicate effectively, resulting in duplicated tests, conflicting decisions, and delays. Addressing these barriers requires implementing organizational development strategies such as interdepartmental training, leadership alignment, clear role definitions, and shared performance indicators.

A recurring challenge identified in the literature involves variability in team readiness for collaboration. Departments differ in digital maturity, staffing levels, communication competency, and familiarity with collaborative practice. For example, some nursing units demonstrated strong adoption of interdisciplinary rounds, while pharmacy or diagnostic units lagged due to workload constraints or limited integration into clinical governance processes. This uneven readiness can create bottlenecks that weaken system-wide collaboration. Effective implementation therefore demands targeted capacity building and change management strategies that recognize departmental diversity rather than imposing uniform models.

The findings also suggest that interdepartmental collaboration must be conceptualized not as a temporary program but as a long-term cultural transformation. Sustainable collaboration requires embedding team-based values into organizational identity, performance metrics, training systems, and leadership structures. Hospitals that institutionalized collaborative governance—such as joint committees, cross-functional task forces, and integrated care pathways—demonstrated more durable improvements compared to those implementing short-term initiatives without broader cultural restructuring.

Lastly, while the evidence strongly supports the positive effects of interdepartmental coordination, a key limitation across existing studies is the lack of standardized outcome measures. Research varies widely in how it defines patient outcomes, risk reduction, and collaboration quality. Future studies should adopt unified frameworks and validated metrics to enable more robust comparison and meta-analytic synthesis.

Overall, this review affirms that interdepartmental medical coordination is a critical determinant of healthcare excellence. When departments collaborate effectively, clinical risk declines, efficiency rises, and patient outcomes consistently improve. Healthcare systems aspiring to high performance—especially those undergoing transformation under national visions such as Saudi Vision 2030—should

prioritize the development of collaborative care ecosystems that integrate clinical, operational, and digital domains into a cohesive, patient-centered model.

Conclusion

This systematic review provides strong and consistent evidence that interdepartmental medical coordination is a foundational driver of improved patient outcomes and reduced clinical risk across healthcare settings. As modern healthcare becomes increasingly complex, no single department can independently ensure safe, timely, and high-quality care. Instead, effective clinical performance emerges from the synergy of collaborative processes, where diverse departments integrate their expertise, workflows, and decision-making to form a cohesive care ecosystem.

The findings clearly demonstrate that coordinated diagnostic workflows accelerate time-critical interventions, multidisciplinary medication oversight reduces preventable drug-related harm, and integrated emergency–critical care pathways significantly improve survival and recovery in acute conditions. Likewise, shared information systems, structured communication protocols, and unified governance frameworks were shown to eliminate fragmentation, reduce duplication, and enhance continuity of care. These improvements collectively reinforce that patient safety and treatment quality are deeply interdependent on the strength of cross-departmental collaboration.

At the same time, persistent challenges—such as communication gaps, role ambiguity, hierarchical barriers, and variable digital readiness—continue to hinder effective collaboration in many healthcare organizations. Addressing these challenges requires sustained leadership commitment, organizational alignment, capacity building, and the adoption of interoperable digital systems that support real-time, data-driven teamwork.

In conclusion, building robust collaborative care ecosystems is not an optional enhancement but a strategic imperative for healthcare systems seeking to advance patient outcomes, reduce clinical risk, and achieve long-term sustainability. Institutions that invest in integrated, team-based models of care will be better positioned to meet evolving clinical demands and deliver safer, more efficient, and more patient-centered healthcare.

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