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The "Silent" Error Cascade: A Systematic Review on Communication Breakdowns at the Clinical-Laboratory-Navigation Interface and Impacts on Patient Care

Abeer Ali Bitali [1] , Ateyah Laheg Nami Alhadri [2] , Sarah Homoud Alshal Alshallali [3] , Ahlam Ayed Orayfij Alruwaili [4] , Hakem Mubarak Dakhilallah Alsharari [5] , Ohood Hassan Hadi Marwani [6] , Abdulmohsen Zeyad Almotairy [7] , Ibrahem Ali Mashny Shunaymir [8] , Mohammed Hussein Mohammed Shaabi [8] , Mihammed Hussien Dammas Matkooor [9] , Aeih Mater Alosaimi [10] , Rabaa Warad Alenze [11]

(1) Imam Abd Arahman Alfesal, Ministry of Health, Saudi Arabia,
(2) Al Darb General Hospital, Ministry of Health, Saudi Arabia,
(3) King Fahd Hospital, Ministry of Health, Saudi Arabia,
(4) Sakaka Women, Maternity and Children's Hospital,Ministry of Health, Saudi Arabia,
(5) Mental Health in Qurayyat,Ministry of Health, Saudi Arabia,
(6) Jazan - Bish General Hospital,Ministry of Health, Saudi Arabia,
(7) PHC Madinah,Ministry of Health, Saudi Arabia,
(8) Jazan City, General Season Hospital,Ministry of Health, Saudi Arabia,
(9) General Season Hospital,Ministry of Health, Saudi Arabia,
(10) Riyadh branch of the Ministry of Health, Saudi Arabia,
(11) Al Rawdah Health Center, Ministry of Health, Saudi Arabia

Abstract

Background: Modern healthcare delivery relies on effective communication across various interprofessional teams—clinical, diagnostic, and administrative. Patient safety and outcomes are often compromised not by isolated errors, but by failures at the handoffs and interfaces among these groups, particularly involving nursing, medical laboratories, patient navigation, health informatics, and social services, creating a critical area for potential communication breakdowns.

Aim: This narrative review aims to synthesize and analyze the existing evidence on how miscommunication, information loss, and coordination failures at the clinical-laboratory-navigation interface contribute to diagnostic and treatment delays, missed social needs, and adverse patient outcomes.

Methods: A search was conducted across five electronic databases (PubMed, CINAHL, Scopus, Web of Science, and PsycINFO) for peer-reviewed studies published between January 2015 and June 2024. Data were extracted and synthesized using a narrative thematic approach.

Results: Analysis of the studies identified three main breakdown themes: (1) communication failures in result sharing among laboratory, nursing, and ordering providers; (2) gaps in care coordination and follow-up involving medical secretaries/navigators; and (3) fragmentation of social needs information across nursing and social service systems.

Conclusion: Communication failures between clinical, laboratory, and navigation services lead to significant patient safety risks and health equity issues. To address this, integrated interventions are needed, focusing on redesigning interprofessional workflows, optimizing electronic health records for teamwork, and formalizing patient navigation roles in communication. Future research should evaluate the effects of these interventions on clinical outcomes.

Keywords: communication breakdown, interprofessional handoff, patient navigation, laboratory error, social determinants of health

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Introduction

The contemporary healthcare landscape is a vast, interconnected ecosystem where patient outcomes are less frequently determined by a single clinician's expertise and more by the efficacy of the system that supports them (Clay-Williams & Braithwaite, 2016). This system relies on the flawless handoff of information across a chain of professionals: from the nurse who draws blood, to the laboratory technician who analyzes it, to the informatics system

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that stores and flags the result, to the medical secretary who schedules the necessary follow-up, and to the social worker who addresses non-clinical barriers to care (Bergström et al., 2015). While each profession maintains rigorous internal standards, the interfaces *between* these professional domains—the clinical-laboratory-navigation interface—are often poorly mapped, under-studied, and rife with vulnerability (Weller et al., 2014). Failures at these junctions do not typically manifest as dramatic, single-point failures but rather as "silent" error cascades: a series of small, often unnoticed communication breakdowns that collectively lead to significant patient harm, including delayed diagnoses, inappropriate treatments, and unaddressed social needs (Graber et al., 2017).

This review focuses on this critical interface, synthesizing evidence on communication breakdowns involving five key professional groups: Nursing, Medical Laboratory, Medical Secretary/Patient Navigator, Health Informatics, and Social Service. Nurses act as the primary executors and coordinators of care at the bedside and in the community. Medical laboratory professionals generate the crucial diagnostic data that drives approximately 70% of medical decisions (Lippi & Plebani, 2017). Medical secretaries and patient navigators manage the logistical and administrative pathways that translate clinical decisions into action. Health informatics provides the digital infrastructure for information exchange. Social service workers address the psychosocial and socioeconomic determinants that fundamentally impact health outcomes (National Academies of Sciences, Engineering, and Medicine, 2019). A lapse in communication between any two of these nodes can disrupt the entire continuum of care.

The rationale for this review is rooted in the paradigm of systems safety, which posits that errors are rarely due to individual negligence but are emergent properties of complex systems with latent flaws (Reason, 2016). Despite technological advances like the Electronic Health Record (EHR), communication remains predominantly a human and socio-technical challenge. Studies consistently show that communication failures are a leading root cause of sentinel events in healthcare (The Joint Commission, 2015). However, most analyses focus on physician-to-physician or nurse-to-physician communication. There is a pressing need to synthesize evidence on the equally critical but less visible communication lines that support the diagnostic and therapeutic journey, particularly those involving "allied" or "support" staff whose roles are essential for care coordination (Kwan et al., 2022). This review, therefore, asks: How do communication breakdowns specifically at the clinical-laboratory-navigation interface occur, what are their impacts on patient care, and what contributing factors and potential solutions are evidenced in the recent literature?

Methodology

This review employed a systematic narrative synthesis methodology, designed to integrate findings from diverse study types into a coherent theoretical analysis (Popay et al., 2006). A systematic search strategy was developed and executed in July 2024.

Search Strategy and Selection Criteria

We searched five electronic databases: PubMed, CINAHL, Scopus, Web of Science, and PsycINFO. The search period was limited to January 2015 – June 2024 to capture the modern EHR-dominant era and evolving models of patient navigation. The search string combined terms using Boolean operators: ("communication breakdown" OR "handoff" OR "hand-off" OR "information loss") AND ("interprofessional" OR "multidisciplinary team") AND ("laboratory error" OR "diagnostic error" OR "test result") AND ("patient navigator" OR "medical secretary" OR "administrative staff") AND ("EHR" OR "health information technology") AND ("social determinant of health" OR "social service"). Reference lists of key articles were hand-searched.

Inclusion criteria were: (1) peer-reviewed original research (qualitative, quantitative, mixed-methods) or systematic reviews; (2) focus on communication, information transfer, or coordination involving at least two of the five target professions; (3) investigation of a process leading to or presenting a risk for delayed diagnosis, treatment error, or missed social need; (4) publication in English. Exclusion criteria included: editorials, opinion pieces, studies focused solely on intra-professional communication (e.g., nurse-to-nurse), or studies set in non-acute or non-primary care contexts without relevance to the defined interface.

Data Extraction

A standardized data extraction form was used to collect information on study design, setting, professions involved, nature of the communication breakdown, patient outcome or risk, and reported contributing factors or solutions.

Data Synthesis and Analysis

Due to the heterogeneity in study designs and outcomes, a meta-analysis was not feasible. Instead, a thematic narrative synthesis was conducted (Thomas & Harden, 2008). Extracted data were organized iteratively, with initial codes grouped into descriptive themes reflecting the stage of care and type of breakdown. These were subsequently refined into three overarching analytical themes that structure the results section. The analysis paid specific attention to the role of health information technology as both a conduit for and a barrier to effective communication.

Results

Thematic Analysis of Breakdowns and Impacts

The synthesis revealed that communication failures follow predictable pathways, which we have categorized into three interconnected thematic domains. The frequency and nature of impacts are summarized in Table 1.

Table 1: Documented Impacts of Communication Breakdowns at the Clinical-Laboratory-Navigation Interface

Impact Category	Specific Patient Outcomes	Illustrative Contexts from Literature
Diagnostic Delays	- Delayed cancer diagnosis (e.g., abnormal imaging or biopsy result not followed up) - Missed or delayed diagnosis of chronic conditions (e.g., elevated HbA1c, positive sepsis markers) - Late identification of infectious diseases	Murphy et al., 2019; Singh et al., 2019; Casalino et al., 2016
Treatment Errors & Delays	- Medication errors due to outdated or unavailable lab data - Delay in initiating or changing therapy - Unnecessary repeat testing due to lost results	El-Kareh et al., 2013; Graber et al., 2017; Wetterneck et al., 2012
Unaddressed Social Needs & Health Inequities	- Missed referrals to social services for housing, food insecurity - Failure to connect patients with financial assistance for medications/treatment - Ineffective discharge planning leading to readmission	Gottlieb et al., 2017; Fiscella & Epstein, 2008; Drake et al., 2021
Patient Harm & System Burden	- Preventable emergency department visits or hospitalizations - Patient anxiety and loss of trust - Increased healthcare costs and resource utilization	Obermeyer et al., 2019; Molina et al., 2020

Pre-analytical and Result Communication Failures

The journey of a laboratory test is a high-risk pathway for communication failure. Breakdowns occur at multiple points: during test ordering, specimen collection, and, most critically, in the communication of results.

Pre-analytical Ambiguity and "Wrong Blood in Tube" Errors

The process begins with an order, often entered by a clinician but frequently transmitted and actioned by nursing and administrative staff. Ambiguous orders in the Computerized Physician Order Entry (CPOE) system—such as unclear timing or preparation instructions—can lead to nurses drawing specimens incorrectly (Plebani, 2010). While "wrong patient" or "wrong tube" errors are often caught by laboratory rejection protocols, the communication loop back to the nursing unit to recollect the specimen is fragile. Studies show that notification of a rejected sample is often sent via an EHR alert to a generic pool or to the ordering provider, who may not be immediately available, leading to significant delays without the nurse responsible for the patient being directly notified (Lippi et al., 2011). This creates a silent gap where both the nurse and the provider assume the test is pending, while the process has actually stalled.

The "Black Hole" of Abnormal Result Follow-up

The communication of critical, significantly abnormal, or even routinely abnormal results remains a paramount challenge. Although laboratories have stringent protocols for calling critical values (e.g., critical potassium levels) to a licensed caregiver, the definition of "critical" is narrow. Many "significantly abnormal" results (e.g., a markedly elevated PSA or a positive fecal occult blood test) fall outside this mandatory call-back protocol and are routed to providers' in-baskets (Casalino et al., 2016). These digital in-baskets are notoriously overloaded, and alerts for non-critical abnormalities compete with dozens of other messages, leading to alert fatigue and missed results (Singh et al., 2019). The breakdown is compounded when the provider who receives the alert is covering for a colleague or is no longer responsible for the patient, a common scenario in resident continuity clinics or group practices. The nurse, who may have ordered the test under a protocol or is managing the patient's daily care, is often left out of this electronic notification loop entirely, despite being the most consistent point of contact (Wetterneck et al., 2012).

The consequence is a well-documented source of diagnostic delay, particularly in oncology. A seminal study by Murphy et al. (2019) found that failures in communication and follow-up of abnormal test results were a contributing factor in over half of diagnosis-related malpractice claims. Patients with actionable findings like lung nodules or anemia can slip through the cracks for months, leading to later-stage diagnoses (Obermeyer et al., 2019). Furthermore, the lack of a clear, closed-loop communication system—where the receipt, interpretation, and plan for a result are acknowledged and tracked—leaves the process vulnerable at every handoff (El-Kareh et al., 2013).

Care Coordination and Follow-up Gaps

Once a result is interpreted and a plan is made (e.g., "schedule colonoscopy," "refer to specialist," "start new medication"), the task of executing that plan frequently falls to medical secretaries, administrative staff, and increasingly, formal patient navigators. This is the next major fracture point.

A provider's referral or order in the EHR is not self-executing. A medical secretary must receive the task, contact the patient, navigate insurance barriers, schedule the appointment within an

appropriate timeframe, and confirm the patient's attendance. Breakdowns here are legion. The task may be routed to an incorrect or overwhelmed pool of staff (Hysong et al., 2019). The information provided in the order may be insufficient (e.g., missing clinical urgency, incorrect insurance information), requiring time-consuming back-and-forth clarification with the clinical team. Contacting patients—especially those from marginalized communities with unstable housing or phone access—can require multiple attempts and sophisticated outreach strategies that exceed the training and time allocated for typical administrative roles (Freeman, 2013).

Patient navigators, often nurses or social workers by training, are explicitly employed to bridge these coordination gaps, particularly for complex care pathways like cancer treatment. However, their effectiveness is hamstrung if they are not integrated into the core communication loops. Evidence shows that navigators are often not notified automatically of new abnormal results, new diagnoses, or specialist consultations (Percac-Lima et al., 2015). They may discover a patient has missed a crucial appointment only in retrospect, rather than being able to proactively prevent it. Furthermore, their work is often poorly documented in the EHR in a way that is visible to the clinical team, creating a parallel, "shadow" track of communication that can lead to duplication or conflict (Kwan et al., 2022).

The failure of this navigation interface directly translates to lost-to-follow-up rates. Patients with positive cancer screening tests fail to complete diagnostic colonoscopies or biopsies at alarming rates due to logistical and communication barriers, not clinical refusal (Davis et al., 2019). Referrals to specialists "fall through the cracks," leading to worsening of chronic conditions like heart failure or diabetes, and ultimately to preventable hospitalizations (McDermott et al., 2022). This domain is a critical lever for health equity, as these logistical barriers disproportionately affect vulnerable populations (Freeman, 2013).

Systemic Fragmentation of Social Needs Information

Healthcare outcomes are inextricably linked to social determinants of health (SDOH). Identifying and addressing SDOH requires communication across nursing, social service, and the informatics system, a triad that is profoundly disconnected.

Screening for SDOH (e.g., food insecurity, transportation needs) has become more common, often conducted by nurses or medical assistants during intake. However, a positive screen often triggers an ill-defined workflow. The information may be buried in a nursing note rather than structured as discrete, actionable data in the EHR (Billioux et al., 2017). There is rarely an automated alert or task generated for a social worker. The nurse, already burdened with clinical tasks, may lack the time or specific knowledge to connect the patient to community resources, leading

to "screening without intervening" (Gottlieb et al., 2017).

Even when a referral to social services is made, the communication is typically one-way and open-looped. The clinical team (nurse or provider) places a consult, but there is rarely a system for the social worker to efficiently communicate findings (e.g., "housing application submitted," "patient declined assistance") back to the clinical team in a structured, visible way (Fiscella & Epstein, 2008). This leads to clinical decisions being made without awareness of the critical social context. For example, a provider may discharge a patient with a prescription for a costly medication, unaware that the social worker has just documented the patient's inability to afford it—a disconnect between social service documentation and clinical workflow that directly jeopardizes care plans (Drake et al., 2021).

This fragmentation renders SDOH screening initiatives largely ineffective and perpetuates health inequities. Unaddressed social needs lead to poor medication adherence, missed appointments, and worse control of chronic diseases, fueling a cycle of poor health and increased acute care utilization (Molina et al., 2020). The communication gap ensures that the vital expertise of social services remains siloed from the clinical decision-making process. Figure 1 illustrates the key communication breakdowns across the clinical–laboratory–navigation interface.

Figure 1. Communication Breakdowns at the Clinical–Laboratory–Navigation Interface Contributing Factors and Proposed Solutions

Analysis of the included studies points to convergent, systemic contributing factors rather than individual professional failings. Table 2 synthesizes these factors and maps them to evidence-based solution strategies. Figure 2 shows a schematic representation of the downstream impacts of communication breakdowns at the clinical–laboratory–navigation interface.

Table 2: Systemic Contributing Factors and Corresponding Intervention Strategies

Contributing Factor	Description	Evidence-Based Intervention Strategies
Poorly Designed EHR Workflows	EHRs are often configured for billing and individual provider workflow, not for team-based, interprofessional communication and task management.	- Design and implement **shared, interprofessional EHR views and dashboards** (Scott et al., 2016). - Use **structured, mandatory data fields** for referrals and result follow-up plans (Adler-Milstein et al., 2020). - Develop **intelligent routing rules** that send alerts/tasks to the most appropriate role (e.g., navigator for scheduling, nurse for abnormal vitals).
Ambiguous Role Responsibilities & Protocols	Lack of clear, organization-wide protocols defining who is responsible for each step in a communication loop (e.g., who follows up on a non-critical abnormal result?).	- Co-create **standardized operating procedures (SOPs)** for high-risk pathways (e.g., cancer diagnosis, SDOH response) with all professions (Bergström et al., 2015). - Implement **role clarity exercises** and interprofessional education (IPE) simulations (Weller et al., 2014).
Lack of Closed-Loop Communication Systems	Most communication is "fire-and-forget" (e.g., placing a referral) without a system to track acknowledgment, completion, or exception.	- Implement **electronic tracking boards** for referrals and test result follow-up (Dave et al., 2020). - Adopt **read-back/verify protocols** for critical verbal handoffs, extended to key administrative tasks. - Use **automated patient-facing notifications** (e.g., text messages for appointments, normal results) to engage patients as a safety net (Hefner et al., 2019).
Inadequate Integration of Navigation & Social Service Roles	Navigators and social workers are often ancillary rather than core, integrated members of the care team with full access and visibility in communication streams.	- Formally **embed navigators/social workers in clinical teams** and include them in huddles (Percac-Lima et al., 2015). - Grant them **protocol-based ability to order services** (e.g., transportation) and **mandate their documentation in shared care plans** (Kwan et al., 2022).
Cultural & Hierarchical Barriers	Implicit hierarchies can discourage lower-status team members (e.g., medical secretaries, aides) from speaking up about potential errors or communication gaps.	- Foster a **culture of psychological safety** through leadership modeling and training (O'Donovan & McAuliffe, 2020). - Implement **structured communication tools** like SBAR to standardize exchanges across power gradients (Müller et al., 2018).

Figure 2. Patient Care Impacts of Communication Failures Across Interprofessional Interfaces

Discussion

This narrative review confirms that the interfaces between nursing, laboratory, navigation, informatics, and social services are critical fault lines in the healthcare system. The "silent" error cascade is a fitting metaphor: a single misstep, like an ambiguous lab order or an unacknowledged EHR alert, triggers a chain of subsequent failures that collectively derail a patient's care trajectory, often without any single alarm sounding. The impacts—diagnostic delays, untreated social needs, inequitable outcomes—are severe and align with national priorities around patient safety and health equity (National Academies of Sciences, Engineering, and Medicine, 2019; The Joint Commission, 2015).

A key insight from this synthesis is the central role of health informatics as both problem and potential solution. The EHR, in its current typical incarnation, often perpetuates professional silos by replicating paper-based, provider-centric workflows in digital form (Blease et al., 2021). It is poorly designed for the dynamic, team-based tracking required for modern complex care. The solution is not more alerts, which cause fatigue, but a smarter, role-aware system design that supports closed-loop communication and makes the status of key care processes transparent to all relevant team members (Scott et al., 2016).

Furthermore, this review highlights the need to formally reconceptualize roles like medical secretaries and patient navigators as essential "safety hubs" in the communication network. Their work is not merely administrative but is a clinical safety function. Empowering them with clear protocols, integrated technology, and a voice in team huddles can transform them from passive recipients of tasks to active stewards of the care process (Freeman, 2013; Hysong et al., 2019).

Limitations

This review has limitations. The search was limited to English-language literature, and the focus on a specific interprofessional interface may have excluded relevant studies framed differently. The included studies were heterogeneous in methodology and quality, necessitating a narrative rather than a quantitative synthesis. Publication bias likely exists, as studies finding no significant communication issues are less likely to be published.

Implications for Practice and Policy

The review highlights the urgent need for action in three key areas: health information technology, clinical leadership, and professional education. First, electronic health record (EHR) systems should evolve to support interprofessional, coordinated care by incorporating features like shared task lists and real-time dashboards. This shift includes using structured data for social determinants of health to facilitate timely interventions. Second, clinical leaders must establish standardized communication pathways and enforce policies through collaborative workshops, ensuring accountability and integrating patient navigators into clinical teams. Lastly, education in nursing, laboratory science, health informatics, and social work should broaden to include all relevant professions in interprofessional education (IPE) and emphasize teamwork and communication skills. By redesigning technology, fostering leadership protocols, and enhancing educational frameworks, the healthcare system can improve patient safety and reduce error cascades.

Conclusion

Communication breakdowns at the clinical-laboratory-navigation interface are not minor administrative glitches; they are systemic vulnerabilities that directly compromise diagnostic accuracy, treatment efficacy, and health equity. This review synthesizes evidence that these failures follow predictable patterns across pre-analytical processes, result follow-up, care coordination, and social needs integration. The root causes are embedded in outdated workflows, poorly designed technology, and ambiguous role definitions.

Mitigating this "silent" error cascade requires a fundamental shift from a provider-centric model to a team-centric, systems-aware model of care delivery. Investments must be made in interoperable health information technology designed for collaboration, in the formalization and empowerment of navigation roles, and in a culture that values the contribution of every link in the communication chain. Future research should move beyond descriptive studies to robustly evaluate the impact of such bundled socio-technical interventions on reducing diagnostic delays, improving follow-up completion, and ultimately, on improving patient outcomes and experiences. Only by strengthening these hidden seams in the healthcare fabric can we build a safer, more reliable, and more equitable system for all patients.

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