

Electronic Health Records and Interprofessional Collaboration: A Constructivist Grounded Theory of Information Exchange in Inpatient Care

Oluwakemi Olufunmilayo Oluwole

oluwolekemisola@yahoo.com

Western University

Amanda McIntyre

Western University

Kristen A. Bishop

Western University

Mark Goldszmidt

Western University

Research Article

Keywords: Electronic health records (EHR), Interprofessional collaboration, Clinical workflow, Health information exchange, Sociotechnical systems, Information quality, Care coordination, ethnographic study

Posted Date: July 13th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10146271/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background:

Interprofessional collaboration (IPC) in hospital medicine depends on timely, accurate, and accessible information exchange. Although the EHR is positioned as the central infrastructure for this exchange, its effectiveness is shaped by user practices, system design, and the complexity of inpatient work. Existing research has emphasized technical features rather than how interprofessional teams navigate workflow-level information needs or how EHRs support or constrain those needs in practice.

Purpose:

This study examines how EHR support or constrain information exchange within clinical activities for IPC in an inpatient unit.

Method:

The study employed an ethnographically informed grounded theory and a sociotechnical systems perspective. Over 220 hours of fieldwork was completed over a fifteen-month period across four interprofessional teams in a large academic hospital. Data included observations of rounds, patient care activities, and documentation practices, supplemented by brief field interviews and in-depth interviews with clinicians across professions. This approach enabled analysis of how information was exchanged within and around the EHR and how clinicians engaged with different digital and non-digital sources during routine collaboration.

Results:

The EHR system supported three primary information functions: serving as a repository of past documentation, supporting the sharing of new information, and collating patient data. These functions aligned more strongly with intraprofessional workflows than with IPC. Four clinical activities made this misalignment visible: triage, information sharing, information analysis and synthesis, and orientation to patient status. Further, coordination in the unit depended on three dimensions of information quality: completeness, interpretability, and coordinative timeliness – which shaped whether information could be effectively shared and acted on across professional roles. As a result of misalignments between the EHR design and workflows, these quality elements were often unmet leading to informal coordination practices to maintain shared awareness.

Conclusion:

Overall, this study suggests that EHRs in inpatient settings function more as profession-specific repositories than as shared coordination infrastructures, highlighting information quality as central to aligning EHRs with interprofessional clinical workflow.

Introduction

Electronic health records (EHRs) play a central role in information exchange in inpatient care, yet persistent challenges limit their ability to support coordination. These limitations are particularly consequential in inpatient settings, where interprofessional collaboration (IPC) depends on coordination under conditions of uncertainty [1] and shifting patient acuity [2]. Although prior research on EHR use for IPC has documented persistent misalignment between clinician workflows and EHRs [3–5], it provides limited insight into the clinical activities through which care is organized, or into how information is used within those activities. As a result, analyses risk obscuring how EHRs shape coordination in practice, reinforcing existing breakdowns rather than addressing the demands of coordination. EHR effectiveness depends on local configuration, and optimization making it essential to examine how clinical activities are enacted in practice and how to improve EHR support for collaboration [6]. This study examines how EHR support or constrains information exchange within clinical activities for IPC in an inpatient unit.

EHRs are often positioned as central infrastructures for information exchange among clinicians because they can, in principle, consolidate orders, documentation, and results in a shared digital environment accessible across professional groups. When effective, EHRs allow clinicians to review prior notes, laboratory results, imaging, and medication histories without relying solely on paper records or verbal updates. In practice, however, clinicians frequently report inconsistent support across professional groups, including fragmented displays, incomplete documentation, and difficulty locating information generated by other professional groups [3, 4, 7], pointing to persistent misalignment between EHR design and clinical workflow-embedded information needs.

Existing literature on EHRs and IPC has focused primarily on system features, communication outcomes, or individual user experiences, with less attention to the clinical activities through which coordination is accomplished, shaped by professional roles, responsibilities, and organizational context [3, 7, 8]. In inpatient care, collaboration unfolds through routine and unplanned activities requiring clinicians to align their actions under time pressure and evolving patient conditions [9]. Within these activities, clinicians must locate, interpret, and use information to coordinate care, and when EHRs do not adequately support these demands, workarounds often emerge [10]. EHR support has also been reported to vary within and across professional boundaries [11]. Efforts to address these challenges have led to the development of add-on tools to enhance EHR-supported collaboration [12, 13]. However, like EHRs, these tools both support and constrain collaboration, improving targeted outcomes while introducing unintended consequences [14–16], highlighting the need to better understand how EHR systems relate to clinical workflows, including varying roles and responsibilities and their information requirements.

From a sociotechnical perspective, coordination in inpatient care is produced through the interaction between EHR structures, clinicians and the interdependent clinical activities for which clinicians access information for decision making [17, 18]. These clinical activities function as work systems that depend on shared situational awareness and timely information exchange across roles and workflows [19]. EHRs can support collaboration when they align with how information is generated and used within clinical activities, and constrain it when their structures fragment, delay, or obscure clinically relevant information [17, 20]. This reflects the broader premise that technology both shapes and is shaped by clinical tasks, professional roles, and organizational conditions through ongoing interaction [17, 21]. Although prior studies have examined EHR-supported information exchange in relation to teamwork and patient safety [7, 18], less attention has been given to how EHRs align with the practical clinical activities through which IPC is enacted in inpatient care.

To address this gap, approaches that can capture how coordination unfolds within routine clinical activities are required. Ethnography enables observation of how EHR-mediated information exchange unfolds in everyday clinical work, capturing tacit and interdependent practices that extend beyond formal system use to include local routines and adaptations shaping how information is produced, accessed, and interpreted across roles [22]. Because these practices are embedded in ongoing work and enacted in real time, they are difficult to capture through interviews, surveys, or system-generated data alone, making observational methods necessary for examining workflow-level coordination [22, 23]. Accordingly, this study uses ethnographically informed constructivist grounded theory (CGT) and a sociotechnical systems perspective to examine how EHRs support or constrain information exchange as it unfolds within clinical activities for IPC in an inpatient unit.

Methods

This study used an ethnographically informed CGT approach, in which prolonged observation of everyday clinical work provided the primary data for inductive category development, to examine how EHR systems support or constrain IPC in inpatient medicine [24]. This approach is well suited to investigating situated clinical practices because it treats analytic categories as co-constructed through interaction between researchers, participants, and context. An STS perspective informed sampling, data collection, and analysis, guiding attention to the interdependencies among digital tools, clinical tasks, communication practices, and organizational structures that shape IPC [25–27].

Study Setting and Organizational Context

The study took place on an inpatient medicine unit at a large academic health sciences centre in a midsized urban community in Southwestern Ontario, Canada. The unit is organized into four interprofessional teams; three are teaching teams that include attending physicians, and learners including senior and junior residents, and medical students. Each team is supported by a patient care facilitator (PCF)—senior nurses who support discharge planning and IPC by liaising across patient, family, and team roles. Teams also work with social workers, physiotherapists, occupational therapists,

and pharmacists, with additional health discipline groups participating when needed. The fourth team is a resident-independent service staffed by an attending physician, a senior resident and, occasionally, fourth year medical student. Although staffing patterns differ, overall interprofessional involvement remains comparable. Patients also receive care from nurses and personal support workers who are attached to the medical unit but not to a specific team.

Physician staffing is characterized by frequent transitions; senior residents rotate every two weeks, junior residents every four weeks, medical students every six weeks and attending physicians every week. These patterns create relational and temporal discontinuities that are typical in teaching hospitals [28, 29]. Formal decision-making authority rests with attending physicians, who determine the timing and involvement of clinicians in assessment, planning, and communication. The unit uses Cerner's inpatient clinical documentation and order entry system. Physician documentation reflects an intermediate level of maturity, corresponding to stages 3–5 of the 8-stage HIMSS Electronic Medical Record Adoption Model [30] where organizations have digitized workflows and basic data exchange capabilities but have not yet achieved full interoperability or paperless operation.

Data Collection

Data collection followed an ethnographic approach [31] using direct observations, field interviews, and follow up in-depth interviews that prioritized capturing both the interactional and material dimensions of IPC and EHR use. Over a fifteen-month period between October 2024 and December 2025, the STS-trained student investigator conducted more than 220 hours of observation across four medicine teams with 51 participants, including attending physicians, residents, medical students, nurses, PCFs, physiotherapists, social workers, personal support workers and clinical information technology staff. Observations took place at different times throughout daytime, evening, and overnight shifts, and over the course of both weekdays and weekends. Observed activities included both routine and high-stakes clinical activities including nursing handovers, shift changes, bedside care, interprofessional rounds, informal discussions in corridors and workspaces, and EHR-mediated activities such as order entry, documentation, review of test results, and electronic messaging.

Field notes documented observations around how people, technologies, spaces, and routines intersected to support or constrain IPC, including moments when the EHR was used, bypassed, or supplemented. Brief field interviews were conducted during or immediately following observations to clarify observations, elicit tacit knowledge, and refine emerging interpretations.

To clarify and refine emerging analytic categories and insights, a subset of participants took part in follow up in-depth interviews. These interviews were based on observation findings and explored experiences with the EHR in IPC, perceptions of how digital tools aligned with workflows, and examples of both effective and problematic coordination. It also helped to clarify information gathered through observation. Interviews were audio-recorded and transcribed verbatim.

The study did not employ a predetermined interview guide. Consistent with ethnographic methodology, interview questions were generated inductively based on issues and patterns that emerged during observation. Interviews were conducted with clinicians and IT professionals to deepen understanding of observed practices, clarify the meaning of specific behaviours, and invite participants to reflect on emerging interpretations. As such, questions were open-ended and tailored to the participant's role and the phenomena observed. Examples of prompts include: "In my observations I noticed [INSERT OBSERVATION]. Can you tell me more about that?"; "Some clinicians mentioned [INSERT OBSERVATION]. Do you see this the same or differently?", and "According to some research, clinicians experience [INSERT ISSUE]. Is this true in your context?". These examples illustrate that interview questions were derived directly from ongoing fieldwork rather than from a fixed set of predetermined items.

Data Analysis

Consistent with CGT, data collection and analysis took place iteratively. All recordings were transcribed verbatim, de-identified, and coded. Analysis of observational field notes involved exploring patterns that recurred across multiple observations and interviews to compare and inform subsequent collection and analysis. Field notes were initially read by the student investigator who developed a preliminary coding structure. Codes were refined through application to subsequent observations, field notes, and interviews, and coding definitions were revised. Analytic memo writing occurred throughout the data collection and analysis phases to generate new insights and enhance rigour. Analytic categories were iteratively developed through memo writing, diagramming, and discussions with the research team. Categories were recursively checked against the data. Comparisons of incidents involving informal documentation or bypassing of formal workflows highlighted recurring patterns in how clinicians compensated for limitations in information quality or system design. The research team met regularly, often weekly, to discuss ongoing data collection and analysis.

Declarations

Declarations

Ethical Considerations

Ethics approval

for this study was obtained from the Western University Research Ethics Board and the London Health Sciences Centre Research Ethics Board through the ReDA system. All procedures involving human participants were conducted in accordance with the Declaration of Helsinki, the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2), and institutional guidelines. All participants provided informed consent prior to participation. Data included observational field notes and interview transcripts; interviews were audio-recorded, transcribed verbatim, deidentified and, along

with field notes, stored on the secure institutional OneDrive. The authors have no competing interests to declare.

Funding

Declaration

This project did not receive any external funding.

AI Use Disclosure

Artificial intelligence (AI) tools were used to support language refinement, structural editing, and the identification of redundancies and clarity issues within this manuscript. AI assistance was limited to revising wording, tightening prose, improving organization and supporting clarity across sections. All conceptual content, analytic decisions, interpretations, and final revisions were developed, validated, and approved by the authors.

Author Contribution

Conceptualization -OO; MGMethodology - OO; MG; KBFormal analysis- OO;MG;AM Investigation - OOData Curation -OO; MGOriginal Draft - OOWriting - Review & Editing -OO;MG;AM;KBSupervision- MGProject administration - KB

Data Availability

The data supporting the findings of this study consist of ethnographic field notes and interview transcripts generated during fieldwork in a clinical inpatient setting. These data were collected under institutional ethics approval and form part of a larger dataset associated with an ongoing program of research that extends beyond the scope of this manuscript. As such, the full dataset is not available for sharing at this time. Requests for access to data directly supporting the reported findings may be considered by the corresponding author upon completion of the broader research program.

Results

Our observations indicated that the EHR fulfilled three primary functions with respect to information exchange: (1) serving as a repository of past documentation; (2) supporting information sharing through task assignment and documentation of new information; and (3) collating and analyzing patient data. Rather than functioning uniformly across coordination, these functions aligned more closely with profession-specific workflows than with the interprofessional activities through which coordination was enacted. How EHR functions supported or constrained information exchange among clinicians in the

inpatient unit was most visible through four collaboratively dependent clinical activities: triage, information analysis and synthesis, information sharing, and orientation to patient status. Across these activities, coordination depended on whether information met three quality requirements: completeness, interpretability, and coordinative timeliness. EHR support for IPC depended on alignment between these activities and information quality requirements. Where misalignment persisted, teams relied on informal coordination practices to compensate for limitations in completeness, interpretability, and coordinative timeliness, as captured in the analytic framework summarized in Table 1. In the following sections, each of the collaboratively dependent activities is examined using the analytic questions outlined in Table 1 to surface how information is accessed, interpreted, and acted upon in practice.

Table 1: Analytic framework linking EHR functions clinical activities and information quality requirements through which coordination becomes visible

Function /Activities	Definition	Examples /Questions
EHR Functions		
Repository of Past Information	Stores previously documented information by clinicians, providing continuity and historical context.	Accessing past lab results, diagnostic imaging, or discharge summaries; reviewing prior admission notes through Clinical Connect; checking medication histories at admission.
Information Sharing (Assigning task and documenting new information)	Central space for documenting new findings, progress notes, and task assignments to support ongoing care.	Pharmacist sending medication order to the nursing team; Junior physicians documenting new orders after rounds; clinicians using EHR to update task completion; assigning tasks such as blood work and medication order.
Collation and Analysis of data	Gathers data from different sources into one platform and provides analytic cues to identify problems or trends.	Nurses noting duplicate medication orders flagged in red; physicians trending vital signs over time; alerts highlighting critical labs; National Early Warning Score (NEWS) and fall-risk scores signaling potential deterioration.
Clinical Activities		
Triage	Triage involved role-specific prioritization decisions based on patient acuity and task urgency, addressing the question: <i>which patients or activities should I prioritize?</i>	Determining which patients require immediate attention based on the severity of illness; Signalling what task other clinicians are waiting on to commence or complete their functions.
Information Analysis and Synthesis	Enables clinicians, particularly when new to a patient, to integrate information from multiple contributors, systems, and time points into a coherent understanding of the patient's condition. Addresses the questions: <i>How do clinicians integrate data from multiple sources, systems, and contributors? Where do gaps, ambiguities, or inconsistencies in the record affect sensemaking?</i>	Reviewing notes, labs, and assessments to form a patient narrative; reconciling inconsistencies across documentation; identifying gaps or ambiguities that affect sensemaking.
Information Sharing	Clinicians need to make new knowledge about a patient visible to others over the course of ongoing care. It tends to address the question: <i>Are others aware of the information I have?</i>	Physician communication orders were automatically routed but often contributed to information overload, obscuring what was current and relevant.

Orientation to Patient Status	Supports clinicians' ability to rapidly understand a patient's current condition, active issues, and required actions at a given point in time. It tends to address the questions: <i>How do clinicians identify what has changed, what is currently active, and what requires action? Which information sources support rapid orientation, and which create uncertainty?</i>	Identifying what has changed since last shift; confirming active orders or therapies; determining whether a patient is improving or deteriorating; assessing which issues require immediate attention.
Information Quality		
Completeness quality	Content quality pertains to the accuracy and completeness of the documented information, including the precise recording of key details, rationale, and conditions.	A progress note should cover all active issues, not some of the issues and nurses should be able to document family and baseline information.
Interpretive Quality	Reflects on how well the documented information aids clinicians in understanding and acting.	A progress note should document <i>why</i> a medication was withheld by explicitly stating the clinical rationale (e.g., hypotension, lab abnormality) instead of simply noting that the medication was not administered
Coordinative Timeliness quality	Coordinative timeliness was defined as the degree to which EHR information reflected current patient status and was available and usable by clinicians when needed to support clinical decision-making and coordination. Temporal: information up to datedness; Representational: status visibility; Relational: cross-role awareness and reciprocal communication.	Temporal timeliness: Although communication orders were automatically routed, their volume made it difficult for clinicians to determine which information was most current, delaying timely response to updates. Representational timeliness For example, A urinary catheter that had been removed remained listed as active in one of the physicians' views in the chart days later. Relational timeliness Nurses confirmed intervention completion through verbal handover because physicians had no indication in the EHR that the task had been carried out because there is no opportunity for feedback.

Triaging

Triaging refers to the process by which clinicians prioritized patients and tasks according to acuity and time sensitivity, respectively. Observations and interviews identified two forms of triage: acuity-based, which prioritizes patients at higher risk of deterioration, and task-based, which prioritizes activities based on when they must be completed to avoid delays or disruptions to others' work. Although distinct, these forms frequently interacted. Changes in patient acuity often interrupted task-based workflows, after which task-based triage resumed once patient stability was restored. This pattern shaped everyday coordination across the unit.

Acuity-based triage played a central role in clinicians' daily work, but the EHR appeared to provide limited support for identifying which patients required urgent attention. As one resident explained, the EHR did not offer a clear mechanism for conveying acuity across the team, so clinicians needed to open individual charts and manually review documentation. Consequently, they often relied on personal judgment, prior knowledge of the patient, and informal cues when determining how to begin rounds.

The EHR supported task-based triage within professions, particularly for nursing administrative tasks. The nursing dashboard used colour-coded indicators to display task status, with active tasks in green and overdue tasks in red (Observation, Nurse 02). These visual cues helped nurses monitor time-sensitive work and allowed incoming staff to identify outstanding tasks without relying solely on verbal handover. In some cases, the indicators also supported interprofessional coordination by helping nurses prioritize requests from physicians or pharmacists. However, the EHR did not differentiate between tasks that varied in urgency or clinical consequence. For example, time critical actions, such as responding to new medication orders, looked identical to low-risk documentation tasks on the screen; clinicians were required to infer priority from context rather than system cues. Participants also described how interdependent tasks across professional roles required certain activities to occur before others could proceed. For example, pharmacists had to wait for physicians to adjust orders or teams to coordinate time sensitive consults. These types of cross-role dependencies shaped how clinicians sequenced work, yet the EHR did not present these dependencies in a way that supported effective triage.

Clinicians compensated for the EHR's limited support for cross-professional task-based triage by creating informal coordination practices. Attending physicians often relied on team room boards to sequence activities for junior staff, making task order visible in ways the EHR did not support effectively. Participants also noted that effective triage required awareness of interdependent tasks, such as steps needed before pharmacists could proceed or deadlines for time-sensitive consults. Because the EHR did not make these dependencies visible, clinicians frequently relied on verbal communication and shared physical artifacts such as scrap piece of paper and personal notes to align priorities and maintain workflow coordination across the unit.

These limitations reflected deficits in representational and relational dimensions of timeliness (as outlined in the analytic framework): the EHR did not make task urgency, sequencing, or cross-role

dependencies visible across professional boundaries. As a result, clinicians relied on informal coordination practices and face-to-face communication to support interprofessional triage when system cues were insufficient.

Information Sharing

Information sharing is the process through which new or updated information becomes visible and usable across professional roles to support and coordinate work. Findings showed that the EHR unevenly supported this process by privileging structured, task-oriented information while limiting interprofessional visibility of interpretive and contextual knowledge.

The EHR supported some kinds of information sharing within and across professional boundaries through consistently recorded and timely role-specific documentation. Physicians documented and shared information through admission notes, progress notes, orders, problem list updates, and consult documentation. In contrast, nurses relied on flowsheets, vital sign documentation, medication administration records, focused system-specific assessments, and nursing notes. Physiotherapists contributed profession-specific assessments and functional status documentation. Role-specific documentation shaped how information moved across the team and what different professionals could reliably access.

The EHR supported information sharing unevenly within and across professions. Structured and task-oriented information, such as medication orders, laboratory values, and consult requests, typically circulated effectively through the system. In contrast, interpretive information such as clinical reasoning, emerging concerns, subtle functional changes, and contextual patient information was difficult for other professionals to locate because it was recorded in narrative notes that were not routinely reviewed across roles. For example, one nurse reported documenting early concern about a patient's functional decline but later learned during rounds that no other clinicians had read the note (Interview Nurse 07). This pattern reflected not a failure to document, but a lack of a legitimate representational space for nursing knowledge within interprofessional workflows.

Physician communication orders circulated effectively because they were automatically routed, but their volume often contributed to information overload, making it difficult for clinicians to identify what was current or relevant. In nearly every chart reviewed, communication orders remained visible long after they had ceased to be clinically relevant. As a result, each profession appeared to rely on a narrow subset of information types that they consistently reviewed (e.g., vital signs, laboratory results) while largely ignoring documentation created by other members of the interprofessional team. This selective review therefore constrained what information was effectively shared.

Information Analysis and Synthesis

Information analysis and synthesis refer to the work through which clinicians interpret and integrate patient information, enacted individually but dependent on distributed contributions. These processes depended on combining information generated across roles, time, and documentation sources, with shared understanding emerging from the alignment of these distributed contributions rather than any single source. Although the EHR served as the primary repository of information, it did not consistently support this work. Clinicians encountered constraints related to incomplete or weakly contextualized documentation, inconsistent use of problem lists, profession-specific documentation structures, and reliance on informal notes that were not easily accessible across clinicians and roles.

Clinicians newly involved in care were observed to struggle to synthesize information because of documentation gaps. Incomplete documentation of functional, daily living, and psychosocial information limited shared understanding. Functional data supported collaborative interpretation only when linked to baseline status and prior timelines; without this context, the information was insufficient for decision making. Consequently, clinicians tended to contact families to re-obtain baseline information when the EHR lacked adequate functional context. Meaning was reconstructed through additional note review, repeated assessments, or verbal clarification.

According to participants, the EHR would ideally provide a shared, multidisciplinary problem list to support collective sensemaking and coordinated decision making. In practice, however, problem lists were incomplete and inconsistently updated across professions, limiting their usefulness as a shared artifact for synthesis across roles.

Profession-specific documentation structures in the EHR further constrained information synthesis by spreading relevant details across separate sections. Information related to a single concern, such as cognition or mobility, appeared across nursing, physician and other health discipline notes. As a result, clinicians were required to navigate multiple sections of the EHR in their attempts to assemble a complete picture of the patient. When this proved inefficient or impossible, they abandoned EHR searches and relied on alternative information sources.

When information could not be meaningfully synthesized within the EHR, clinicians reconstructed patient understanding through additional assessments, family contact, or verbal clarification, systematically shifting analytic and sensemaking work outside the formal record.

Orientation to Patient Status

Orientation to patient status is inherently collaborative because no single clinician or documentation source can hold a complete, up to date picture of the patient's condition. Instead, clinicians relied on information generated by others across roles and shifts, requiring shared access, alignment, and interpretation to maintain a common understanding of the patient's current status.

In the absence of EHR features that consistently supported shared orientation to patient status, physician notes, particularly admission and progress notes, were occasionally used to reconstruct a patient's current condition and recent changes. These notes were inconsistently updated, which limited their usefulness for real-time orientation across shifts. Physician teams relied on prior notes when other EHR sources did not provide sufficient information. However, this reliance did not constitute a shared solution. Nurses did not routinely consult physician notes due to limited protected time to review them. Nurses mostly relied on verbal updates and handover notes documented outside the EHR. As such, physician notes tended to function as a profession-specific silo that contributed to fragmented orientation rather than supporting a shared understanding of patient status.

Limited visibility of therapeutic intervention status appeared to constrain clinicians' ability to orient to a patient's current treatment state, particularly across professions. In the current EHR, documenting routine nursing updates, such as catheter removal, intravenous fluid restrictions, or oxygen discontinuation, requires multiple steps before being consistently visible to other professional roles. As a result, completed interventions sometimes remained listed as active in some sections of the EHR. Physicians had few ways to confirm whether interventions had been carried out. As one physician explained, "We put the discontinue order in [...] but we don't get a response saying telemetry has been discontinued. We observe the patient during rounds, and we put in the order again if we notice it is yet to be discontinued as requested" (Follow-up interview, ASR6). These delays created temporal misalignment which necessitated direct communication between clinicians to confirm therapeutic status.

Limitations of the EHR's automation tools often diverted, rather than supported, clinicians' orientation to shared patient status by introducing additional interpretive work and disrupting workflow. Although automated indicators such as NEWS scores and fall risk calculators were available, they often provided limited or misleading support for maintaining an up to date understanding of patient condition. These tools were not routinely used by nurses, and some nurses and physicians were unaware of their existence or how they were intended to function.

Across professions, failures of representational and relational dimensions of timeliness undermined the EHR's role as a shared reference point for current patient status, reinforcing reliance on verbal confirmation even for routine therapeutic decisions.

Discussion

This study examined how an EHR supported or constrained information exchange within clinical activities for IPC in an inpatient unit. Across the findings, a consistent contrast emerged between how the EHR supported coordination within professional groups and how it supported coordination across professional boundaries. While intraprofessional collaboration was generally well supported through shared documentation practices and aligned workflows, IPC was constrained by limitations in how information was represented, interpreted, and made visible across roles.

By examining EHR use within clinical activities, it shows that coordination depends less on information availability than on activity-specific completeness, interpretability, and coordinative. These requirements were most evident for triage, information sharing, analysis and synthesis, and orientation to patient status, all of which depend on shared awareness across professional roles.

Intraprofessional versus Interprofessional Support

This study identifies a previously underexplored distinction in EHR support between intraprofessional and IPC, arising from differences in alignment with profession-specific workflows. This distinction emerged inductively through analysis of clinical work and coordination practices rather than being specified a priori. Within professional groups, standardized documentation formats supported information exchange. In contrast, when information was exchanged across professional boundaries, it was often fragmented or ambiguous, placing limits on how current EHR structures support cross-role exchange.

While prior research has documented disruptions to interprofessional coordination [7,32,33], how such effects vary across different forms of collaboration has only recently been examined [11,34]. Our findings suggest this variation may be more consequential than previously recognized. Rather than treating collaboration as uniform, our findings indicate that EHR support for information exchange depends on the degree of alignment between system structures, users' practices, and professional workflows.

Variation within and across professional groups can be understood by considering how information exchange is enacted within routine clinical activities. Information that is readily interpretable within profession-specific contexts may not retain its visibility or accessibility when exchanged across professional boundaries, highlighting the dependence of effective exchange on shared interpretive conventions [35]. As a result, breakdowns in coordination are more likely to arise in activities requiring shared awareness across roles [11]. From a sociotechnical perspective, this reflects how EHRs stabilize profession-specific forms of information exchange through structured documentation and shared conventions [5], while providing weaker support for exchange across heterogeneous practices. When system structures are not aligned with the coordination demands of clinical activities, fragmentation in information exchange becomes more likely [4]. Extending sociotechnical accounts of alignment and fit [13,36], these findings suggest that EHR effectiveness is contingent rather than uniform, varying with the demands of interprofessional information exchange.

Information Quality

From a sociotechnical perspective, information quality emerges as a central mechanism shaping interprofessional collaboration, particularly through its completeness, interpretability, and coordinative timeliness. Prior work, including the CLIQ framework, has identified these dimensions as critical for digital health information quality [37], but has offered limited insight into how they operate within everyday clinical workflows. Our findings extend this literature by demonstrating that, in inpatient

settings, information that is sufficient within professional groups does not necessarily translate into shared understanding across roles. Instead, limitations in completeness, interpretability, and temporal alignment contribute to fragmentation and siloing, constraining IPC. Importantly, these limitations are not inherent to the data itself but arise through documentation norms, role boundaries, and local configuration decisions embedded within organizational context. As such practices become stabilized within EHR systems, they shape what information is captured, how it is represented, and when it becomes visible, often producing persistent misalignments with the coordination demands of clinical work. By grounding these dynamics in specific clinical activities, this study addresses a key gap in prior research, namely the lack of workflow-level insight into how EHR-supported information quality enables or constrains interprofessional information exchange in inpatient care.

Because inpatient work is highly time sensitive [38], coordinative timeliness depended not only on how quickly information was entered into the EHR but also on how well it was integrated into workflows for timely access and use. While prior studies have emphasized timely documentation [39], or compliance with timely documentation [40], timely updates alone were insufficient when information was invisible or inaccessible at the point of coordination.

Informal Coordination Practices as Coordination Infrastructure

Prior STS research has described how technology and work practices evolve through ongoing adaptation when system design does not align with professional roles or organizational routines [17,41]. Consistent with this STS perspective, informal coordination practices reflect persistent gaps in formal system support [17,41]. When the EHR did not provide complete, interpretable, or timely information, clinicians relied on verbal communication, paging, phone calls, and informal notes. Our study shows how these practices formed a parallel coordination infrastructure embedded in everyday inpatient work. Importantly, these informal communications were not a failure of EHR systems, nor were they something that can or should be eliminated in complex inpatient work. Rather, the problems appeared to arise when clinically relevant information exchanged informally was not subsequently incorporated into the EHR in ways that supported shared awareness and coordination across roles and time.

These adaptations introduce trade-offs between coordination efficiency and information integrity [36,42]. Information exchanged informally was often selectively preserved, unevenly shared, or inconsistently integrated into the formal record, limiting the EHR's role as a reliable shared source of information across roles and time. Over time, these gaps increase the likelihood of misinterpretation, missed information, and ultimately medical error [43].

Implications

Our findings highlight opportunities for both system-level improvement and local configuration decisions that shape how EHRs support coordination. By grounding these observations in four clinical activities, this study shows where EHR functionality most directly constrains interprofessional coordination. These findings suggest that meaningful EHR optimization depends on aligning system representations not only

with professional roles, but with the information demands of specific clinical activities through which coordination is enacted. They also point to deeper architectural assumptions within EHR design that require further STS investigation. Although EHR challenges are often attributed to vendor-level design, much of the system's effectiveness in supporting clinical work reflects local configuration and implementation choices [6]. Understanding how EHR features function in practice, and identifying where they fail to support IPC, is essential for recognizing meaningful opportunities for local optimization.

The observational approach used in this study can support these efforts by revealing coordination challenges that are often invisible in formal evaluations. In many environments, clinicians develop informal coordination practices that compensate for system limitations without recognizing underlying constraints. Typical of observational approaches [44,45], this method helped surface EHR-related issues that prompted routine adaptations and workarounds which often remain invisible in formal system evaluations.

Persistent informal coordination practices can also signal limitations in how EHR systems support interprofessional coordination [46,10]. Rather than representing inappropriate use, these practices reflect practical adaptations to time-sensitive coordination that emerge when EHR systems do not provide sufficient information quality or timely information exchange [17,47-49].

In addition, as organizations progress through the Electronic Medical Record Adoption Model [30], advancing adoption requires alignment with clinical activities, not technical optimization alone. These findings suggest that selective optimization for specific professions or units can produce uneven EHR support, improving some areas while constraining information exchange and coordination in others. This underscores the need to account for interdependencies across roles in EHR design and implementation.

Our findings are aligned with others highlighting how clinicians develop informal coordination strategies to manage gaps in how EHR systems support coordination [3,23,50]. Making these practices visible may help teams recognize and share safe but effective approaches for maintaining shared awareness and coordination when system features do not fully support interprofessional information exchange.

Recent work highlights EHR add-ons and artificial intelligence as ways to improve how clinical information is summarized, prioritized, and shared across professional roles [4,51]. However, prior studies show that these tools can also introduce unintended clinical consequences [12,52]. From a design perspective, our findings suggest that layering new tools onto existing EHR infrastructures without first addressing underlying sociotechnical misalignments may reinforce, rather than resolve, breakdowns in interprofessional information exchange. Design efforts should therefore prioritize making core EHR representations responsive to clinical activities, cross-role dependencies, and information practices, rather than relying on additional technological layers.

Limitations and Transferability

This study was conducted in a single academic internal medicine unit using one EHR system, which may limit direct transferability. However, the mechanisms identified, including repository-oriented EHR use, compensatory informal practices, and timeliness-driven coordination, reflect patterns reported in other inpatient settings [7,17,42,44,47]. At the time of data collection, the EHR was in the mid-stages of implementation and configuration, corresponding to stages 3 to 5 of the 8-stage Electronic Medical Record Adoption Model (EMRAM) [30], and may not fully represent more mature implementations. In addition, even when organizations use the same EHR vendor and are at similar stages of adoption, local configurations and modifications can vary substantially. These differences may influence how EHRs support information exchange in practice, further limiting transferability across settings. As such, transferability lies in the identified sociotechnical mechanisms rather than in specific organizational or system features.

Interpretations in this study are shaped by a sociotechnical, activity-oriented analytic lens that emphasizes coordination breakdowns, misalignment, and compensatory practices. While this framing is supported by prior literature, it privileges interpretations of informal practices as rational adaptations to system limitations and may underrepresent alternative explanations such as professional preference, habit, or contextual cultural norms. In addition, interpretations of information quality and coordinative timeliness are based on observed practices and participant accounts rather than direct measures of clinicians' cognitive processes, limiting insight into how information is internally interpreted or prioritized.

A further limitation is that the study's focus is on information exchange within clinical activities; less attention was paid to how power dynamics and hierarchical relationships shape coordination. Sociotechnical research emphasizes the importance of these factors in structuring clinical practice [17], suggesting that future work could examine how they interact with coordination to influence EHR support for IPC.

In addition, the distinction between intraprofessional and interprofessional information exchange emerged inductively during analysis rather than being specified a priori. As a result, the study was not designed to systematically compare these forms of collaboration, which may limit the extent to which differences between them can be generalized.

Conclusion

This study examined how EHR support or constrain information exchange within the clinical activities through which inter- and intraprofessional collaboration is enacted on an inpatient unit. By analyzing coordination as it unfolds in routine work, the study shows that EHR support for collaboration depends less on information availability than on whether information is represented, interpreted, and made visible in ways that align with activity-specific coordination demands across professional roles. Rather than functioning primarily as shared coordination infrastructures, EHRs in inpatient settings often operate as profession-specific information repositories, requiring ongoing informal communication to sustain

interprofessional coordination. The challenge, therefore, is not to eliminate informal practices, which are intrinsic to complex clinical work, but to better align formal EHR representations with how coordination is accomplished so that informal and formal information practices can work compatibly over time.

Declarations

Ethical Considerations

Ethics approval for this study was obtained from the Western University Research Ethics Board and the London Health Sciences Centre Research Ethics Board through the ReDA system. All procedures involving human participants were conducted in accordance with the Declaration of Helsinki, the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2), and institutional guidelines. All participants provided informed consent prior to participation. Data included observational field notes and interview transcripts; interviews were audio-recorded, transcribed verbatim, deidentified and, along with field notes, stored on the secure institutional OneDrive. The authors have no competing interests to declare.

Availability of Data and Materials

The data used in this study are part of a larger institutional dataset governed by the Western University Research Ethics Board and the London Health Sciences Centre Research Ethics Board. In accordance with these approvals, the dataset cannot be publicly released until all manuscripts arising from the broader project have been completed and published. Data are currently stored in the London Health Sciences Centre repository and will be made available from the corresponding author upon reasonable request once these conditions have been met and in compliance with institutional and ethics board requirements.

Consent for publication

Not applicable. No identifying images, personal details, or clinical information that compromise participant anonymity are included in this manuscript.

Rigour and Trustworthiness

Rigor was enhanced through reflexive memoing, investigator triangulation, and an audit trail. Memoing encourages methodological reflexivity (E.g., memos to improve collection and coding of the data) and analytic reflexivity (E.g., memoing to explore insights into how various team perspectives and interpretations shape the analysis). In terms of investigator triangulation, the team included members with expertise in internal medicine (M.G.), nursing (A.M.), health informaticist (O.O) and qualitative research specialists (M. G., K. A. B.). In addition, O. O., a PhD student, and K.A.B, a Ph.D. nonclinical researcher, were able to bring naïve insider and outsider perspectives to the team and its interpretations of the data. A detailed audit trail documenting coding decisions, category development, and analytic memos was maintained to support transparency.

Funding Declaration

This project did not receive any external funding.

AI Use Disclosure

Artificial intelligence (AI) tools were used to support language refinement, structural editing, and the identification of redundancies and clarity issues within this manuscript. AI assistance was limited to revising wording, tightening prose, improving organization and supporting clarity across sections. All conceptual content, analytic decisions, interpretations, and final revisions were developed, validated, and approved by the authors.

References

1. Romero-Pastor M, Ricart-Basagaña MT, Mariné-Méndez A, Lomero-Martínez MDM, Romaní-Alfonso O, Rubio-Rico ML. Uncertainty experienced by the critical patient upon discharge to the general ward: care proposals from the perspective of Mishel's theory. *Nurs Crit Care* 2025;30(5):e13217. 10.1111/nicc.13217
2. Brennan CW, Daly BJ. Patient acuity: a concept analysis. *J Adv Nurs* 2009;65(5):1114-1126. 10.1111/j.1365-2648.2008.04934.x PMID:19374698
3. Chao CA. The impact of electronic health records on coordination routines: a narrative network analysis. *Int J Med Inform* 2016;94:39-47. 10.1016/j.ijmedinf.2016.07.002 PMID:27435956
4. Robertson ST, Rosbergen ICC, Burton-Jones A, Grimley RS, Brauer SG. The effect of the electronic health record on interprofessional practice: a systematic review. *Appl Clin Inform* 2022;13(3):541-559. 10.1055/s-0042-1748855 PMID:35758335
5. Vos JF, Boonstra A, Kooistra A, Seelen M, van Offenbeek M. The impact of electronic health record use on collaboration among healthcare professionals: a systematic review. *BMC Health Serv Res* 2020;20:676. 10.1186/s12913-020-05501-3 PMID:32787862
6. Wright A, McCoy AB, Choudhry NK. Recommendations for EHR-based interventions. *Ann Intern Med* 2020;172(11 Suppl):S110-S115. 10.7326/M19-0870 PMID:32374395
7. Bardach NS, Real K, Bardach DR. Perspectives of healthcare practitioners: an exploration of interprofessional communication using electronic medical records. *J Interprof Care* 2017;31(3):300-306. 10.1080/13561820.2016.1261098 PMID:28166656
8. Georgiou A, Westbrook J, Braithwaite J, Iedema R. Multiple perspectives on the impact of electronic ordering on hospital organisational and communication processes. *Health Inf Manag* 2005;34(4):130-135
9. Burm S, Faden L, DeLuca S, Hibbert K, Huda N, Goldszmidt M. Using a sociomaterial approach to generate new insights into the nature of interprofessional collaboration. *J Interprof Care* 2019;33(2):153-162. 10.1080/13561820.2018.1538118 PMID:30451687

10. Chao CA, Kuo YF, Hsu YC, Chan YC. Workarounds in health information systems: a systematic review. *J Biomed Inform* 2021;118:103783. 10.1016/j.jbi.2021.103783 PMID:33964315
11. Mohsin-Shaikh S, Blandford A, Franklin BD. Interprofessional communication and electronic health records. *PLoS One* 2023;18(11):e0294714. 10.1371/journal.pone.0294714 PMID:37922587
12. Lapointe R, Bhesania S, Tanner T, Peruri A, Mehta P. An innovative approach to improve communication and reduce physician stress and burnout in a university affiliated residency program. *J Med Syst* 2018;42(7). 10.1007/s10916-018-0988-2 PMID:29752534
13. Melby L, Brattheim BJ, Hellesø R. Patients in transition: improving hospital-home care collaboration through electronic messaging. *J Clin Nurs* 2015;24(23-24):3389-3399. 10.1111/jocn.12991 PMID:26100455
14. Abraham J, Jaros J, Ihianle I, Kochendorfer K, Kannampallil T. Impact of EHR-based rounding tools on interactive communication. *Int J Med Inform* 2019;129:423-429. 10.1016/j.ijmedinf.2019.06.009 PMID:31445277
15. Asan O, Chiou E, Montague E. Quantitative ethnographic study of physician workflow and interactions with electronic health record systems. *Int J Ind Ergon* 2015;49:124-130. 10.1016/j.ergon.2015.05.004
16. Jiang SY, Murphy A, Heitkemper EM, Hum RS, Kaufman DR, Mamykina L. Impact of an electronic handoff documentation tool on team shared mental models. *J Biomed Inform* 2017;69:24-32. 10.1016/j.jbi.2017.03.006 PMID:28336437
17. Berg M. Patient care information systems and health care work: a sociotechnical approach. *Int J Med Inform* 1999;55(2):87-101. 10.1016/S1386-5056(99)00011-8 PMID:10530825
18. Coiera E. *Guide to Health Informatics*. 3rd ed. Boca Raton, FL: CRC Press; 2015
19. Lyytinen K, Newman M. Explaining information systems change: a punctuated sociotechnical change model. *Eur J Inf Syst* 2008;17(6):589-613. 10.1057/ejis.2008.50
20. Zheng K, Guo MH, Hanauer DA. Using time motion methods to study clinical work processes and workflow. *J Biomed Inform* 2015;52:1-2. 10.1016/j.jbi.2014.10.001 PMID:25497437
21. Davis Z, Khansa L. Evaluating the Epic electronic medical record system: a dichotomy in perspectives and solution recommendations. *Health Policy Technol* 2016;5(1):65-73. 10.1016/j.hlpt.2015.11.002
22. Unertl KM, Johnson KB, Lorenzi NM. Health information exchange technology on the front lines of healthcare: workflows and workarounds. *J Am Med Inform Assoc* 2012;19(3):392-400. 10.1136/amiajnl-2011-000432 PMID:22003158
23. Assis-Hassid S, Grosz BJ, Zimlichman E, Rozenblum R, Bates DW. Assessing EHR use during hospital morning rounds. *PLoS One* 2019;14(2):e0210669. 10.1371/journal.pone.0210669 PMID:30785967
24. Charmaz K. *Constructing grounded theory*. 2nd ed. London, UK: Sage; 2014

25. Bostrom RP, Heinen JS. MIS problems and failures: a sociotechnical perspective: Part II. MIS Q 1977;1(4):11-28. 10.2307/248710
26. Coiera E. Putting the technical back into sociotechnical systems research. Int J Med Inform 2007;76 Suppl 1:S98-S103. 10.1016/j.ijmedinf.2006.05.019
27. Pasmore W, Winby S, Mohrman SA, Vanasse R. Reflections: sociotechnical systems design and organization change. J Change Manag 2019;19(2):67-85. 10.1080/14697017.2018.1553761
28. van Rossum TR, Scheele F, Scherpbier AJ, Sluiter HE, Heyligers IC. Dealing with the complex dynamics of teaching hospitals. BMC medical education. 2016 Apr 5;16(1):104. 10.1186/s12909-016-0623-3
29. Vidyarthi AR, Arora V, Schnipper JL, Wall SD, Wachter RM. Managing discontinuity in academic medical centers: strategies for a safe and effective resident sign-out. Journal of Hospital Medicine. 2006 Jul;1(4):257-66. 10.1002/jhm.103
30. Furukawa M, Pollack E. Achieving HIMSS Stage 7 designation for EMR adoption. Nurs Manage 2020;51(1):10-12. 10.1097/01.NUMA.0000617044.57943.e1.
31. Hammersley M, Atkinson P. Ethnography: principles in practice. 3rd ed. London, UK: Routledge; 2007
32. Amano A, Brown-Johnson CG, Winget M, et al. Perspectives on the intersection of electronic health records and health care team communication, function, and well-being. JAMA Netw Open 2023;6(5):e2313178. 10.1001/jamanetworkopen.2023.13178 PMID:37163392
33. Kossman SP. Perceptions of impact of electronic health records on nurses' work. Comput Inform Nurs 2006;24(6):337-347 PMID:17102276
34. Lääveri T, Viitanen J, Reponen J, Renko J. Physicians' experiences of EHR technical quality. Proc Med Inform Eur 2024:23-27
35. Berg M. Rationalizing medical work: decision-support techniques and medical practices. Soc Stud Sci 1998;28(3):489-516
36. van Offenbeek MA, Vos JF, van den Hooff B, Boonstra A. When workarounds aggravate misfits in EHR systems. Inf Syst J 2024;34(2):293-326. 10.1111/isj.12429
37. Fadahunsi KP, O'Connor S, Akinlua JT, et al. Information quality frameworks for digital health technologies: systematic review. J Med Internet Res 2021;23(5):e23479. 10.2196/23479 PMID:33983494
38. Stone B, Cooley A, Reese C, Lucas M, Signorino M, Obisesan O. Goal-driven timed target workflow: optimizing the workflow for emergency department to inpatient admission. J Emerg Nurs 2025. 10.1016/j.jen.2025.03.023
39. Karp EL, Freeman R, Simpson KN, Simpson AN. Changes in efficiency and quality of nursing electronic health record documentation. Comput Inform Nurs 2019;37(5):260-265. 10.1097/CIN.0000000000000510 PMID:30649075

40. Al Baloushi FA, Ramukumba MM. Electronic documentation of patients' records: completeness, timeliness and clinicians' views. *Afr J Phys Act Health Sci* 2015;21(3.2):968-979
41. Carayon P, Schoofs Hundt A, Karsh BT, et al. Work system design for patient safety: the SEIPS model. *Qual Saf Health Care* 2006;15 Suppl 1:i50-i58. 10.1136/qshc.2005.015842 PMID:17142608
42. Blijleven V, Hoxha F, Jaspers M. Workarounds in electronic health record systems: a scoping review. *J Med Internet Res* 2022;24(3):e33046. 10.2196/33046 PMID:35231523
43. Keenan G, Yakel E, Dunn Lopez K, Tschannen D, Ford YB. Challenges to nurses' efforts of retrieving, documenting, and communicating patient care information. *J Am Med Inform Assoc* 2013;20(2):245-251. 10.1136/amiajnl-2012-001206 PMID:22910874
44. Reddy MC, Paul SA, Abraham J, et al. Challenges to effective crisis management. *Int J Med Inform* 2006;75(9):713-722. 10.1016/j.ijmedinf.2006.07.009 PMID:16904377
45. Varpio L, Rashotte J, Day K, et al. The EHR and building the patient's story. *Int J Med Inform* 2015;84(12):1019-1028. 10.1016/j.ijmedinf.2015.09.009 PMID:26441416
46. Ash JS, Sittig DF, Poon EG, Guappone K, Campbell E, Dykstra RH. The extent and importance of unintended consequences related to computerized provider order entry. *J Am Med Inform Assoc* 2007;14(4):415-423. 10.1197/jamia.M2373 PMID:17460127
47. Koppel R, Wetterneck T, Telles JL, Karsh BT. Workarounds to barcode medication administration systems. *J Am Med Inform Assoc* 2008;15(4):408-423. 10.1197/jamia.M2616 PMID:18436903
48. Fitzpatrick G, Ellingsen G. A review of 25 years of CSCW research in healthcare. *Comput Support Coop Work* 2013;22(4-6):609-665. 10.1007/s10606-012-9168-0
49. Ash JS, Berg M, Coiera E. Some unintended consequences of information technology in health care. *J Am Med Inform Assoc* 2004;11(2):104-112. 10.1197/jamia.M1471 PMID:14633936
50. Blijleven V, Koelemeijer K, Wetzels M, Jaspers M. Workarounds emerging from electronic health record system usage. *JMIR Hum Factors* 2017;4(4):e7978. 10.2196/humanfactors.7978 PMID:29141806
51. Sarraf B, Ghasempour A. Impact of artificial intelligence on EHR-related burnout. *Front Public Health* 2025;13:1628831. 10.3389/fpubh.2025.1628831
52. Genovese A, Prabha S, Forte AJ. Invited response to artificial intelligence in rhinoplasty. *Aesthet Plast Surg* 2025:1-2. 10.1007/s00266-025-05058-6