International Platform of Registered Systematic Review and Meta-analysis Protocols

INPLASY

INPLASY202640049

doi: 10.37766/inplasy2026.4.0049

Received: 14 April 2026

Published: 14 April 2026

The impact of health information interoperability on healthcare professional performance: A mixed-methods systematic review protocol

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ADMINISTRATIVE INFORMATION

Support - No external funding was received for this review.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202640049

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 April 2026 and was last updated on 14 April 2026.

INTRODUCTION

Review question / Objective How does health information interoperability (HII) influence healthcare professional performance outcomes across clinical settings, and what sociotechnical factors moderate these effects?

Rationale Digital health transformation has positioned interoperability as both a technical imperative and a policy priority. Despite widespread implementation of interoperable health information technologies, their effects on healthcare professional performance remain poorly synthesised and theoretically underdeveloped. Existing systematic reviews have examined patient safety outcomes or clinician experiences in isolation, but have mostly not integrated qualitative, quantitative, and mixed-methods evidence to explain the mechanisms by which the same interoperable technology produces divergent effects on clinician performance across settings. This review addresses that gap by proposing the HII Dual-Pathway Performance Model, a sociotechnical framework that explains both facilitative and disruptive performance effects and identifies the moderating conditions under which each pathway predominates.

Condition being studied Health Information Interoperability (HII), the capacity of health information systems to access, exchange, integrate, and use clinical data across organisational and national boundaries and its effects on healthcare professional performance, including workflow efficiency, clinical decision-making, cognitive workload, care coordination, documentation burden, burnout, and job satisfaction.

METHODS

Search strategy PubMed and Scopus were searched in February 2026 for publications from January 2015 to December 2025. Search terms combined controlled vocabulary (MeSH terms in PubMed) and free-text keywords across three

concept clusters: (1) interoperability, health information exchange, electronic health records; (2) healthcare professionals, clinicians, nurses, physicians; (3) professional performance, workflow, cognitive workload, burnout, decision-making. In Scopus, searches were restricted to title, abstract, and keyword fields. In PubMed, no field restrictions were applied to maximise sensitivity.

Participant or population Healthcare professionals involved in direct patient care, including but not limited to physicians, clinicians, nurses, pharmacists, and allied health staff across all clinical settings and specialties.

Intervention Interoperable health information technologies enabling electronic exchange of clinical data across systems or organisations, including regional and national Health Information Exchange (HIE) platforms, integrated Electronic Health Record (EHR) systems, FHIR-based point-of-care applications, shared prescribing tools, and cross-institutional medication reconciliation systems.

Comparator No direct comparator required. Given the descriptive and qualitative nature of many included studies, comparison between interoperable and non-interoperable conditions was not mandated as an eligibility criterion.

Study designs to be included Peer-reviewed empirical studies using qualitative, quantitative, or mixed-methods designs, including cross-sectional surveys, cohort studies, qualitative interviews and focus groups, observational studies, and mixed-methods studies.

Eligibility criteria Inclusion: Peer-reviewed empirical studies; qualitative, quantitative, or mixed-methods design; published in English between January 2015 and December 2025; full text available; reporting professional performance-related outcomes in relation to HII interventions.
Exclusion: Studies focused solely on technical architectures or algorithms without reporting workforce-related outcomes; studies reporting only patient outcomes without examining professional implications; non-empirical sources; non-peer-reviewed publications including dissertations and conference abstracts without full papers.

Information sources PubMed (MEDLINE) and Scopus. Reference lists of included studies were also reviewed. The full search strategy is available on Mendeley Data (doi.org/10.17632/t9xvgdkmvz.1).

Main outcome(s) Positive and negative healthcare professional performance outcomes, specifically: workflow efficiency; clinical decision-making quality and diagnostic accuracy; care coordination and continuity; cognitive workload and information overload; documentation and administrative burden; professional burnout and job satisfaction; clinical communication quality.

Additional outcome(s) Moderating sociotechnical factors including system usability and interface design, training adequacy and digital literacy, organisational culture and governance, regulatory and legal environment, clinician characteristics and expertise, and diagnostic complexity and clinical context.

Data management Search results were exported to EndNote (v21) for reference management and de-duplication. Data were extracted into a standardised framework. Initial extraction was completed by one reviewer (OMM) and independently verified by a second reviewer (MY). Full dataset available on Mendeley Data (doi.org/10.17632/t9xvgdkmvz.1).

Quality assessment / Risk of bias analysis Methodological quality was assessed using the Mixed Methods Appraisal Tool (MMAT), version 2018, which provides design-specific criteria for qualitative, randomised, non-randomised, quantitative descriptive, and mixed-methods studies. Ratings were assigned as "Yes", "No", or "Can't tell". Two reviewers independently appraised each study and resolved discrepancies through discussion and consensus.

Strategy of data synthesis Convergent narrative synthesis, consistent with PRISMA 2020 recommendations for mixed-methods reviews. Quantitative findings were qualitised by translating statistically significant numerical associations into directional descriptive statements. Findings were organised into three thematic domains: positive impacts, negative consequences, and moderating sociotechnical factors. Qualitative insights were used to explain mechanisms behind quantitative associations. Study weight in the synthesis was informed by MMAT quality rating.

Subgroup analysis Subgroup analyses were not pre-specified given the heterogeneity of study designs, interoperability intervention types, and clinical settings. Findings were examined by professional group (physicians, nurses, allied health), clinical setting (emergency, primary care, hospital inpatient), and interoperability technology

type (HIE platform, integrated EHR, FHIR-based application) to identify contextual patterns.

Sensitivity analysis Sensitivity analyses were conducted by restricting the synthesis to higher-confidence studies (those rated "Yes" on four or five MMAT criteria) to assess whether conclusions changed materially when lower-confidence evidence was excluded.

Language restriction The review was restricted to English-language publications. This is acknowledged as a limitation; relevant literature indexed in non-English databases or authored in other languages may have been missed.

Country(ies) involved Turkey.

Other relevant information The review introduces the HII Dual-Pathway Performance Model: a sociotechnical conceptual framework grounded in sociotechnical systems (STS) theory that explains why health information interoperability simultaneously facilitates and disrupts professional performance, identifies six interdependent moderators governing pathway dominance, and generates testable propositions for future research. Full dataset, search strategy, quality appraisal tables, and study characteristics tables are available on Mendeley Data (doi.org/10.17632/t9xvgdkmvz.1).

Keywords health information interoperability; healthcare professional performance; electronic health records; health information exchange; sociotechnical systems.

Dissemination plans Findings will be submitted for publication in a peer-reviewed journal. Data and materials are publicly available on Mendeley Data.

Contributions of each author

Author 1 - Mehmet Yorulmaz - Contributed equally to the conception and design of the review, development of eligibility criteria and search strategy, screening of titles and abstracts, full-text assessment, data extraction, quality appraisal using MMAT 2018, narrative synthesis, and critically revising the manuscript.
Author 2 - Olebeng Mpho Mackenzie - Contributed equally to the conception and design of the review, development of eligibility criteria and search strategy, screening of titles and abstracts, full-text assessment, data extraction, quality appraisal using MMAT 2018, narrative synthesis, and drafting and critically revising the manuscript.
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