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Best Practices For Managing Laboratory, Nursing, And Social Services Data In Electronic Health Records

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Abstract
The integration of laboratory, nursing, and social services data within Electronic Health Records (EHRs) has become a defining element of healthcare digital transformation. This integrative review synthesizes studies published between 2020 and 2024 to identify best practices that enhance data accuracy, interoperability, and multidisciplinary collaboration across healthcare settings. A systematic search of PubMed, Scopus, CINAHL, Web of Science, and Google Scholar yielded 38 eligible studies addressing laboratory data management, nursing documentation, and social services data integration. Findings reveal that implementing standardized frameworks such as HL7-FHIR, LOINC, and ISO 15189 significantly improves laboratory interoperability and reporting accuracy. In nursing, structured documentation using NANDA-I, NIC, and NOC taxonomies enhances communication, decision support, and compliance with quality standards. The inclusion of social determinants of health (SDOH) within EHRs fosters holistic care planning and strengthens community-based interventions. Cross-domain themes emphasize the importance of governance, workforce training, and national policy alignment. Collectively, these findings demonstrate that EHRs achieve their full potential when supported by strong governance, interoperability standards, and informed clinical participation. Aligning these practices with Saudi Arabia's Vision 2030 digital-health strategy can accelerate the development of a unified, patient-centered health information ecosystem.

Keywords: Electronic Health Records (EHRs); Laboratory Information Systems (LIS); Nursing Informatics; Social Services; Interoperability; Health Data Management; HL7-FHIR; LOINC; Social Determinants of Health (SDOH); Vision 2030.

Introduction

The rapid digital transformation of healthcare systems has made the Electronic Health Record (EHR) a cornerstone for data management, clinical decision-making, and continuity of care. EHRs integrate information from multiple disciplines, including laboratory diagnostics, nursing documentation, and social services reports, to provide a holistic view of the patient's condition. However, the complexity of combining data from these diverse sources poses significant challenges in interoperability, data quality, and workflow alignment. Inconsistent data exchange formats, missing contextual information, and limited integration of social determinants of health often lead to fragmentation in patient records, reduced efficiency, and compromised patient outcomes (Wilkerson et al., 2015; Vest et al., 2023).

The management of laboratory data within EHRs requires precise coding systems such as LOINC and well-configured interfaces between the Laboratory Information System (LIS) and the EHR to ensure that results are transmitted accurately and displayed consistently. Similarly, nursing data are essential for documenting care processes, monitoring patient progress, and coordinating multidisciplinary interventions; yet, many EHR systems fail to capture nursing assessments in a structured, interoperable form (Topaz & Bowles, 2021). Furthermore, social services data—including psychosocial assessments, family support plans, and community resource referrals—remain under-represented in most EHR frameworks despite their critical role in comprehensive care management (Fields et al., 2022).

To address these gaps, researchers and policymakers have emphasized the need for best practices that unify technical, organizational, and professional standards across healthcare disciplines. These practices include the adoption of shared terminologies, standardized documentation templates, interoperability protocols, and multidisciplinary data governance frameworks (Alalwan et al., 2024). For healthcare organizations aiming to align with national digital health strategies—such as Saudi Arabia's Vision 2030 Health Sector Transformation Program—the effective management and exchange of laboratory, nursing, and social service data within EHRs is essential for achieving seamless patient-centered care. Therefore, this integrative review aims to synthesize and analyze best practices reported in recent literature (2020–2025) concerning the management and exchange of laboratory, nursing, and social services data in EHR systems. By identifying evidence-based strategies and highlighting multidisciplinary perspectives, the review seeks to provide a framework that supports interoperability, enhances care coordination, and advances data-driven decision-making across healthcare settings.

Methods

This study adopted an integrative review design to provide a comprehensive synthesis of evidence regarding best practices for managing laboratory, nursing, and social services data within Electronic Health Records (EHRs). The integrative review methodology was selected because it allows the inclusion and comparison of diverse types of research—quantitative, qualitative, and mixed-methods—thereby offering a holistic understanding of how multidisciplinary data are managed and exchanged in EHR systems (Whittemore & Knafl, 2005).

Search Strategy

A systematic literature search was conducted between January 2020 and October 2025 using the following databases: PubMed, Scopus, CINAHL, Web of Science, and Google Scholar. Additional gray literature and policy reports were reviewed to include relevant governmental and institutional guidelines.

The search combined MeSH terms and keywords such as:

- "Electronic Health Record" OR "EHR"
- "Laboratory Information System" OR "LIS"
- "Nursing Documentation" OR "Nursing Informatics"
- "Social Services" OR "Social Work Data"
- "Data Management" OR "Data Exchange" OR "Interoperability"
- "Best Practices" OR "Standards"

Boolean operators ("AND," "OR") were applied to refine combinations. Reference lists of included articles were also screened for additional studies.

Inclusion and Exclusion Criteria

Inclusion criteria:

1. Studies addressing the management, exchange, or integration of laboratory, nursing, or social service data within EHRs.
2. Research discussing interoperability standards, data governance, or clinical workflows.
3. Articles presenting best practices, implementation outcomes, or multidisciplinary perspectives.

Exclusion criteria:

1. Studies focused solely on technical software development without healthcare context.
2. Articles unrelated to data management in EHRs.
3. Commentaries or editorials without empirical or review-based evidence.

Data Extraction and Evaluation
Titles and abstracts were screened independently by two reviewers to ensure relevance and avoid bias. Full-text articles were then examined for inclusion. A data extraction matrix was developed to capture study characteristics, including:
- Author(s), year, and country
- Study design and setting
- Domain focus (Laboratory, Nursing, Social Services)
- Main findings related to best practices
- Reported outcomes on interoperability, data quality, or care coordination

The Mixed Methods Appraisal Tool (MMAT 2018) was used to assess methodological quality. Any discrepancies were resolved through consensus.

Data Synthesis
Extracted data were synthesized through thematic analysis, grouping findings into three main domains—laboratory, nursing, and social services. Within each domain, recurrent best practices were identified and compared to highlight similarities, gaps, and integration strategies. Finally, cross-domain themes such as interoperability frameworks, data standardization, and multidisciplinary governance were analyzed to propose an evidence-based model for EHR data management.

Results (2020–2024)
A total of 38 studies published between 2020 and 2024 met the inclusion criteria. The literature highlights a shared emphasis on data interoperability, standardization, and cross-disciplinary collaboration in improving Electronic Health Record (EHR) effectiveness. Studies originated mainly from Saudi Arabia, the United States, Canada, the United Kingdom, and Australia.
The findings were categorized into three main domains — Laboratory Data Management, Nursing Data Management, and Social Services Data Integration — followed by cross-cutting themes representing unified best practices across all domains.

1. Laboratory Data Management
Recent studies (2020–2024) underscore that the integration between Laboratory Information Systems (LIS) and EHRs must follow international standards such as LOINC and HL7-FHIR to maintain accuracy and reduce redundancy (Alshammari et al., 2023; Khademi et al., 2022).
Automation in laboratory result transmission, along with digital verification workflows, decreased reporting delays and improved diagnostic safety. In Saudi healthcare institutions, pilot projects using HL7-FHIR protocols demonstrated improved turnaround time and consistency between reported and displayed results (Alenzi et al., 2024).
Routine data audits and alignment with ISO 15189 standards were frequently cited as core best practices for maintaining data integrity and compliance.

2. Nursing Data Management
From 2020 to 2024, literature showed a growing shift toward structured nursing documentation and evidence-based informatics frameworks within EHRs (Topaz & Bowles, 2021; Park & Lee, 2023). Use of standardized taxonomies (NANDA-I, NIC, and NOC) improved communication and facilitated data analytics for quality improvement. Nursing-focused EHR modules integrating Clinical Decision Support Systems (CDSS) were found to enhance patient monitoring and early detection of complications.
Training programs in nursing informatics competencies across Saudi and international hospitals correlated with higher compliance, accuracy, and time efficiency in documentation (Alalwan et al., 2024).

3. Social Services Data Integration

Recent evidence emphasizes the value of embedding social determinants of health (SDOH) and psychosocial assessments into EHRs to achieve a holistic care model (Vest et al., 2023; Fields et al., 2022).
Integration of Social Services Information Exchange (SSIE) systems with hospital EHRs allowed smoother coordination between social workers and clinical teams, particularly for chronic disease follow-up and vulnerable populations.
Nevertheless, barriers such as insufficient coding standards for social data and privacy restrictions underlined the ongoing need for robust governance and ethical data-sharing frameworks (Rahman & Almutairi, 2024).

4. Cross-Domain Themes
Across the three domains, three consistent best-practice themes were identified:
1. Interoperability and Standardization: Adoption of HL7-FHIR, LOINC, and SNOMED CT ensures consistent data transmission and cross-system compatibility.
2. Governance and Policy Alignment: Establishing data governance committees that include lab technologists, nurses, and social workers improves compliance with national eHealth standards.
3. Capacity Building and Digital Literacy: Continuous training in EHR use, privacy, and data quality improves user engagement and system reliability (WHO, 2023; Alalwan et al., 2024).

Table 1. Best Practices in Managing Laboratory, Nursing, and Social Services Data (2020–2024)

Domain	Best Practices Identified	Supporting Sources (APA)	Key Outcomes
Laboratory	Integration of LIS with EHR via HL7-FHIR; LOINC coding; ISO 15189 compliance; interface audits.	Khademi et al. (2022); Alshammari et al. (2023); Alenzi et al. (2024).	Reduced reporting errors, faster turnaround, improved accuracy.
Nursing	Structured templates (NANDA-I, NIC, NOC); CDSS alerts; nursing informatics training.	Topaz & Bowles (2021); Park & Lee (2023); Alalwan et al. (2024).	Enhanced continuity of care; higher compliance; early risk detection.
Social Services	Inclusion of psychosocial and SDOH data; SSIE–EHR linkage; privacy governance.	Vest et al. (2023); Fields et al. (2022); Rahman & Almutairi (2024).	Improved coordination, holistic patient care, ethical data exchange.
Cross-Domain	FHIR-based interoperability; multidisciplinary data governance; digital-literacy programs.	WHO (2023); Alalwan et al. (2024).	Consistent documentation, policy compliance, multidisciplinary collaboration.

Between 2020 and 2024, literature in health informatics converges on the conclusion that the integration of laboratory, nursing, and social service data into EHR systems enhances care coordination, data reliability, and clinical decision-making.
Successful implementation depends on a balance between technical interoperability and organizational readiness, including governance frameworks, user training, and adherence to international data standards.

Discussion
The integration of laboratory, nursing, and social services data within Electronic Health Records (EHRs) represents a critical advancement in building patient-centered healthcare systems. Between 2020 and 2024, global research in health informatics consistently emphasized that the value of EHRs lies not only in their technical capacity to store and retrieve data but in their ability to connect multiple disciplines through standardized, interoperable, and context-rich information flows. The findings of this integrative review demonstrate that healthcare systems adopting unified data management frameworks achieved significant improvements in clinical efficiency, decision-making accuracy, and continuity of care.

Laboratory data emerged as the technical foundation of digital interoperability. Studies revealed that integration between Laboratory Information Systems (LIS) and EHRs through standardized coding systems such as LOINC and messaging formats like HL7-FHIR substantially reduced manual transcription errors and improved the turnaround time of diagnostic results (Khademi et al., 2022; Alshammari et al., 2023). These improvements were not merely operational but directly influenced patient outcomes, enabling faster treatment initiation and reducing diagnostic uncertainty. However, challenges persisted, particularly regarding inconsistencies in laboratory code mapping and the lack of validation mechanisms between local and national systems. Continuous data auditing and compliance with international standards such as ISO 15189 were therefore highlighted as essential practices for sustaining accuracy and reliability in laboratory data exchange.

Parallel to laboratory integration, the nursing domain presented a strong body of evidence supporting structured documentation as a key factor in enhancing communication and quality of care. Studies between 2020 and 2024 (Topaz & Bowles, 2021; Park & Lee, 2023) demonstrated that the adoption of standardized terminologies—such as NANDA-I for diagnoses, NIC for interventions, and NOC for outcomes—allowed nursing documentation to become interoperable, analyzable, and comparable across institutions. When nursing data were organized systematically, EHR systems could better support decision-making through automated alerts, reminders, and clinical decision support tools. Yet, despite these advancements, nurses frequently reported usability issues and workflow burdens linked to documentation overload. Training and ongoing digital competency programs proved to be crucial enablers, improving both the accuracy of nursing records and the user experience with EHR systems (Alalwan et al., 2024).

Equally important is the integration of social services data, which reflects the broader determinants of health that influence patient outcomes beyond the hospital environment. Recent studies (Vest et al., 2023; Fields et al., 2022; Rahman & Almutairi, 2024) highlighted that embedding psychosocial, economic, and community-related data into EHRs creates a more comprehensive view of patient well-being. Integrating Social Services Information Exchange (SSIE) systems with hospital EHRs enabled clinicians and social workers to coordinate interventions more effectively, particularly for patients with chronic diseases or mental health challenges. However, this integration remains limited due to privacy regulations, lack of unified coding standards for social data, and institutional barriers between healthcare and social welfare sectors. The literature underscores the need for ethical, well-governed frameworks that ensure patient confidentiality while facilitating secure and meaningful data sharing.

Across all domains, the review reveals a set of common denominators for success. Interoperability standards such as HL7-FHIR, SNOMED CT, and LOINC are indispensable for consistent data exchange, while governance frameworks that include representatives from laboratories, nursing, and social services departments ensure accountability and coordination. Moreover, digital literacy and workforce readiness emerge as non-technical determinants of EHR success. Institutions that invested in multidisciplinary training programs reported better data quality, reduced documentation errors, and higher user satisfaction. These findings align closely with the goals of Saudi Arabia's Vision 2030, which prioritizes digital transformation, value-based healthcare, and integrated information systems. National initiatives such as SEHA Virtual Hospital, Mawid, and the Unified Health Record project reflect a systemic shift toward data-driven, interoperable healthcare infrastructure.

In summary, the evidence from 2020 to 2024 demonstrates that managing multidisciplinary data within EHRs is both a technical and organizational endeavor. When laboratory precision, nursing documentation, and social service insights are harmonized within a unified digital framework, healthcare delivery becomes more responsive, equitable, and efficient. To realize this vision fully—particularly in the Saudi context—stakeholders must sustain their commitment to interoperability, governance, and workforce capacity building, ensuring that EHRs evolve into intelligent ecosystems that support holistic, patient-centered care.

Conclusion and Recommendations

This integrative review concludes that the effective management of laboratory, nursing, and social services data within Electronic Health Records (EHRs) is central to achieving patient-centered, data-driven, and sustainable healthcare. Evidence from 2020 to 2024 demonstrates that the success of EHR systems depends on more than digital infrastructure—it relies on the seamless interaction between technology, governance, and human capacity. Integrating laboratory data through standardized

frameworks such as LOINC, HL7-FHIR, and ISO 15189 ensures the accuracy and reliability of diagnostic results, while structured nursing documentation using standardized terminologies such as NANDA-I, NIC, and NOC enhances communication, accountability, and clinical decision support. In parallel, embedding social services data and social determinants of health within EHRs provides a holistic view of the patient, acknowledging the influence of psychosocial and community factors on health outcomes.

To move toward this vision, healthcare institutions should strengthen interoperability by adopting globally recognized standards and establishing governance frameworks that connect laboratories, nursing departments, and social services. Building digital competencies among healthcare professionals through continuous informatics training will ensure that data are not only accurately documented but also meaningfully interpreted for clinical and administrative use. Integrating social and behavioral data within EHRs will promote equity and continuity of care, particularly for patients with complex or chronic conditions. Aligning local EHR systems with national digital-health initiatives—such as SEHA Virtual Hospital, the Unified Health Record, and Vision 2030's Health Sector Transformation Program—will enhance nationwide data consistency, security, and efficiency.

Ultimately, the integration of multidisciplinary data within EHRs transforms them from static repositories into intelligent ecosystems that support proactive, coordinated, and patient-centered care. By uniting laboratory precision, nursing insight, and social understanding under a unified digital framework, Saudi healthcare institutions can accelerate their transition toward a value-based, interoperable, and sustainable healthcare system in line with the aspirations of Vision 2030.

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