

Introduction to Health Informatics Standards

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Key concepts, purpose, and major families of standards used in health information systems.

1. Why Standards Matter in Health Informatics

Reason	Explanation
Interoperability	Enables different systems (EHRs, labs, imaging, devices) to exchange data reliably.
Data Quality & Consistency	Guarantees that the same clinical concept is recorded the same way across sites.
Patient Safety	Reduces errors caused by misinterpreted or missing information.
Regulatory Compliance	Supports legal requirements (e.g., HIPAA, GDPR, FDA regulations).
Research & Public Health	Facilitates aggregation of data for analytics, surveillance, and outcomes research.

2. Core Types of Health Informatics Standards

Category	Primary Focus	Representative Standards
Data Structure & Content	How information is organized and coded.	HL7 FHIR, CDA, OpenEHR, OMOP CDM
Terminology / Vocabulary	Standardized clinical vocabularies.	SNOMED CT, LOINC, ICD-10-CM, RxNorm, UCUM
Message Exchange	Transport of data between systems.	HL7 v2.x, HL7 v3, IHE Profiles, DICOM
Security & Privacy	Protection of data confidentiality, integrity, and access control.	HIPAA Security Rule, ISO/IEC 27001, FHIR Security, OAuth 2.0 / OpenID Connect
Implementation Guides & Profiles	Context-specific constraints on generic standards.	HL7 FHIR Implementation Guides (IGs), IHE Integration Profiles (e.g., XDS-I, PIX/PDQ)
Quality & Measurement	Defining metrics, outcomes, and reporting.	FHIR Quality Reporting, CMS Measures, HL7 QDM

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3. Major Standards Families

3.1 HL7 (Health Level Seven)

Substandard	Purpose	Typical Use Cases
HL7 v2.x	Delimited message protocol (e.g., ADT, ORU).	Lab results, admission/discharge notifications.
HL7 v3	XML-based, richer data model (less adopted).	Complex clinical documents, regulatory submissions.
CDA (Clinical Document Architecture)	Structured clinical documents (XML).	Discharge summaries, progress notes (e.g., CCD).
FHIR (Fast Healthcare Interoperability Resources)	RESTful API, modular "Resources".	Mobile apps, cloud services, real-time data exchange.

3.2 IHE (Integrating the Healthcare Enterprise)

- **Goal:** Define "profiles" that combine existing standards to solve specific workflow problems.
- **Key Profiles:**
 - **XDS/I/XDS-b:** Document sharing repository.
 - **PIX/PDQ:** Patient identity cross-reference.
 - **MHD (Mobile Health Document):** FHIR-based document exchange.

3.3 DICOM (Digital Imaging and Communications in Medicine)

- **Focus:** Imaging data (CT, MRI, X-ray) and related metadata.
- **Key Elements:** SOP Classes, Transfer Syntaxes, PACS integration.

3.4 Terminology Standards

Standard Domain Example