

Overview of Health Informatics

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Field that blends health care, information science, and technology to improve patient outcomes, research, and health system efficiency.

1. Definition & Scope

Aspect	Description
Health Informatics (HI)	The systematic use of data, information, and knowledge to support health care delivery, education, research, and policy.
Core Domains	- Clinical Informatics - Public Health Informatics - Consumer Health Informatics - Translational Bioinformatics
Key Goals	- Enhance quality & safety of care - Enable evidence-based decision making - Reduce costs & inefficiencies - Facilitate data-driven research

2. Major Components

Component	Examples	Primary Functions
Electronic Health Records (EHRs)	Epic, Cerner, Allscripts	Capture patient clinical data; support documentation, order entry, and care coordination.
Health Information Exchange (HIE)	Statewide HIE networks, Direct messaging	Secure sharing of patient information across organizations.
Clinical Decision Support (CDS)	Alerts for drug interactions, order sets	Provide real-time, evidence-based recommendations at point of care.
Telehealth & mHealth	Video visits, mobile health apps	Remote monitoring, patient engagement, access to care.

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Component	Examples	Primary Functions
Health Data Analytics	Predictive modeling, population health dashboards	Turn raw data into actionable insights for clinicians and administrators.
Standards & Interoperability	HL7 FHIR, LOINC, SNOMED CT, ICD?10	Ensure consistent data representation and exchange.
Privacy & Security	HIPAA, GDPR, role? based access controls	Protect patient confidentiality and maintain data integrity.

3. Health Informatics Lifecycle

1. **Data Generation** – Capture from EHRs, devices, labs, patient?reported outcomes.
 2. **Data Integration** – Map to common standards, store in data warehouses or lakes.
 3. **Data Processing** – Cleanse, normalize, de?identify, and aggregate.
 4. **Information Management** – Apply terminologies, ontologies, and metadata.
 5. **Knowledge Generation** – Use analytics, AI/ML, and research methods.
 6. **Knowledge Application** – Embed into CDS, clinical pathways, policy decisions.
 7. **Evaluation & Feedback** – Measure impact on outcomes, usability, and cost; refine processes.
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4. Key Stakeholders

Stakeholder	Role in Health Informatics
Clinicians	Use informatics tools for diagnosis, treatment, documentation.
Patients & Consumers	Generate data (wearables, portals) and receive personalized information.
Health IT Professionals	Design, implement, maintain systems; ensure interoperability.
Researchers	Access de?identified datasets for epidemiology, genomics, outcomes research.
Administrators & Policy Makers	Leverage analytics for resource allocation, quality reporting, regulation.
Vendors & Developers	Build compliant software, support standards adoption.

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5. Current Trends & Emerging Technologies

Trend	Description	Potential Impact
Artificial Intelligence & Machine Learning	Predictive risk scores, image analysis, natural?language processing of clinical notes.	Earlier disease detection; workflow automation.
FHIR (Fast Healthcare Interoperability Resources)	Modern	