

***AMIA Health Informatics Certification™ (AHIC™)
Outline of Exam Topics¹***

Domain	# Tasks / # KSs	Weighting (% of questions on the exam)
1. Foundational Knowledge	NA / 31	17%
2. Enhancing Health Decision-making, Processes, and Outcomes	11 / 21	21%
3. Health Information Systems (HIS)	26 / 36	21%
4. Data Governance, Management, and Analytics	17 / 28	20%
5. Leadership, Professionalism, Strategy, and Transformation	20 / 28	21%
Total	74 / 144	100%

¹ The *Health Informatics Delineation of Practice* was developed during the 2018 health informatics practice analysis conducted by AMIA and will be described in Gadd CG, Steen EB, Caro CM et al. Domains, tasks, and knowledge for health informatics practice: results of a practice analysis. *J Am Med Inform Assoc* 2020;27(6):845-852. doi:10.1093/jamia/ocaa018.

Tasks, Knowledge, and Skills

Domain 1: Foundational Knowledge

Fundamental knowledge and skills that provide health informaticians with a common vocabulary, basic knowledge across all health informatics domains, and understanding of the environment in which they function.

Knowledge / Skills

- K001. The discipline of health informatics (e.g., definitions, history, domains, professional organizations)
- K002. Fundamental informatics concepts, models, and theories
- K003. Core informatics literature (e.g., foundational literature, principal journals, critical analysis of literature, use of evidence to inform practice)
- K004. International efforts to advance health informatics practice
- K005. Health Information Technology (HIT) principles and science
- K006. Computer programming fundamentals and computational thinking
- K007. Fundamentals of data, including their characteristics, types, structures, and forms
- K008. Basic database structure, data retrieval and analytics techniques and tools
- K009. Basic systems and network architectures
- K010. Policies and procedures for data sharing across systems (e.g., health information exchanges, public health reporting)
- K011. Interoperability of information systems, including technical and non-technical approaches to facilitate access to data
- K012. Development and use of interoperability/exchange standards (e.g., Fast Health Interoperability Resources [FHIR], Digital Imaging and Communications in Medicine [DICOM])
- K013. Development and use of transaction standards (e.g., American National Standards Institute X12)
- K014. Development and use of messaging standards (e.g., Health Level Seven [HL7] v2)
- K015. Development and use of clinical decision support standards (e.g., CDS Hooks)
- K016. Development and use of data model standards (e.g., Clinical Information Modeling Initiative [CIMI]),
- K017. Vocabularies, terminologies, and nomenclatures
- K018. Data taxonomies and ontologies
- K019. Knowledge management and information science
- K020. Methods for knowledge persistence and sharing
- K021. Security, privacy, and confidentiality regulations and best practices
- K022. Basic epidemiology and bio-statistical methods and principles
- K023. Basic genomics and personalized medicine
- K024. Components of translational and biomedical research
- K025. Sociotechnical concepts
- K026. Similarities, differences, and dependencies across health system organizations and domains (e.g., health care delivery, public health, personal health, population health, education of health professionals, clinical and translational research)

- K027. The flow of data, information, and knowledge within the health system
- K028. Determinants of individual and population health
- K029. Forces shaping health care delivery and considerations regarding health care access, including equity and disparities in health care delivery, financing, access and policy
- K030. Health care economics and financing, including care delivery and payment models
- K031. Policy and regulatory frameworks related to the healthcare system

Domain 2: Enhancing Health Decision-making, Processes, and Outcomes

Support and enhance decision-making by clinicians, patients, and public health professionals; analyze existing health processes and identify ways that health data and HIS can enable improved outcomes; evaluate the impact of HIS on practice; pursue discovery and innovation in HIS and informatics practice.

Tasks

- 2.01. Develop, implement, monitor, evaluate, and maintain decision support systems to promote health care quality and enhance public health surveillance effectiveness.
- 2.02. Contribute to the development and evaluation of processes and tools for systematically acquiring, reviewing, approving, and maintaining clinical knowledge content.
- 2.03. Integrate knowledge of patient-specific attributes (e.g., social determinants of health, stratified risk factors, genomics, patient-reported outcomes, and preferences) and clinical and technical guidelines to determine optimal management and interventions for individual and population health.
- 2.04. Develop, curate, maintain, and promote institutional knowledge repositories to ensure the continuity of domain and interdisciplinary knowledge across staff transitions, venues of care, and systems and organizational changes.
- 2.05. Apply the information derived from advanced diagnostic, predictive, and prescriptive analytic approaches to derive actionable insights, improve care delivery and public health processes, and influence policy.
- 2.06. Assist users in understanding relationships between data, processes, and outcomes of the services they provide in order to identify areas of potential improvement.
- 2.07. Analyze and redesign existing methods, models, systems, and processes (e.g., care delivery models, EHRs, workflows) to identify opportunities for optimization and innovation.
- 2.08. Identify clinical and health quality improvement opportunities based on statistical analysis of current practice patterns and informed by evidence-based health practices.
- 2.09. Identify, determine feasibility of, implement, and evaluate strategies (e.g., patient safety, pay for performance, public health surveillance) to improve both individual and population health and healthcare outcomes.
- 2.10. Identify, evaluate, disseminate, and promote use of benchmarks and guidelines to improve individual and organizational performance.
- 2.11. Support the development and implementation of new healthcare delivery and public health models using emerging health information technology and innovative informatics approaches.

Knowledge / Skills

- K032. Clinical decision support principles and practices
- K033. Legal, regulatory, and ethical issues regarding clinical decision support
- K034. Decision science (e.g., Bayes theorem, decision analysis, probability theory, utility and preference assessment, test characteristics)
- K035. Risk stratification and adjustment

- K036. Methods and approaches to implementation of guidelines and best practices that improve outcomes and performance
- K037. Quality improvement principles and practices (e.g., Six Sigma, Lean, Plan-Do-Study-Act [PDSA] cycle, root cause analysis)
- K038. Problem identification and systems analyses within complex and dynamic systems
- K039. Business analysis
- K040. Key performance indicators (KPIs)
- K041. Frameworks for continuous improvement and innovation in health care (e.g., Learning Health System)
- K042. Methods of workflow analysis
- K043. Principles of workflow re-engineering
- K044. User-centered design principles
- K045. Concepts and tools for care coordination
- K046. Definitions of measures (e.g., quality performance, regulatory, pay for performance, public health surveillance)
- K047. Measure development and evaluation processes and criteria
- K048. Clinical and financial benchmarking sources (e.g., Gartner, Healthcare Information and Management Systems Society [HIMSS] Analytics, Centers for Medicare and Medicaid Services [CMS], Leapfrog)
- K049. Claims and other payment analytics and benchmarks
- K050. CMS standards (e.g., Hospital Acquired Condition [HAC], re-admissions, Meaningful Use)
- K051. Healthcare quality measures developed and promoted by national organizations such as National Committee for Quality Assurance [NCQA], National Quality Forum [NQF], Centers for Medicare and Medicaid Services [CMS], The Joint Commission)
- K052. Facility accreditation quality and safety standards (e.g., Clinical Laboratory Improvement Amendments [CLIA])

Domain 3: Health Information Systems (HIS)

Plan, develop or acquire, implement, maintain, and evaluate health information systems that are integrated with existing information technology systems across the continuum of care, including clinical, consumer, and public health domains, while addressing security, privacy, and safety considerations.

Tasks

- 3.01. Collaborate with key stakeholders (e.g., clinical, public health, federal, business) to determine strategic and financial planning priorities for HIS application development/configuration/acquisition requests and projects.
- 3.02. Work with stakeholders (including end users and technical teams) to elicit and document functional and system design requirements to ensure their alignment with business and clinical strategies and systems.
- 3.03. Perform vendor evaluations and select product(s).
- 3.04. Plan and participate in HIS implementation.
- 3.05. Plan, implement, and participate in HIS maintenance and upgrade cycles.
- 3.06. Plan, implement, and participate in HIS downtime activities, including recovery.

- 3.07. Develop, and implement a comprehensive system testing plan using functional testing (e.g., unit testing, integration testing, regression testing) and non-functional testing (e.g., user acceptance testing, security testing).
- 3.08. Develop HIS safety plan/program that aligns with organizational patient safety priorities, best practices, and externally validated resources (e.g., SAFER Guides, ISMP and ECRI tools).
- 3.09. Participate in security threat assessments and development of security policies, risk mitigation strategies, and security training.
- 3.10. Ensure that HIS policies and procedures comply with applicable privacy, confidentiality, security, and data sharing laws, rules and regulations, and ethics.
- 3.11. Provide strategic guidance to ensure that HIS maintains the integrity of individual and population health information sourced across multiple systems.
- 3.12. Ensure effective and secure electronic communication of health data among individuals (e.g., patient-health professional, clinician-clinician).
- 3.13. Reconcile requirements for integration of data with technical constraints in order to maintain connectivity, interoperability, and validity of content across health information systems.
- 3.14. Design standards-based scalable technology frameworks for integration of HIS across health settings (e.g., clinical, ambulatory) and domains (e.g., pharmacy, laboratory).
- 3.15. Design tools and applications based on review and identification of requirements, industry standards, and existing literature.
- 3.16. Assess and evaluate user-facing technology to improve usability for health professionals, patients, and consumers using formal methodologies (e.g., usability testing, creating personas, creating use cases).
- 3.17. Develop, implement, evaluate and/or integrate consumer-facing health informatics applications (e.g., disease management, patient education, behavior modification) within integrated and interoperable HIS architecture.
- 3.18. Develop and improve methodologies for workflow analysis.
- 3.19. Apply workflow methodologies to support HIS development and implementation.
- 3.20. Evaluate systems as built to ensure they fully meet specifications.
- 3.21. Monitor and evaluate system performance to identify opportunities to optimize reliability.
- 3.22. Monitor the integrity, reliability, consistency and efficiency of integration across components of the HIS (e.g., pharmacy, orders, nursing, laboratory) and other departments to optimize the flow of information, clinical work processes, clinical logic, and preserve contextual meaning.
- 3.23. Identify features and enhancements for implementation in future development based on HIS evaluations (e.g., quantitative and qualitative performance metrics), emerging technologies, needs analysis, and requirements gathering.
- 3.24. Develop and implement strategy for effective use of telehealth.
- 3.25. Develop training programs and provide training for new users and/or for current users on new features/updates.
- 3.26. Develop and/or maintain technical documentation of all aspects of the health information system.

Knowledge / Skills

- K053. System development lifecycle
- K054. Systems thinking principles and transdisciplinary approaches
- K055. Unintended consequences of system interventions/implementations
- K056. Implementation science (i.e., methods to promote and reduce barriers to the adoption of evidence-based practices and interventions into routine health care and public health settings)
- K057. Informatics conceptual frameworks (e.g., distributed cognition, clinical communication space, situational awareness, technology acceptance model)
- K058. Strategies for ensuring provenance and integrity of individual and population health informatics sourced across multiple integrated systems
- K059. Methods of stakeholder engagement, including end-users and subject matter experts
- K060. Health information technology landscape (e.g., emerging technologies)
- K061. Information system maintenance requirements
- K062. Information needs analysis and information system selection
- K063. Information system implementation procedures
- K064. Information system evaluation techniques and methods
- K065. Information testing techniques and methodologies (e.g., unit, function, regression, production validation testing, and end user acceptance testing)
- K066. Enterprise architecture (databases, storage, application, interface engine)
- K067. Methods of communication between software components
- K068. Network communications infrastructure and protocols between information systems (e.g., Transmission Control Protocol/Internet Protocol [TCP/IP], switches, routers)
- K069. Overlapping and distinct aspects of each health professional domain, including scope of practice licensure and ‘top of practice’, and implications for system design
- K070. Implications of purpose and workflow in health setting (e.g., inpatient, labs, ambulatory, radiology, home) on the design and use of HIS.
- K071. Types and functions of health information systems (e.g., Electronic Health Records [EHR], targeted departmental information systems, financial management systems, data archiving and management systems, population health information systems)
- K072. Processes for generating system functional requirements
- K073. Models and theories of human-computer interaction (HCI), including design standards and principles
- K074. HCI evaluation, usability engineering and testing, study design and methods
- K075. Consumer-facing health information applications (e.g., patient portals, mobile health apps and devices, disease management, patient education, behavior modification)
- K076. User types and roles for access control
- K077. Clinical communication channels and best practices for use (e.g., secure messaging, closed loop communication)
- K078. Health IT safety models and frameworks
- K079. Security threat assessment methods and mitigation strategies
- K080. Security standards and safeguards
- K081. Clinical impact of scheduled and unscheduled system downtimes
- K082. Information system failure modes and downtime mitigation strategies (e.g., replicated data centers, log shipping)
- K083. Clinical registries

- K084. Health information exchanges
- K085. Patient matching strategies including master person index (MPI) and unique identifiers
- K086. Regulated and non-regulated medical devices (e.g., pumps, telemetry monitors, consumer devices)
- K087. Telehealth workflows and resources (e.g., software, hardware, staff)
- K088. Business Process Modeling (BPM)

Domain 4: Data Governance, Management, and Analytics

Establish and maintain data governance structures, policies, and processes. Acquire and manage health-related data to ensure its quality and meaning across settings and to utilize it for analysis that supports individual and population health and drives innovation.

Tasks

- 4.01. Collaborate in the establishment and maintenance of data governance structures, policies, and processes that encompass data quality, integrity, security roles, access rules, data domain management, definition of clinical and business cohorts, oversight and application of data standards, data provenance/lineage, metadata, data dictionaries/definitions, and data use agreements.
- 4.02. Employ methods and techniques (e.g., de-identification, anonymization, suppression) to ensure confidentiality and security of protected data containing PHI, PII and other sensitive elements.
- 4.03. Collaborate with key stakeholders to identify data needed to implement processes that address organizational priorities intended to improve individual and population health and healthcare outcomes.
- 4.04. Develop, implement, and/or leverage data/information lifecycle processes for defining sources, and acquiring, storing, cleaning, normalizing, and ensuring integrity of data to safeguard the availability of relevant and valid data to meet clinical, quality, research, business, and strategic objectives.
- 4.05. Develop, implement, and maintain a health data intake plan that addresses data requests, data quality assessment, data models, terminologies, and data from multiple sources.
- 4.06. Acquire and incorporate health information from current and emerging data sources (e.g., imaging, bioinformatics, registries and exchanges, medical and health devices, internet of things (IoT), patient-generated, social determinants, claims) to augment healthcare and public health practice.
- 4.07. Develop, enhance, and/or leverage scalable data architecture to store, query, retrieve, and record data from large data sets.
- 4.08. Develop, modify, and maintain data management techniques (e.g., concept mapping, extract, transform, load [ETL], and validation) to improve the quality and availability of health-related data.
- 4.09. Implement semantic interoperability by utilizing data standards and taxonomies to digest, harmonize, and transform data from disparate health information systems to allow computable data availability for health care and public health processes and analytics.

- 4.10. Assess and improve data quality using automated and manual methods (e.g., machine learning, KPIs, checklists, peer review).
- 4.11. Contribute to the ongoing development, evaluation, and maintenance of clinical reference models and accompanying data definitions.
- 4.12. Develop tools (e.g., data visualizations and dashboards) that provide quality, operational, financial, and strategic metrics.
- 4.13. Employ and deploy advanced and emerging data mining and analytic techniques (e.g., data visualization, artificial intelligence, natural language processing (NLP), and machine learning) to optimize health and business decision-making.
- 4.14. Develop capabilities for and implement real-time analytics to improve decision-making at the point of care.
- 4.15. Formulate, test, and validate new statistical and other quantitative methods, models, systems and processes (e.g., agent-based simulations, Markov models, stochastic) to evaluate the effect of health policies or interventions to minimize costs and optimize health outcomes.
- 4.16. Develop new and innovative methods to understand health through the use of bioinformatics and data science (e.g., genomics, proteomics, computational modeling).
- 4.17. Participate in regional data sharing through health information exchanges, public health reporting, and other mechanisms.

Knowledge / Skills

- K089. Regulations, laws, organizations, and best practice related to portability, data access and sharing agreements, and data use
- K090. Stewardship of data
- K091. Data associated with workflow processes and clinical context
- K092. Metadata and data dictionaries
- K093. Data life cycle
- K094. Data flow diagrams
- K095. Techniques for the storage of disparate data types
- K096. Techniques to extract, transform, and load data
- K097. Data management and validation techniques
- K098. Types of specialized and emerging data sources (e.g., imaging, bioinformatics, internet of things (IoT), social determinants)
- K099. Use of patient-generated data
- K100. Flat files, relational and non-relational/not only SQL (NoSQL) database structures, distributed file systems
- K101. Methods for integrating emerging data sources into business and clinical decision making
- K102. Standards related to storage and retrieval from specialized and emerging data sources
- K103. Database architecture (e.g. transactional, reporting, research, system of record, clinical decision support, analytics)
- K104. Information architecture
- K105. Query tools and techniques
- K106. Definitions and appropriate use of descriptive, diagnostic, predictive, and prescriptive analytics

- K107. Descriptive and inferential statistics
- K108. Analytic tools and techniques (e.g., Boolean, Bayesian, statistical/mathematical modeling)
- K109. Advanced modeling and algorithms
- K110. Predictive analytic models, techniques, indications, and limitations
- K111. Spatial and time analysis using geographic information system
- K112. Data visualization (e.g., graphical, geospatial, 3D modeling, dashboards, heat maps)
- K113. Cost analysis methods and techniques
- K114. Genomic and proteomic data used in clinical care (bioinformatics)
- K115. Precision medicine (i.e., customized treatment plans based on patient-specific data)
- K116. Artificial intelligence (e.g., machine learning, natural language processing, image recognition)

Domain 5: Leadership, Professionalism, Strategy, and Transformation

Build support and create alignment for informatics best practices; lead health informatics initiatives and innovation through collaboration and stakeholder engagement across organizations and systems.

Tasks

- 5.01. Practice professional ethical principles and maintain high standards of excellence in health informatics with an emphasis on preserving the confidentiality, privacy, and security of patient and other health data, balanced with appropriate stakeholder access.
- 5.02. Establish and/or direct data and Health Information System (HIS) governance that aligns with informatics best practices and incorporates end user perspectives.
- 5.03. Develop privacy and confidentiality policies, data-use agreements and data sharing agreements.
- 5.04. Manage data use and intellectual property agreements to meet organizational objectives and partner needs.
- 5.05. Build support and create alignment for informatics best practices to ensure all stakeholders are active, visible sponsors of informatics within their respective roles.
- 5.06. Educate stakeholders on informatics concepts and the value health informatics can bring to an organization.
- 5.07. Communicate the organization's informatics vision by engaging with and disseminating information among cross-disciplinary team members and other stakeholders.
- 5.08. Identify and utilize informatics trends, best practices, and new technologies to position the organization for future opportunities and improve health informatics practice.
- 5.09. Participate in the development of health informatics goals, strategies, and tactics that are aligned with the organization's mission, and operational, performance, and financial goals.
- 5.10. Ensure informatics solutions are aligned with consumers' and patients' health information needs.
- 5.11. Lead and manage planned and unplanned changes associated with health information systems to promote organizational readiness and adoption by users.

- 5.12. Leverage the processes and principles of project management to drive the successful completion of projects on time, within scope, and within budget.
- 5.13. Engage, educate, supervise, mentor, and provide opportunities to support the professional development of informatics colleagues and strengthen the informatics workforce.
- 5.14. Articulate informatics-specific workforce needs to ensure the workforce is efficiently and sufficiently staffed to meet informatics challenges.
- 5.15. Contribute to education and training, including teaching and peer-review activities, to disseminate health informatics methods, tools, and best practices.
- 5.16. Participate in the development of organizational policies that support health informatics solutions.
- 5.17. Advocate for public policies that support informatics solutions to optimize care delivery and care experience, improve population and public health, and advance biomedical research.
- 5.18. Serve in leadership roles for the profession (e.g., governing bodies, councils, membership organizations, governmental task forces, standard setting bodies).
- 5.19. Contribute to the development and dissemination of the health informatics body of knowledge (e.g., serve as subject-matter expert, present at conferences).
- 5.20. Collaborate interprofessionally to identify transformative opportunities for discovery, innovation, and translation.

Knowledge / Skills

- K117. Ethical principles and professionalism (e.g., the informatician's responsibility to the profession, their employers, and to the stakeholders of the informatics solutions they create and maintain; professional practices that incorporate ethical principles and the values of the discipline).
- K118. Institutional governance of health information systems
- K119. Leadership principles, models, and methods
- K120. Consensus building and collaboration strategies and techniques
- K121. Negotiation strategies, methods, and techniques
- K122. Conflict management strategies, methods, and techniques
- K123. Principles, models, and methods for building and managing effective interdisciplinary teams
- K124. Group management processes (e.g., nominal group, consensus mapping, Delphi method)
- K125. Environmental scanning (i.e., survey and interpret information to identify external opportunities and threats)
- K126. Innovation models and strategies
- K127. Business plan development for informatics projects and activities (e.g., return on investment, business case analysis, pro forma projections)
- K128. Basic revenue cycle
- K129. Basic managerial/cost accounting principles and concepts
- K130. Capital and operating budgeting
- K131. Strategic planning
- K132. Communication strategies and methods

- K133. Effective communication programs to support and sustain systems implementation
- K134. Writing effectively for various audiences and goals
- K135. Assessment of organizational culture
- K136. Strategies and methods to measure and report overall organizational performance
- K137. Change management principles, theories, models, and methods
- K138. Coaching, mentoring, championing, and cheerleading methods
- K139. Adult learning theories, methods, and techniques
- K140. Teaching modalities for individuals and groups
- K141. Methods to assess the effectiveness of training and competency development
- K142. Theory and methods for promoting the adoption and effective use of health information systems
- K143. Adoption metrics (e.g., Electronic Medical Records Adoption Model [EMRAM], Adoption Model for Analytics Maturity [AMAM], Meaningful Use metrics)
- K144. Project management principles, tools, and techniques