



# Health Informatics Principles

**Foundational Curriculum:  
Cluster 4: Informatics**

**Module 7: The Informatics Process and Principles of Health  
Informatics**

**Unit 2: Health Informatics Principles  
FC-C4M7U2**

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# Unit Objectives

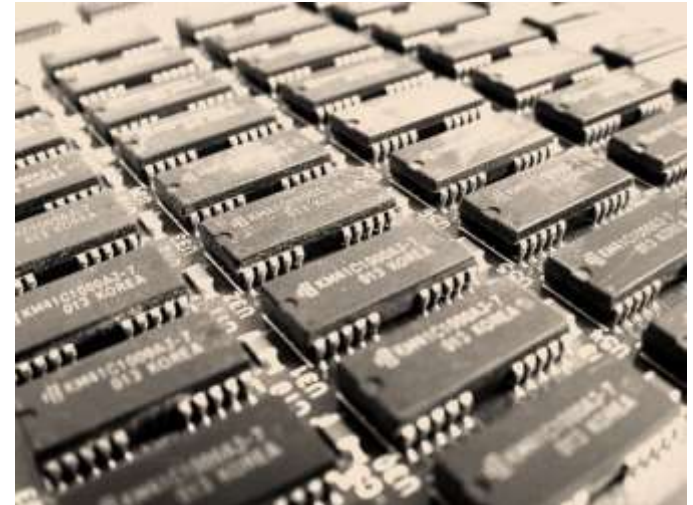


- Describe the evolution of informatics
- Explain the benefits and challenges of informatics
- Differentiate between information technology and informatics
- Identify the three dimensions of health informatics
- State the main principles of health informatics in each dimension



# The Evolution of Health Informatics (1940s-1950s)

- In 1940, the first modern computer was built called the ENIAC. It was 24.5 metric tonnes (27 tons) in volume and took up 63 m<sup>2</sup> (680 sq. ft.) of space
- In 1950 health informatics began to take off with the rise of computers and microchips. The earliest use was in dental projects during late 50s in the US.
- Worldwide use of computer technology in healthcare began in the early 1950s with the rise of mainframe computers





# The Evolution of Health Informatics (1960s)



- Specialized university departments and informatics training programs began during the 1960s in France, Germany, Belgium and The Netherlands
- The **International Medical Informatics Association (IMIA)** was established in 1967 as a technical committee of the International Federation for Information Processing (IFIP).
  - IMIA is an independent organization that plays a role in promoting and furthering the application of information science in modern society, particularly in the fields of healthcare, bioscience and medicine
- One of today's major healthcare IT organizations was originally founded in 1961 by industrial engineers whose focus was to improve the efficiency of healthcare. The organization's original acronym was HMSS, which stood for the Hospital Management Systems Society
  - There were approximately 45 members at the first national convention of HMSS





# The Evolution of Health Informatics (1970s)

- In the 1970's computers were beginning to be used more in hospitals
  - The focus there was primarily financial (billing, tracking charges, data processing, etc.)
  - Computers were not routinely used in the clinical setting. Most of the people working with computers were computer specialists
- MEDLINE (the online resource for accessing biomedical literature) began at the National Library of Medicine in the 70s
- Medical informatics research units began to appear during the 1970s in Poland and in the US
- Also in the 1970s, academic physicians were applying science to physicians' thinking by teaching medical problem solving and the foundation of clinical decision support





# The Evolution of Health Informatics (1980s)



- Remember HMSS? During the 1980s the word “information” was added to the acronym, and the “hospital” term was changed to “health” to be more inclusive; the acronym then became **HiMSS** (Health *Information* & Management Systems Society), as it is known today
  - Today’s HIMSS annual conventions attract a global audience of more than 45,000 attendees
- Since the 1980s, the development of high-quality health informatics research, education and infrastructure has been a goal of the U.S. and the European Union







# The Evolution of Health Informatics (1980s Cont'd)



- In the 1980s, the informatics community was also beginning to organize more into professional organizations
- IMIA became an independent organization in 1987 and was established under Swiss law in 1989
- The **American Medical Informatics Association** (AMIA) was formed in 1988
- The National Library of Medicine (NLM) (US) began to fund training programs in informatics that are today a major funding source for training research **informaticians** (also known as an **informaticist**, an informatician is an interdisciplinary professional practicing the science of informatics)
- In addition, the 1980s brought specializations within informatics, such as Nursing Informatics





# The Evolution of Health Informatics (1990s)



- Beginning in the 1990s and continuing to the present, we have seen much more general computer use
- The 1990s saw a need for increased practice efficiency, and younger physicians more likely to be receptive to technological improvements that can improve efficiency
- There was a growing trend for patient empowerment in the 90s. The shift was also fueled by technology changes, such as increasing availability of the Internet for healthcare information. Populations were becoming more and more comfortable with accessing that information through technology







# The Evolution of Health Informatics (1990s-2000s)



- The Data Protection Directive (officially **Directive 95/46/EC** on the protection of individuals with regard to the processing of personal data and on the free movement of such data), which regulates the processing of personal data within the European Union, was adopted in 1995
- In the US, HIPAA health data security legislation was passed in 1996
- In the 2000s Personal Health Records, that is electronic records of patient information controlled by the patients themselves, have begun to be developed
- One of the key foci in healthcare continuing into the 2000s was the concern with quality of care. This concern has continued to the present





# The Evolution of Health Informatics (2000s)



- The use of clinical guidelines and standardized protocols of care increased during this period. This is a major reason for an increased use of information technology
- The 2000s saw an increase in using technology for remote monitoring of patients in their homes, or what has been called telehealth
- Whereas telemedicine has tended to focus on treating acutely sick patients, telehealth can include monitoring patients with chronic conditions, or even working with patients through computer access, to keep them healthy





# The Evolution of Health Informatics (2010s)



- The 2010s brought the implementation of meaningful use of Electronic Health Records for Hospitals and Physicians in the United States, within their Medicare and Medical reimbursement programs. This led to gradual implementation and use of EMR/EHRs by a majority of healthcare providers and organizations nationwide over the first half of the decade
- The 2010s also saw widespread use of social media, smart phones, handheld technologies and other consumer applications for healthcare and telehealth purposes
- The General Data Protection Regulation, adopted in April 2016, supersedes the Data Protection Directive of 1995 and is enforceable starting on 25 May 2018





# Technology Evolution in Health Informatics

## Analogue era (1950's to 1980's):

- Telephone calls (or letters and physical visits) from patients
- Information was stored by typing or handwriting to a diary
- Chronological order of visits, patient information transcribed or mapped by a secretary stored in archives

## Digital era (1990's to 2000's):

- Data and information was written on a computer instead of a typewriter
- Internet could be used for searching information
- New ways of collecting data: images, imaging, sensors
- Data could be faxed or scanned
- Data is stored electronically

## Cyber era (2010's to present):

- Data is stored online for other doctors AND the patient to see
- Databases for symptoms, statistics and recommendations
- Active participation from other clinicians and the patient, other than just by calling to the doctor
- Social media, smart phones, internet applications and cloud storage are used for health information, education, communication and exchange



Figure: available (cited 18.10.2017): <https://www.healthcare-informatics.com/blogs/rajiv-leventhal/ehr/ehrs-evolution-are-they-advancing-too-slowly>



# The Benefits of Health Informatics



- Information is easily available in a digital format for healthcare professionals, the patient and possibly by family members as well (with proper authentication and credentials)
- Modern statistics and datasets, aligned with best practices and standards of care, are designed help clinicians quickly assess and make recommendations regarding symptoms, diagnoses and treatments. Flags and alerts are built in for better care protocols and minimize drug interactions, allergies, etc.
- Single-sign-on (SSO) and biometrics can eliminate the need for multiple passwords, logons, etc.
- Robust automatic and electronic systems decrease the time required for scheduling, storing data and sending information
- Younger, technology saavy healthcare staff are often very open to using digital skills in the workplace



# The Challenges of Health Informatics



- Information may need to be made available in different formats (paper, media, etc.) depending on patient preference and needs
- Clinical decision support engines and databases work best when they are standardized, making customization difficult and sometimes discouraged. Also, alerts may be over-sensitive. This may lead to decrease of use by some clinicians
- Cybersecurity is crucial when handling personal healthcare data, protection is dependent on the systems and devices, but also the professional's actions
- Requirements for hardware and software increase, when the systems get more complex
- More education is required for the workforce to handle all the technology used in the healthcare settings





# Information Technology versus Informatics



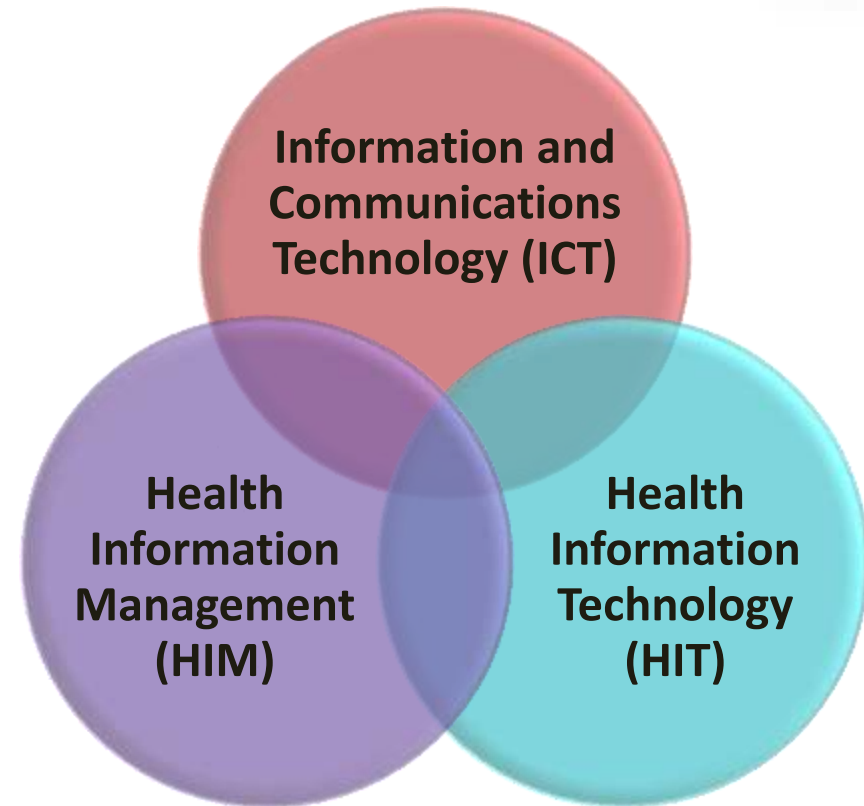
- It is important to understand the difference between information technology and informatics
  - The concept of health IT includes the use of technology in the healthcare field, but health informatics is not synonymous with health IT. Instead, informatics is “the science, the how and why, behind health IT,” according to the US Centers for Disease Control and Prevention.
- *Information technology* concentrates on the development, design and implementation of systems and technology tools in working with information
  - Focus is on the *Development* of systems and technology
- *Informatics* is concerned with the development, design and usability of information systems and technology tools to enable adoption, application or transformation of a process, for example, healthcare or biotechnology
  - Focus is on the *Process* of integrating information and systems



# The Dimensions of Health Informatics



- Health informatics incorporates a combination of knowledge, skills and abilities obtained from the dimensions of ICT, HIM and HIT
- The dimensions blend information and technology, health and management sciences
- Basically, Health informatics is making computers and technology accessible and usable for clinicians and all other end users





# The Principles of Health Informatics



Each dimension has several key principles that are important to the practice of health informatics

## ICT Principles:

- Facilitate appropriate consumer use of health information and communication technologies
- Integrate data quality into the identification, use and management of information systems
- Address information, business, and technical requirements to meet the full range of stakeholders' information needs
- Contribute to the selection and utilization of appropriate information technologies to meet business requirements
- Apply appropriate health informatics standards and models to enable system interoperability
- Apply knowledge of health data, information and workflow models to information technology solutions
- Relate information technology best practices (quality management systems, testing, service level agreements, business continuity, incident management) throughout the system life cycle
- Follow best practices and implement solutions required to maintain the security of data, systems, devices and networks

Information and  
Communications  
Technology (ICT)



# The Principles of Health Informatics



## HIM Principles:

- Demonstrate understanding of the need to balance the privacy of personal health information with improved care delivery and health system management
- Promote an information culture by facilitating appropriate uses of information and knowledge
- Facilitate individual, team, interdisciplinary and organizational learning and development through the use of appropriate technologies, communication channels and organizational skills
- Use quality improvement and process engineering to facilitate business and clinical transformation
- Contribute to ongoing evaluation of the functionality of systems so that they can evolve to support best practice in clinical care
- Apply principles of change management in the implementation of new processes or systems
- Demonstrate knowledge of indicators and metrics for healthcare delivery and systems management
- Assess and mitigate safety, privacy and other risks associated with health information and systems throughout the system life cycle





# The Principles of Health Informatics



## HIT Principles:

- Apply knowledge of basic clinical and biomedical concepts, clinical care processes, technologies and workflow
- Demonstrate knowledge of analysis, design, development and implementation of health information systems and applications
- Demonstrate knowledge of commonly used formats, structures and methods for recording and communicating clinical data and how these are incorporated into system and application use
- Foster the adoption and use of health information systems in clinical settings
- Demonstrate an understanding of architectural relationships between key health information technology components
- Facilitate clinicians' use of electronic decision support tools in accessing evidence to support practice
- Address the challenges related to the adoption and realization of the clinical value of information systems and technology in the health sector
- Promote the safe and appropriate use of health information technologies to ensure patient safety

Health  
Information  
Technology (HIT)



# Unit Review Checklist



- Described the evolution of informatics (FFB02)
- Explained the benefits and challenges of informatics (FFB01)
- Differentiated between information technology and informatics (JB05)
- Identified the three dimensions of health informatics
- Stated the main principles of health informatics in each dimension

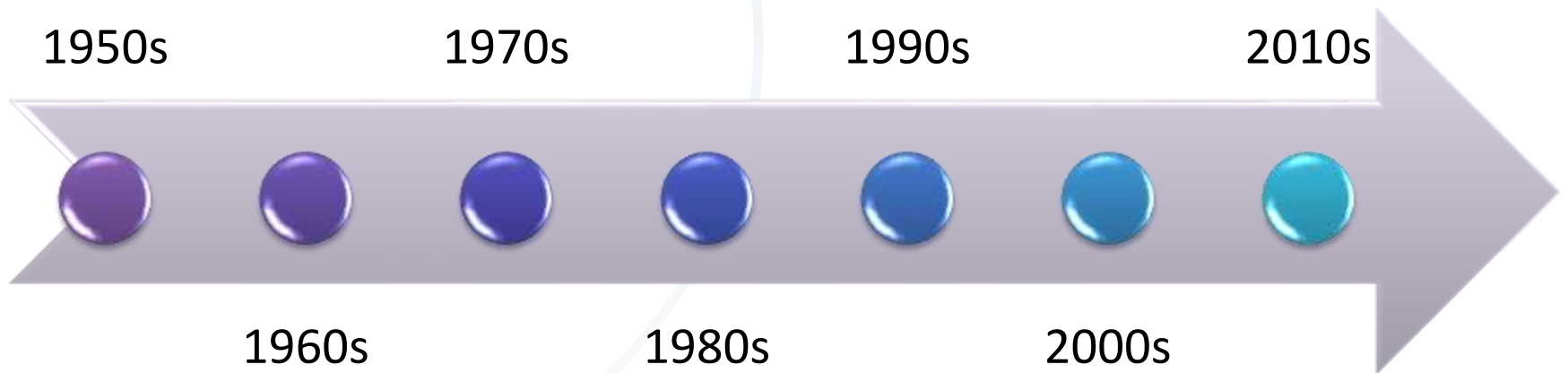




# Unit 21 Review Exercise/Activity



On the timeline below, list a major event in the evolution of health informatics for each of the decades given:





# Unit Exam



1. *True or False:*

AMIA was started in 1967

T F

2. *True or False:*

The earliest use of computers in health informatics was in dental projects during late 50s in the US

T F

3. *True or False:*

There were over 40 members at the first HMSS convention in the 1960s

T F

4. *True or False:*

The use of clinical guidelines and standardized protocols of care increased significantly during the 1970s

T F



# Unit Exam (cont'd)

5. Which of the following is a challenge of health informatics?
- a. Modern statistics and datasets used to compare symptoms, diagnoses and treatments
  - b. Information is easily available in a digital format for healthcare professionals, the patient and possibly by family members as well (with proper authentication and credentials)
  - c. Protection and security of data and information is not only dependent on the systems and devices, but also on the professional's actions
  - d. Electronic systems decrease the time required for scheduling, storing data and sending information



# Unit Exam (cont'd)



6. Which of the following is an HIM principle of health informatics?
- a. Contribute to the selection and utilization of appropriate information technologies to meet business requirements
  - b. Contribute to ongoing evaluation of the functionality of systems so that they can evolve to support best practice in clinical care
  - c. Demonstrate knowledge of analysis, design, development and implementation of health information systems and applications
  - d. Demonstrate an understanding of architectural relationships between key health information technology components