



# E health and health informatics

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# Learning objectives

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What are E health and Health informatics and their significance in today's healthcare?

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What are healthcare information systems?

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Interoperability and it's levels and it's importance in healthcare IT

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Usability and it's importance in healthcare IT and the importance of usability testing

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Standards for health informatics



A conceptual graphic for E-Health. A central teal rectangle contains the text "E-HEALTH" in white. Surrounding this rectangle is a network of white icons connected by dotted lines. The icons include: a hand holding a globe, a medical cross, a stethoscope, a laboratory flask, a telephone with a cross, a doctor's silhouette, a clipboard, test tubes, a heart with a cross, a virus/cell, a hospital truck, an eye, two pills, a heart, a hospital bed, and two syringes. The background is dark blue with a blurred image of a hand on the left.

# E-HEALTH

# Objectives



What is ehealth?



History of eHealth



Characteristics of E-health



Scope of eHealth in Developing Countries



Benefits of eHealth



# Introduction

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## What is E health?

eHealth can be defined as delivery of health care using modern electronic information and communication technologies when health care providers and patients are not directly in contact and their interaction is mediated by electronic means.





**World Health Organization (WHO) defines, eHealth as** “the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research.”

## According to World Health Organization ; three main core areas of eHealth are:

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- Delivery of health information, for health professionals and health consumers, through the Internet and telecommunications.
- Using the power of IT and e-commerce to improve public health services, e.g. through the education and training of health workers.
- The use of e-commerce and e-business practices in health systems management.



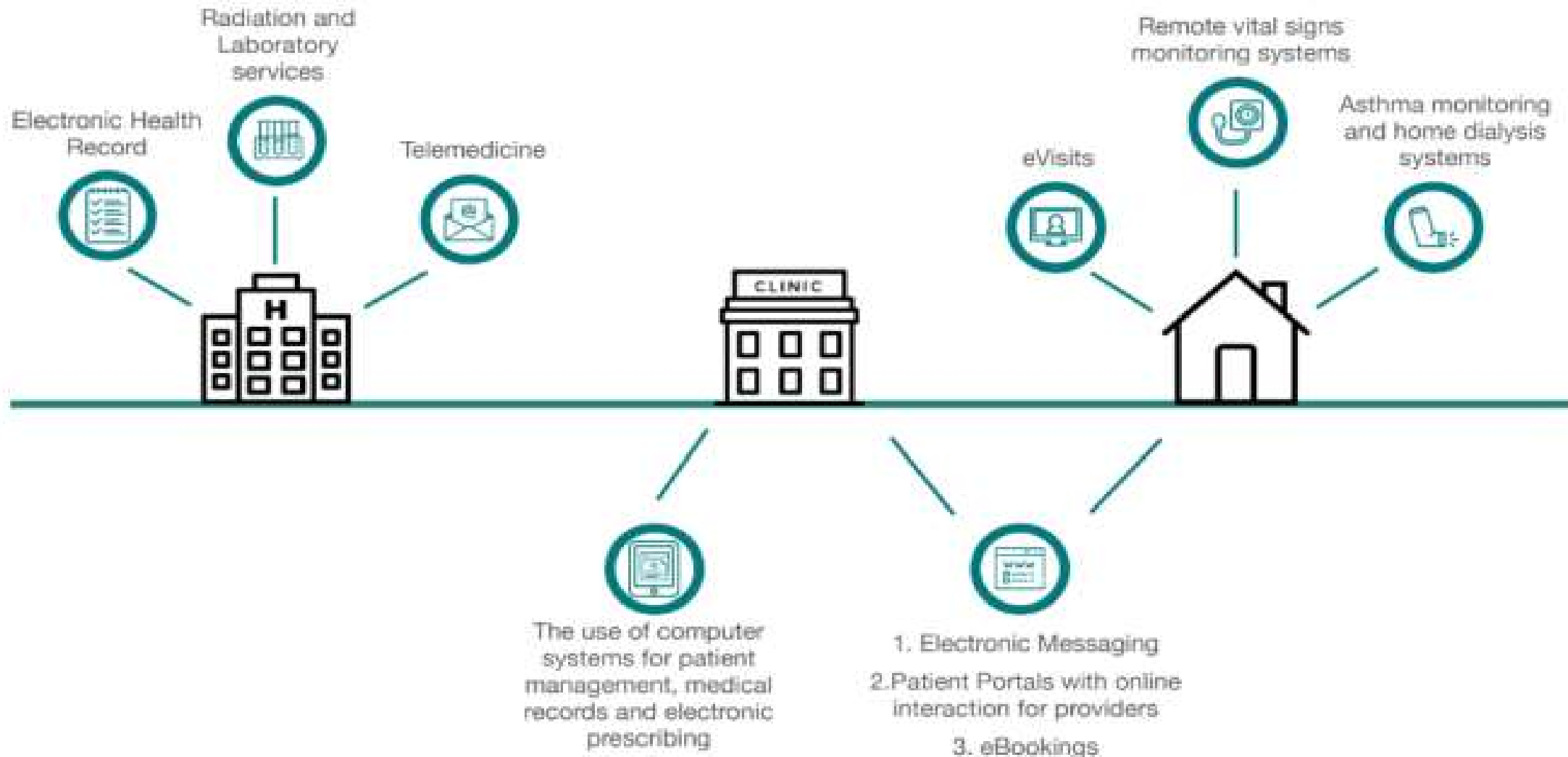
# History of eHealth

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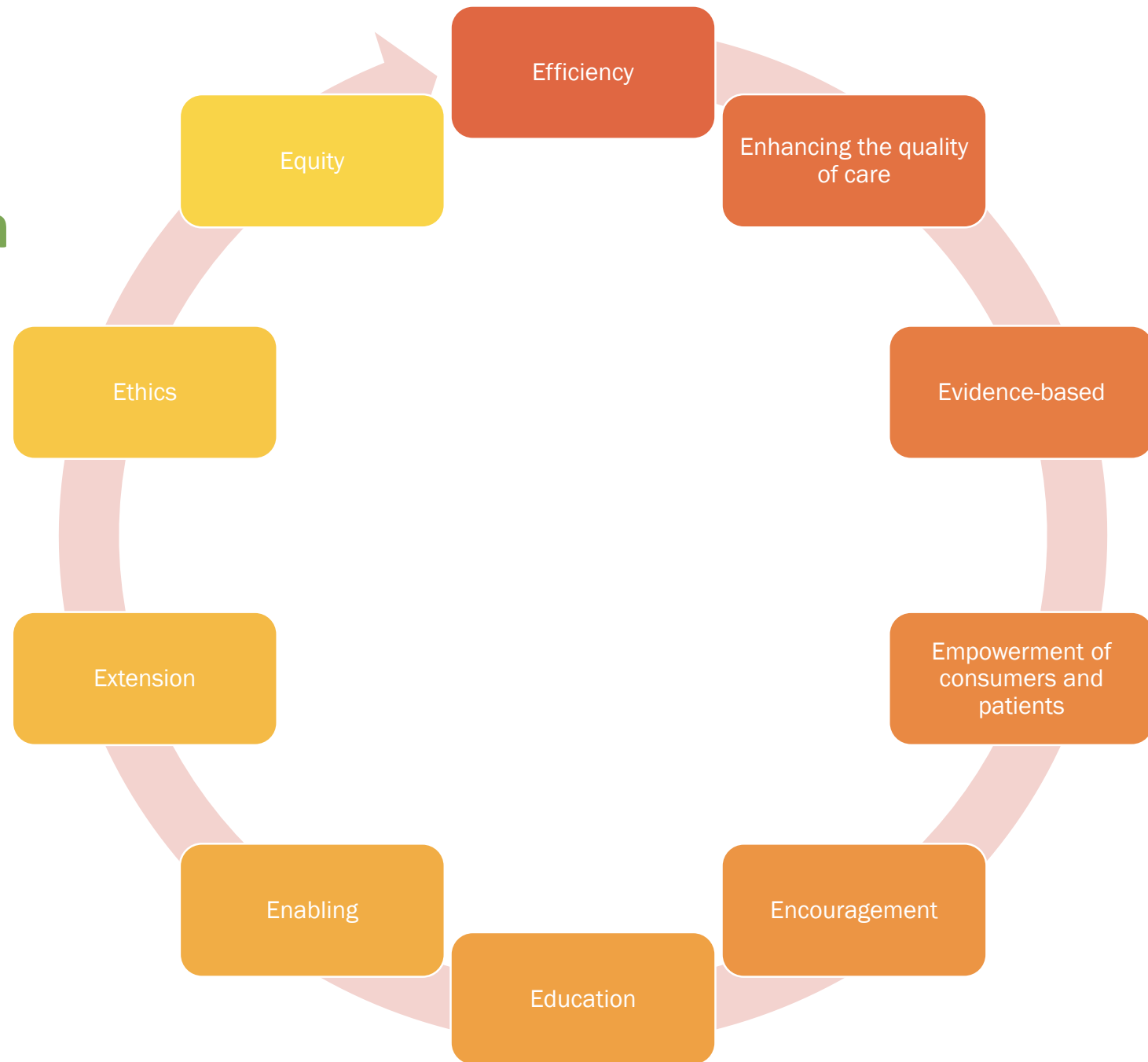
- Traditionally, health care providers kept paper records on the history and status of their patients.
- But with rise in the health care cost and technological advancement, it has encouraged the development of electronic tracking system.
- Thus the concept of digital health or eHealth emerged to designate the use of information and communication technologies (ICT) in the healthcare sector.
- eHealth is an evolving field in the juncture of medical informatics, public health, and business, stating to the health services and information distributed or heightened through the internet and associated technologies.

# Examples of eHealth solutions around you



# Characteristics of E-health

The ‘e’ in the eHealth doesn’t just mean ‘electronic’ but represents a number of e’s that characterize what eHealth is all about. The characteristics of e-health or what e-health should comprise of, can be illustrated in following 10 e’s.



## 1. Efficiency

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- One of the assurances of e-health is to ensure efficiency in health care with reduction in cost.
- Efficiency is achieved through avoiding duplicative or unnecessary diagnostic, decreasing overhead cost in practice and involving patients for improving communication.

## 2. Enhancing the quality of care

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- Increasing efficiency refers to not only decreasing costs but also improving quality of services.
- eHealth may improve the quality of health care by allowing comparisons between diverse providers.

### 3. Evidence-based

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- E-health interventions must be evidence-based in the sense that their value and competence should not be presumed but proven by laborious scientific assessment.
- Much work is still left to be done in this sector.

### 4. Empowerment of consumers and patients

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- eHealth incorporates expanding patients knowledge and access of personal electronic records over the internet
- This unseals new opportunities for patient-centered medicine and facilitates evidence-based patient choice.

## 5. Encouragement

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- Encouragement of patients participation through more proactive care.
- E-health provides encouragement for a new link between the patient and health expert, towards a true corporation, where choices are made mutually.

## 6. Education

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- For both patient and providers it is platform to expand knowledge through researches or health care information.
- eHealth helps to educate physicians and consumers through online sources (ongoing medical education and other resources)

## 7. Enabling

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- Creation of environment for easier exchange of information and easy communication between the consumer and the service provider.
- eHealth promotes information discussion and communication between health care institutions in a consistent way .

## 8. Extension

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- E-health extends opportunity of health care further than its conservative boundaries.
- E-health also facilitates consumers to effortlessly achieve health services online from international providers.

## 9. Ethics

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- E-health includes new forms of patient-physician communication, poses new challenges, and pressures to ethical issues
- e.g. online professional practice, informed consent, privacy and equity issues.

## 10. Equity

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- Despite clear gap between the 'haves' and 'have not', equity is one of the promises made by eHealth.
- E-health is and should be equitably accessible to all the people, irrespective of their age, race, gender, ethnicity etc.
- People, whose economic conditions are poor, people who lack skills, and access to computers and networks, cannot use computers efficiently. As a result, these patient populations (which would truly value the utmost from health information) are those who are the least expected to benefit from developments in information technology, except political trials ensure equitable access wholly.

# Scope of eHealth in Developing Countries

- eHealth has been broadly regarded as an opportunity for marked improvement in the public sector in developing countries.
- As developing countries are confronted with health-related problems, eHealth can be a sector for development of whole country.
- The strategic advantage is relevant to the developing countries where the access is limited due to various reasons.



- The tools of eHealth can lead to improve the quality and efficacy of healthcare services.
- Government in the developing nations are keeping eHealth in their priorities to bring improvement in quality, accessibility and capability of health sector.
- Patients and physician are encouraged to use eHealth technologies in effective ways to improve health care.
- eHealth can reduce the cost even in the emergency where resources shortage takes place.



# Benefits of eHealth

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- eHealth Provides quick access to patient records and information for efficient health care.
- Reduces paper work, reduced duplication of costs etc. thus reducing the cost of health care.
- Communication is much easier and bridges the gap between the patient and health service provider
- Patients conditions can be easily monitored through its use and their progress can be recorded in real time

- It is the most cost effective and time saving means to improve the access and quality of care
- Conveys the promises and excitement of bringing e-commerce to health care.
- Keeping track of the daily activities of what we eat, what is heart rate, how much sleep I got, when to take medicines, etc. have become very convenient
- Provides better health by encouraging healthier lifestyles in the entire population, including increased physical activity, better nutrition, avoidance of behavioral risks, and wider use of preventative care.
- In emergency situation, it can be used as the responders for consultation and easier flow of the fact based information.



- Can be used in the bridging the gap of inaccessibility of the resources for the consumer to receive the service.
- eHealth can also be used for distance learning.
- eHealth is crucial in accomplishing supreme health priorities such as universal health coverage (UHC) and the Sustainable Development Goals (SDGs).
- Reduces medical errors and better clinical decision making.
- Provides better health care by improving all aspects of patient care, including safety, effectiveness, patient-centeredness, communication, education, timeliness, efficiency, and equity.



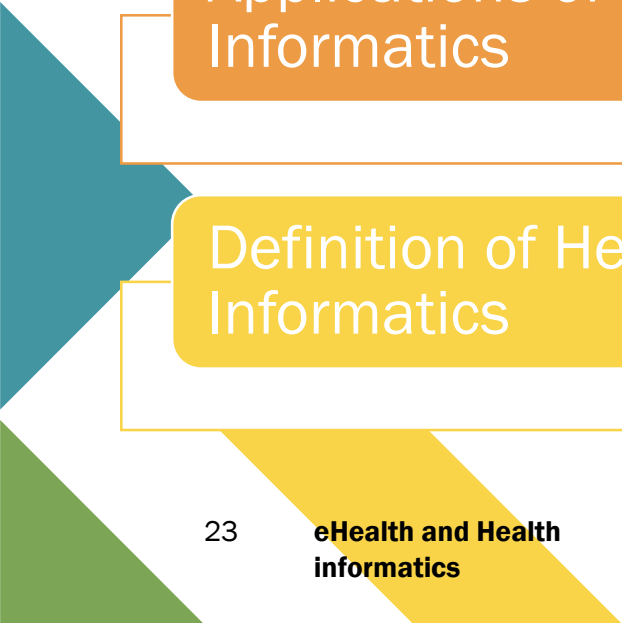


Enabling people to  
manage their own



# HEALTH INFORMATICS

# Objectives



Introduction

Applications of Health Informatics

Definition of Health Informatics



Goal of use of Health Informatics

How does Health Informatics and eHealth integrate?

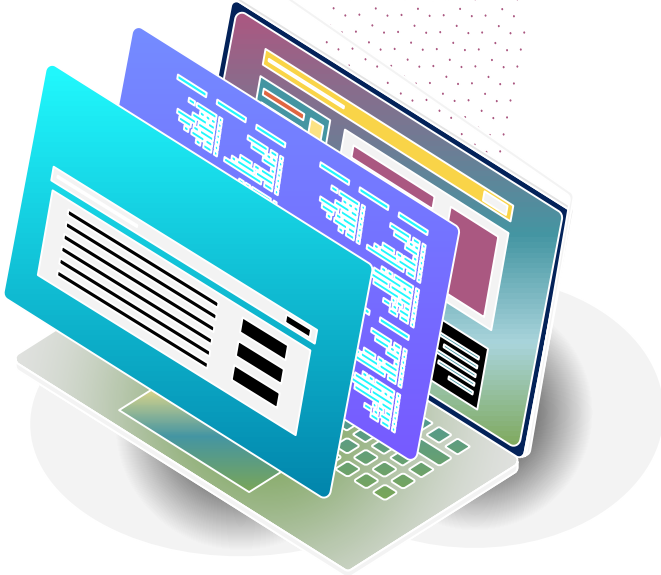
# Introduction

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- Health care informatics is, at a very basic level, the use of data and information technology to meet the **quadruple aim goals of health care**: improved clinical outcomes, lower cost of care, improved experiences for both patients and providers, and to provide better care in a more cost-effective manner.
- It also has important applications for health care professionals, public health specialists, insurance industry professionals, medical researchers, health care professionals administrators, biotech companies and more.

## Applications of health informatics include



**Communication with  
health care  
professional via email**



**Access medical  
records**



**Research health  
information**



**Tracking diseases and  
Monitoring public  
health**

# Definition of health informatics

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**According to the American Medical Informatics Association (AMIA),** “health informatics applies principles of computer and information science to the advancement of life sciences research, health professions education, public health, and patient care. This multidisciplinary and integrative field focuses on health information technologies (HIT), and involves the computer, cognitive, and social sciences.



# In short,

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**Health informatics** is the interdisciplinary study of the design, development, adoption, and application of IT-based innovations in public health and healthcare to improve health care and health.

- It comprises two main sub-disciplines: **clinical informatics** and **public health informatics**.
- health informatics is probably best defined in the context of e-health, which is generally accepted as an umbrella term composed of 2 elements:

## 1. health informatics

- related to the collection, analysis and movement of health information and data to support health care

## 2. telehealth

- related to direct e.g. videoconferencing or indirect e.g. website delivery of health information or health care to a recipient.

# The goal to use health informatics

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- Improve patient care at the individual and clinical level
- Improve the health of entire populations (for example, by using data to predict and even prevent outbreaks of disease in a particular geographical area)
- Enable health organizations to deliver care more cost effectively
- The widespread use of health care technologies and data management has allowed many health care specialties to utilize health informatics in ways that work best for them, meaning there is no “one size fits all” understanding of the field.



# How does health informatics and eHealth integrate?

- Health informatics provides the tools and domain knowledge that supports a quality driven eHealth platform.
- Standards developed by the health informatics community provide architecture which ensures that systems implemented are interoperable.
- Simply stated the systems across and between services can provide access to legible safe and accurate electronic health records.



- Such information is easily accessible for clinical judgements on best care for people.
- Health informatics also provides tools to support and facilitate change therefore making it possible to deliver the anticipated benefits for service users.
- Health informatics as an interdisciplinary and interprofessional field of practice provides knowledge and expertise to deliver integrated care which unites and provides an enabling environment to empower people to manage their health and well-being.



Source: <http://www.earth.org>  
Copyright © 2009 by Earth.org

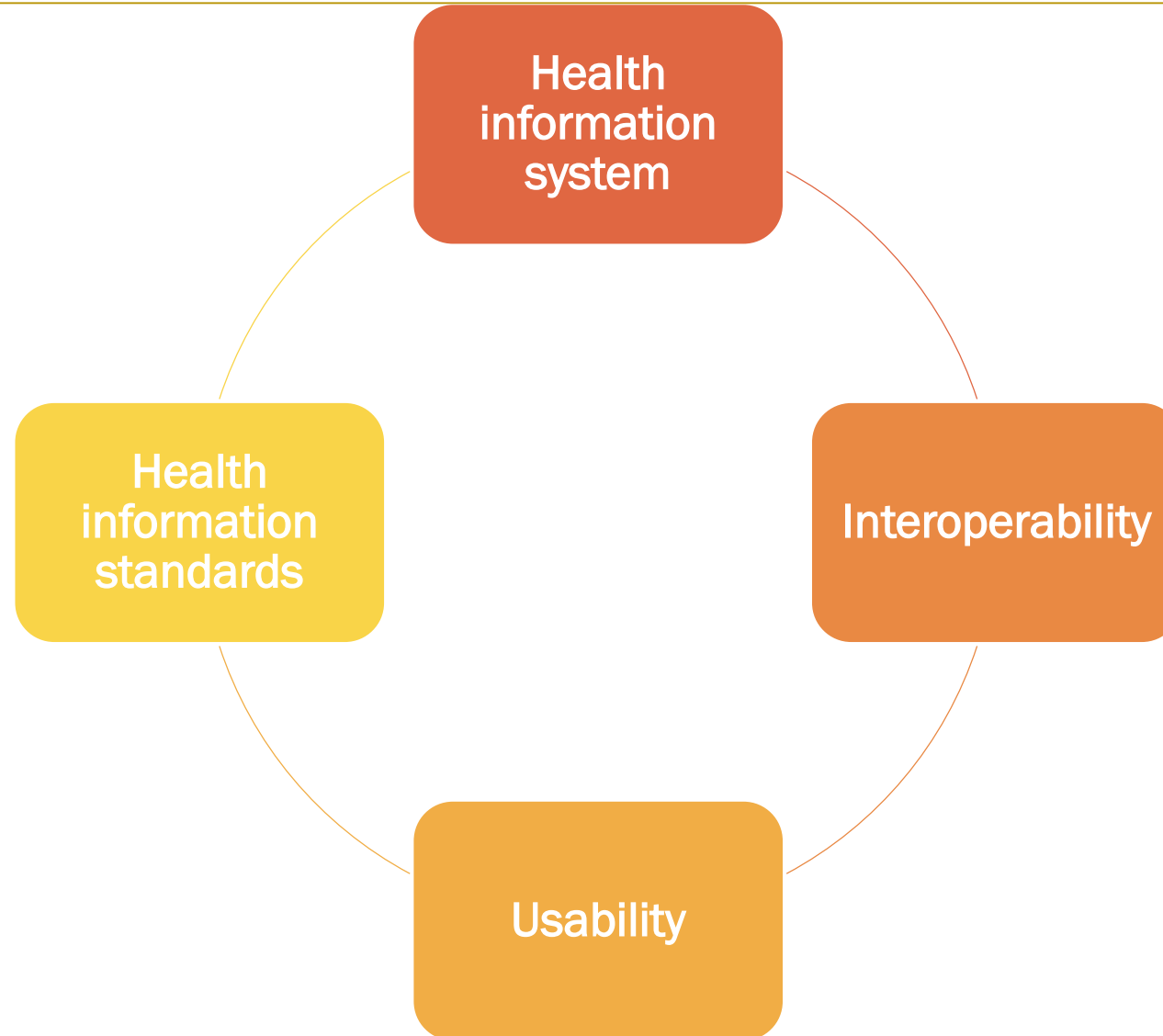


# Teamwork activity 1

- Describe the role of e-health and health informatics in your organization. What drawbacks it will remove from the existing system.
- How do you think developing countries would benefit from applying eHealth?



# Basic concepts in E health and Health informatics



The background image shows a modern hospital room with a large surgical light, medical equipment, and a patient bed. Overlaid on this is a complex network of white lines connecting various circular icons. These icons include a DNA helix, a book, a shield, a person, a Wi-Fi symbol, a camera, and a cloud. A central teal box contains the text 'Health information system(H.I.S.)'.

# Health information system(H.I.S.)

# Objectives

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Definition  
of H.I.S.

Importance  
of H.I.S.

Types of  
H.I.S.

Examples  
of H.I.S.

## Definition of health information system (H.I.S.):

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A system enables health care organizations to collect, store, manage, analyze, retrieval, and optimize patient treatment histories and other key data either clinical or non-clinical .



## Importance of (H.I.S.):

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- Information saves lives. This is especially true in the medical field.
- Placing health data into the right hands quickly depends on health information systems, which seamlessly and intelligently integrate health care with information technology.
- A health information system enables health care organizations to collect, store, manage, analyze, and optimize patient treatment histories and other key data.
- These systems also enable health care providers to easily get information about macro environments such as community health trends.
- Health information systems are also valuable to administrators, who can analyze statistics about different departments or procedures to better allocate the organization's resources.



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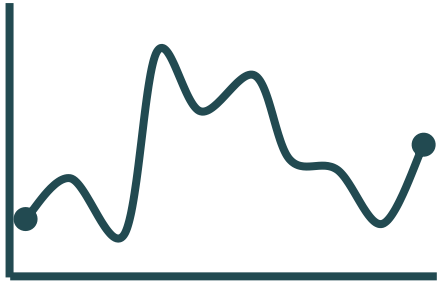


## 1-PATIENT-FACING HEALTH INFORMATION SYSTEMS

Many health care organizations now offer “patient portals,” which may be either websites or apps. Patients can log in to personal accounts to access secure information about their own medical history, such as records of previous doctor’s visits. Often, physicians or nurses will record a care plan, including recommended medicines or follow-ups, allowing the patient to participate in their own treatment. Patient portals also help patients see the results of lab work or other testing, schedule non-urgent appointments, or check the status of payments or insurance benefits.

## 2-PROVIDER-FACING HEALTH INFORMATION SYSTEMS

Other systems are intended for providers. These systems may include information about population health, trends within the hospital, or other data that can inform treatment decisions.



## 3-CLOUD-BASED HEALTH INFORMATION SYSTEMS



- Another important distinction involves cloud-based information systems, where common records are made accessible across different departments or even different facilities.
- For example, in a five-hospital system, providers at each facility can log in to the remote cloud server to view or amend patient records.
- Cloud-based systems play an important role in collaborative care. The patient's journey is not always linear, and a comprehensive treatment plan may involve the patient seeking input from different providers, specialists, or therapists.
- When each provider in this chain can easily access the same information, it helps ensure a clear picture of the patient's treatment history, minimizes redundant treatments, and keeps providers all on the same page.

# Examples of Health Information Systems

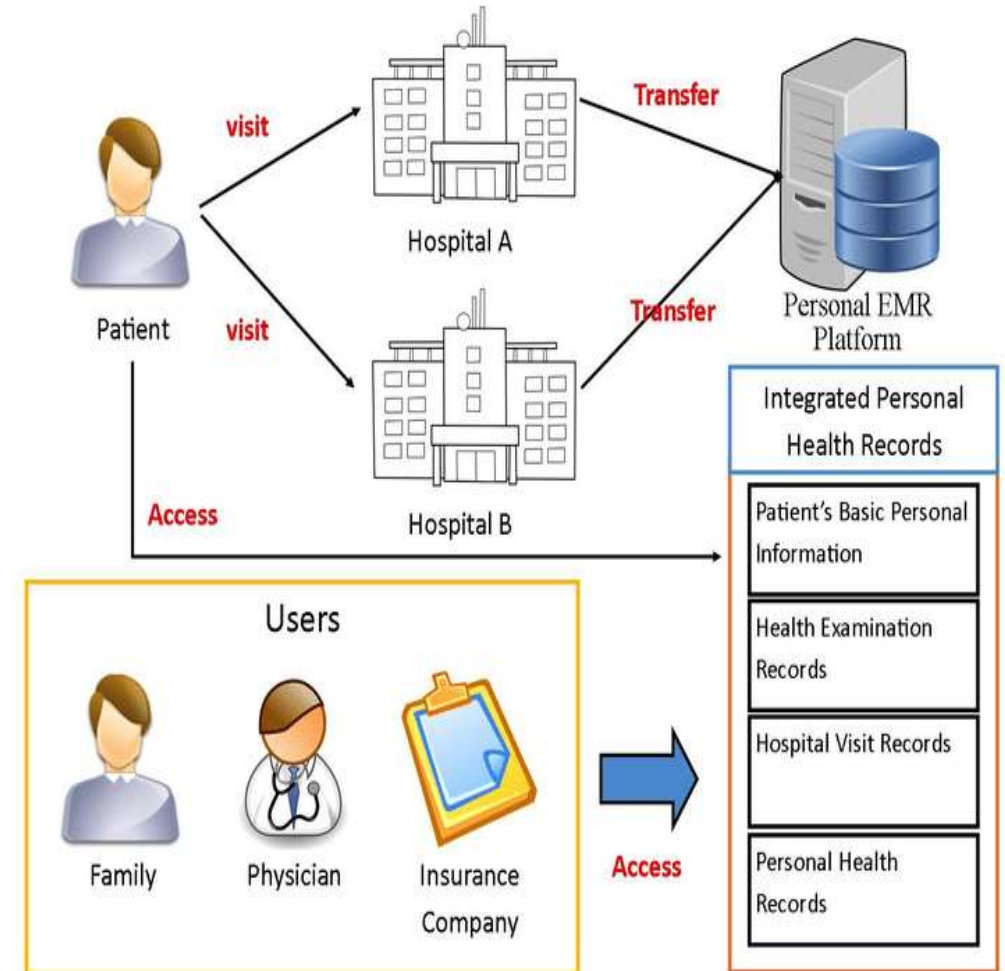
Within these overarching categories are several specific examples of health information systems. Here are a few of the most common ones.



# Examples of Health Information Systems

## 1. Electronic Medical Record (EMR) and Electronic Health Record (EHR)

EMR and EHR systems replace paper patient records. The medical information on each patient is collected and stored electronically. These records include patient health information, test results, doctor and specialist visits, healthcare treatments.



# Examples of Health Information Systems

## 2. Practice Management Software

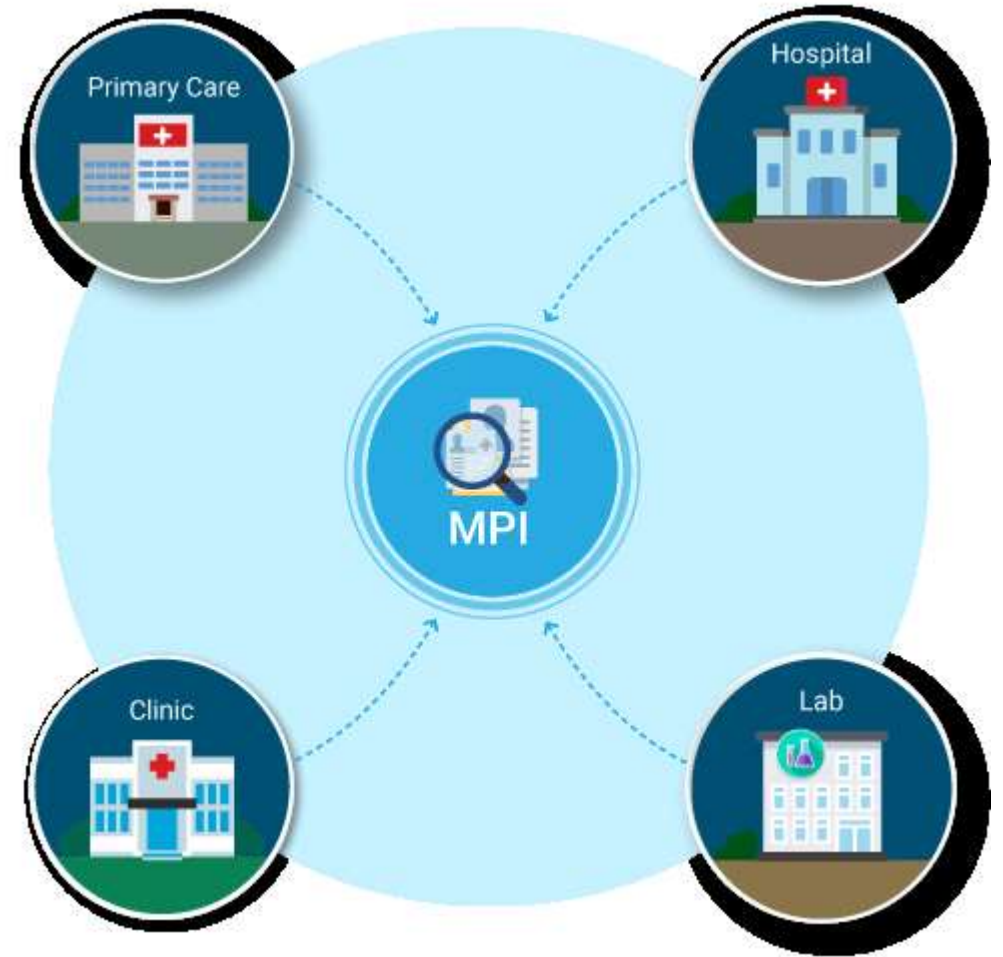
- Information systems assist healthcare facilities and personnel with the management of daily operations of the facility.
- This includes scheduling of patients and medical services billing. Regardless of their size from single practice doctors to huge multi-center hospitals, all healthcare providers utilize practice management systems.
- The goal is to automate administrative tasks carried out as part of doing business in the facility.



# Examples of Health Information Systems

## 3. Master Patient Index (MPI)

- The software of this healthcare information system connects patient records to more than one database.
- The MPI contains records for any patient registered at a healthcare organization.
- MPI creates an index on all the records for that patient.
- MPIs reduce duplicate patient records and avoid inaccurate patient information that could result in patient claim denials.



# Examples of Health Information Systems

## 4. Patient Portals

- This information system enables patients to peruse their health data.
- They can access appointment information, medications they may be receiving, and their lab results via the internet.
- Some patient portals also facilitate active communication with healthcare professionals, including physicians, pharmacists regarding their prescription refill requests, and scheduling of appointments.



## Examples of Health Information Systems

### 5. Remote Patient Monitoring (RPM)

- Also known as telehealth, RPM provides medical sensors that can transmit patient data to healthcare professionals.
- RPM can monitor blood glucose levels and blood pressure. It is particularly helpful for patients with chronic conditions such as type 2 diabetes, hypertension, or cardiac disease.
- Data collected and transmitted via RPM can be used by a healthcare professional or a healthcare team to detect medical events such as stroke or heart attack that require immediate and aggressive medical intervention.
- Data collected may be used as part of a research project or a health study.
- RPM is a life-saving system for patients in remote areas who cannot access face-to-face health care.



# HOW REMOTE MONITORING WORKS



**1 SCHEDULE**  
Clinic schedules dates for the patient to send information from their device to the clinic.

**2 SEND**  
Device information is sent automatically (for wireless ICDs) or manually by the patient (for pacemakers).

**3 TRANSMIT**  
Device information travels from the remote monitor to the clinic.

**4 REVIEW**  
The clinic reviews the device information on a secure website.

# Examples of Health Information Systems

## 6. Clinical Decision Support (CDS)

- CDS analyzes data from clinical and administrative systems.
- The aim is to assist healthcare providers in making informed clinical decisions.
- Data available can provide information to medical professions who are preparing diagnoses or predicting medical conditions like drug interactions and reactions.
- CDS tools filter information to assist healthcare professionals in caring for individual clients.



# THE BENEFITS OF CDS SOLUTIONS

## IMPACT ON PATIENT OUTCOMES <sup>2</sup>

HIGHER  
QUALITY-OF- LIFE  
SCORES

REDUCING  
PATIENT  
MORTALITY AND  
ADVERSE  
EFFECTS

IMPROVING  
EFFICIENCY AND  
REDUCING COSTS

INCREASING  
PATIENT  
SATISFACTION



INCORPORATING EVIDENCE-BASED MEDICINE  
INTO POWERFUL CDS SOLUTIONS CAN:

VARIABILITY

PATIENT  
OUTCOMES

OPTIMISE  
EHR  
INVESTMENT

ACHIEVE  
NEAR-TERM  
ROI

## THE EFFECT ON CLINICIANS <sup>1</sup>

60% MORE LIKELY  
TO PRESCRIBE  
THE CORRECT  
MEDICINES AND  
THERAPY

70% MORE LIKELY  
TO ORDER THE  
NECESSARY  
DIAGNOSTIC  
TESTS

60% MORE LIKELY  
TO MONITOR  
DRUG EFFECTS  
IN LINE WITH  
EVIDENCE

40% TIMES MORE  
LIKELY TO TAKE  
APPROPRIATE  
PREVENTATIVE  
MEASURES

### REFERENCES

<sup>1</sup> 8 SYSTEMATIC REVIEWS – IMPLEMENTATION SCIENCE, AHRQ, ANNALS OF INTERNAL MEDICINE.  
<sup>2</sup> BATES, DAVID. (2001) "REDUCING THE FREQUENCY OF ERRORS IN MEDICINE USING INFORMATION TECHNOLOGY," JOURNAL OF THE AMERICAN MEDICAL INFORMATICS ASSOCIATION.

# Examples of Health Information Systems

## 7. Laboratory Information System (LIS)

- LIS software allows doctors and lab technicians coordinate inpatient and outpatient tests for microbiology, hematology, chemistry, and immunology to obtain clinical data.
- A standard information system for a lab manages patient demographics, check-in information, specimen entry and processing, and results.



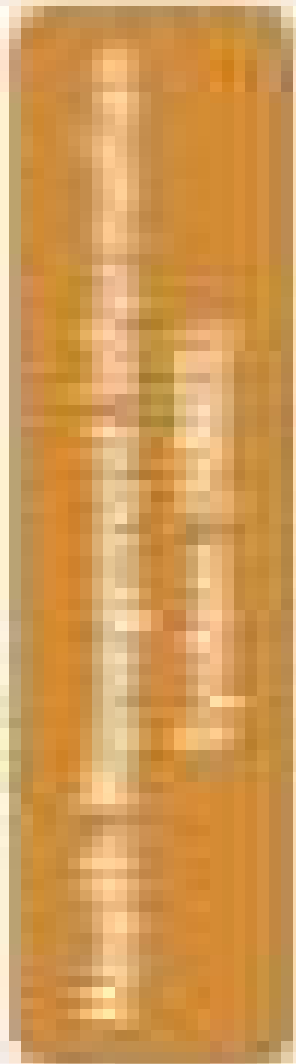
EMR

HIS

EMR

EHR

HIS



**INTEROPERABILITY**

# Objectives of interoperability:

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•Definition of interoperability.

•Levels of interoperability.

Why Is Interoperability Important In Healthcare?

## Definition of Interoperability.

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**Interoperability in health care Information Technology (I.I.T)** is the ability of different information systems, devices and applications to access, exchange, integrate and cooperatively use data in a coordinated manner, within and across organizational, regional and national boundaries, to provide timely and seamless portability of information and optimize the health of individuals and populations globally.



## Interoperability Example

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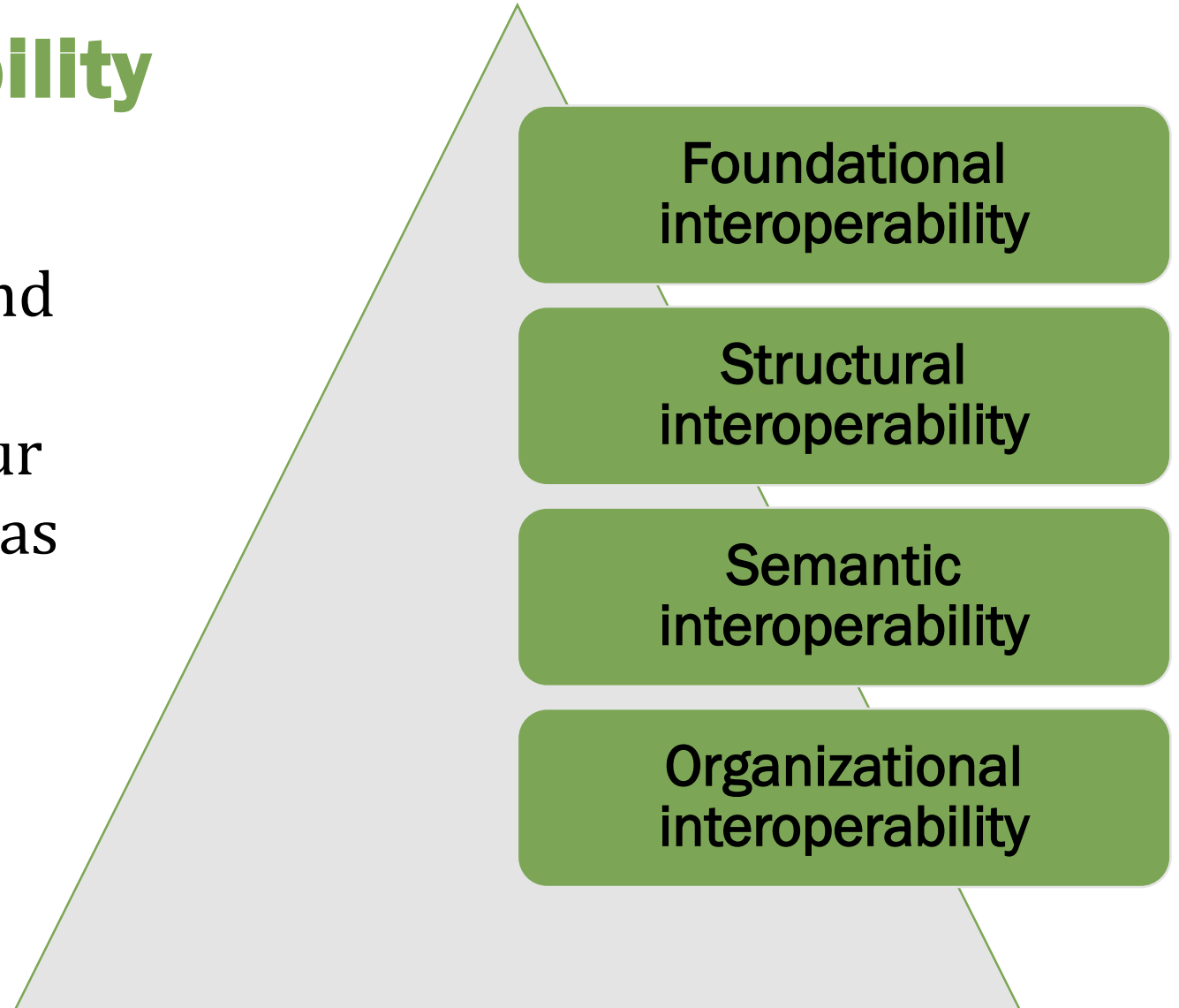
- A good interoperability example is the development of infusion pump interfaces. The calculations used to be written on a printed order, then programmed into the device by a nurse.
- There are now interfaces that transmit the medication calculations from a hospital EHR system to the pump. The process includes safety checks that require human confirmation of the calculation before the medication is started.



# Levels of interoperability

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The Healthcare Information and Management System Society (HIMSS) has come up with Four levels to define what qualifies as interoperability.



# 1-Foundational Interoperability

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is the lowest level of operation, requiring data exchange from one system or device to another without an expectation that the data is interpreted.

An example might be the use of a patient portal to send a PDF document that has patient history information.

The recipient of the PDF document would need to open it and manually enter that data into an electronic medical record system.



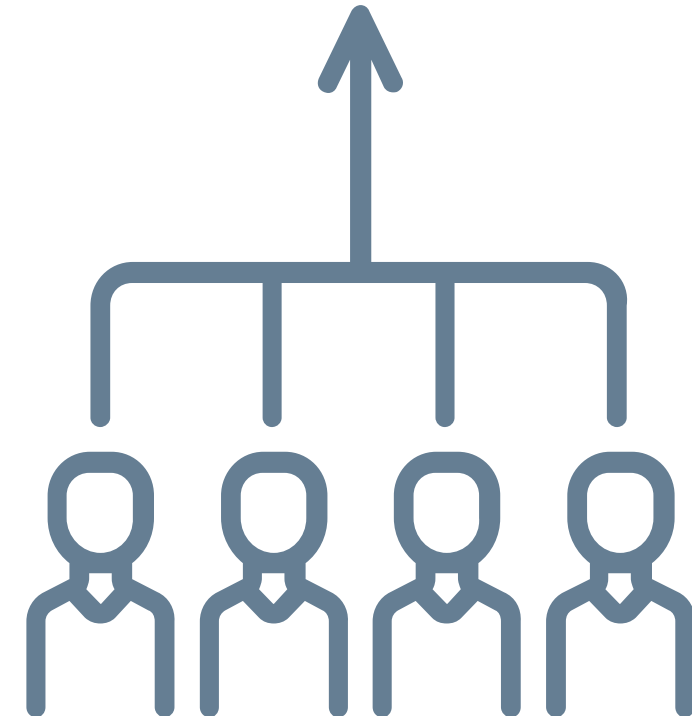
## 2-Structural interoperability

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is the next level of operation requires the data to follow some structure or format, that there is uniform movement of the data, and that the data is stored somewhere in the receiving system.

The data also needs to be preserved in its original form. Examples of structural interoperability are HL7 interfaces and the transmission of patient data from connected devices like Fitbits.

Patient portals can be configured to allow patients to upload data from these devices. .



### 3-Semantic interoperability

is the **highest level** of interoperability, requiring interpretation and use of the data to achieve positive outcomes.

Examples of semantic interoperability are **health information exchanges** and **data collection methods** for population health.

Population health technology makes use of risk scores, which are calculations of many clinical data points to predict, for example how likely a patient is to be readmitted to a hospital in the near future.

A clinical case manager can work from a report of risk scores to personally reach out to high risk patients with intervention activities.



Health Level Seven International (HL7), a standards development organization (SDO), talks about functional and semantic interoperability:

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## Functional interoperability

- is the capability to reliably exchange information without error.

## Semantic interoperability

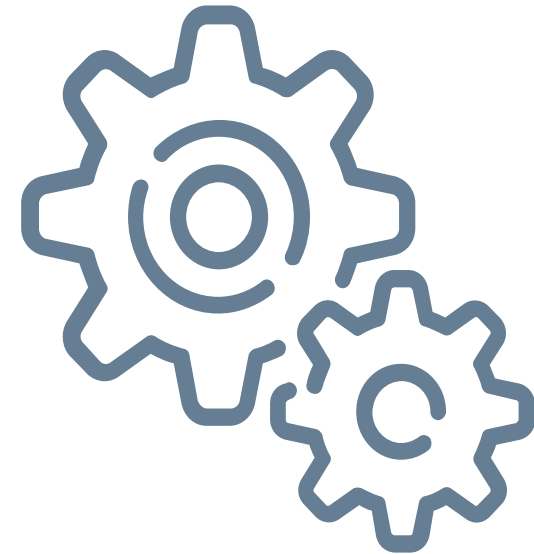
- is the ability to interpret, and, therefore, to make effective use of the information so exchanged

## 4-Organizational interoperability

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Includes governance, policy, social, legal and organizational considerations to facilitate the secure, seamless and timely communication and use of data both within and between organizations, entities and individuals.

These components enable shared consent, trust and integrated end-user processes and workflows



# Why Is Interoperability Important In Healthcare?

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- **Interoperability in eHealth systems is important for:**
  1. delivering quality healthcare and reducing healthcare costs.
  2. Health Information Exchange and Data Sharing
- **Health information exchange (HIE)**, provides the capability to electronically move clinical information among disparate healthcare information systems and maintain the meaning of the information being exchanged.
- The goal of health information exchange is to facilitate access to and retrieval of clinical data to provide safe, timely, efficient, effective and equitable patient-centered care.
- HIE can also be used by public health authorities to assist in the analysis of the health of populations.

The term HIE is generally used as either a verb or a noun.

**Verb:** The electronic sharing of health-related data between two or more organizations facilitated by applied standards for use by a variety of stakeholders to inform health and care.

**Noun:** Organizations within the United States that provide health information exchange technology and services at a state, regional or national level and often work directly with communities to promote secure sharing of health data.



- **In the European Union**, the act of information exchange is often referred to as data sharing.
- **The European Commission's Support Centre for Data Sharing** uses the term to refer to the collection of practices, technologies, cultural elements and legal frameworks that are relevant to transactions in any kind of information digitally, between different kinds of organizations.
- This term is more broadly applied to all types of data sharing, but can also be specifically used for health-related data.



## Teamwork activity 2

- Is anyone using eHealth or mHealth tools for activity ,vital sign , life style monitoring ,and food security and safety?
  - a. Yes
  - b. No
- What are the parameters to evaluate the effect of public health interventions based on eHealth as a user?

# USABILITY



## Usability Objectives:

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Definition of usability

The importance of usability

Usability testing

# What Is Usability?

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Usability refers to the quality of a user's experience when interacting with products or systems, including websites, software, devices, or applications.

Usability is about effectiveness, efficiency and the overall satisfaction of the user.



Usability is not a single, one-dimensional property of a product, system, or user interface.

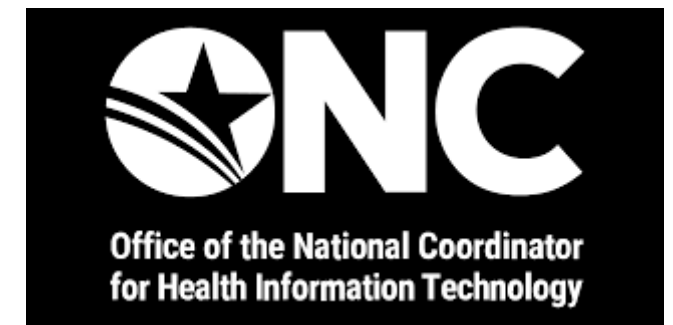
‘Usability’ is a combination of factors including:

- **Intuitive design:** a nearly effortless understanding of the architecture and navigation of the site
- **Ease of learning:** how fast a user who has never seen the user interface before can accomplish basic tasks
- **Efficiency of use:** How fast an experienced user can accomplish tasks
- **Memorability:** after visiting the site, if a user can remember enough to use it effectively in future visits
- **Error frequency and severity:** how often users make errors while using the system, how serious the errors are, and how users recover from the errors
- **Subjective satisfaction:** If the user likes using the system



# What is the importance of usability?

- Productivity, patient safety, clinician satisfaction, clinician burnout, profitability – all of these things and more are impacted by health informatics usability .
- Some experts even conclude that it's the single most important thing to look for when choosing a new health informatics system.
- Plus, it's required for patient-safety related 2015 Edition criteria by the ONC



# Usability Testing

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Usability testing refers to evaluating a product or service by testing it with representative users.

To run an effective usability test, you need to develop a solid test plan, recruit participants, and **then** analyze and report your findings.

**The goal** is to identify any usability problems ,collect qualitative and quantitative data and determine the participant's satisfaction with the product.



# Why Usability Test?



**Uncover Problems**  
in the design



**Discover Opportunities**  
to improve the design



**Learn About Users**  
behavior and preferences

# Benefits of Usability Testing

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- Learn if participants are able to complete specified tasks successfully and
- Identify how long it takes to complete specified tasks
- Find out how satisfied participants are with your Web site or other product
- Identify changes required to improve user performance and satisfaction
- And analyze the performance to see if it meets your usability objectives



# Objectives:

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Definition of  
standard

Definition health  
information  
standard

Standards  
Development  
Organizations  
(SDOs)

Purpose of Health  
information  
standards

Implementation of  
Standards

Key standard  
developers and  
types of standards

## What is meant by standard ?

Something considered by an authority or by general consent as a basis of comparison ; an approved model.

## What are health informatics standards?

Document, established from evidence and by consensus and approved by a recognized body, that provides rules, guidelines or characteristics for activities or their results, in the field of information for health, and health information and communications technology.



# Standards Development Organizations (SDOs)

- **ISO** :International Organization for Standard (also known as the International Standards Organization)
- **CEN** :European Committee for Standardization
- **JIC** :JIC for Global Health Informatics Standardization
- **HL7** :Health Level Seven International
- **Open EHR** :Open Electronic Health Record Foundation
- **CDISC** :Clinical Data Interchange Standards Consortium
- **ANSI** :American National Standards Institute



# Purpose of HI Standards

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\*At a general level, HI standards support clinical practice and the management, delivery, and evaluation of health services.

**According to ISO, their specific purpose is to:**

- promote interoperability between independent systems,
- enable compatibility and consistency for health information and data
- reduce duplication of effort and redundancies.



# Implementation of Standards

In healthcare, data standards will be implemented with one (or a mix of) of three primary goals in mind:

1-To **improve** the outcome of an individual patient's diagnostic and treatment process by involving a team of healthcare professionals, for example: Computer-based clinical guidance in breast cancer to aid the creation of optimal personal treatment plans.

2-To **serve** the national health system's goals (such as quality reporting, public health, health technology assessment, clinical research, and so on), e.g, monitoring the quality of diabetes patients' care has resulted in the systematic recording of key process indicators as well as proximal and distal outcomes.

3-To **increase** commercial interest in investing in solutions needed by patients and/or professionals in health management and the delivery of healthcare services due to the diversity of equipment in multiple vendors access to the market.



# Key standard developers and types of standards

Main standards created by Standards Development Organizations (SDOs) and widely used across healthcare organizations fall into four large groups:

○Terminology

○Content

○Data exchange or transport standards

○Privacy and security standards

# 1-Terminology standards:

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- Health data may be exchanged without terminology standards, but there's no guarantee that all parties will be able to understand and use it.
- Imagine that each system calls the same disease or process by a different name. Or, vice versa, gives the same name to different elements.
- The absence of a unified vocabulary leads to miscommunication, and in healthcare it can literally be a matter of life and death.



To avoid ambiguity and enhance the clarity of content, healthcare systems rely on **code sets** and **classification systems** representing health concepts.

**For example,**

- \* **ICD-10-CM** codes for diagnoses
- \* **CPT** – Outpatient services and procedures
- \* **HCPCS**- medical equipment and supplies
- \* **CDT**- Dental services
- \* **SNOMED CT** – clinical concepts
- \* **LOINC**- Laboratory observations
- \* **NDC** -pharmacy products
- \* **RxNorm**- Clinical drugs



## 2-Content standards:

- \*C-CDA- clinical documents
- \*HL7 V2 and V3 – Clinical messages
- \*USCDI- Set of exchange data elements

Content standards dictate the structure of electronic documents and types of data they must contain. They ensure that medical data is properly organized and represented in a clear and easy to understand form.

for example

C-CDA{ Consolidated Clinical Document Architecture) designed by HL7 is the primary framework for creating electronic clinical documents in the US. It specifies how to structure medical records and how to encode data elements for exchange.



## HL7 – What Does it Mean?

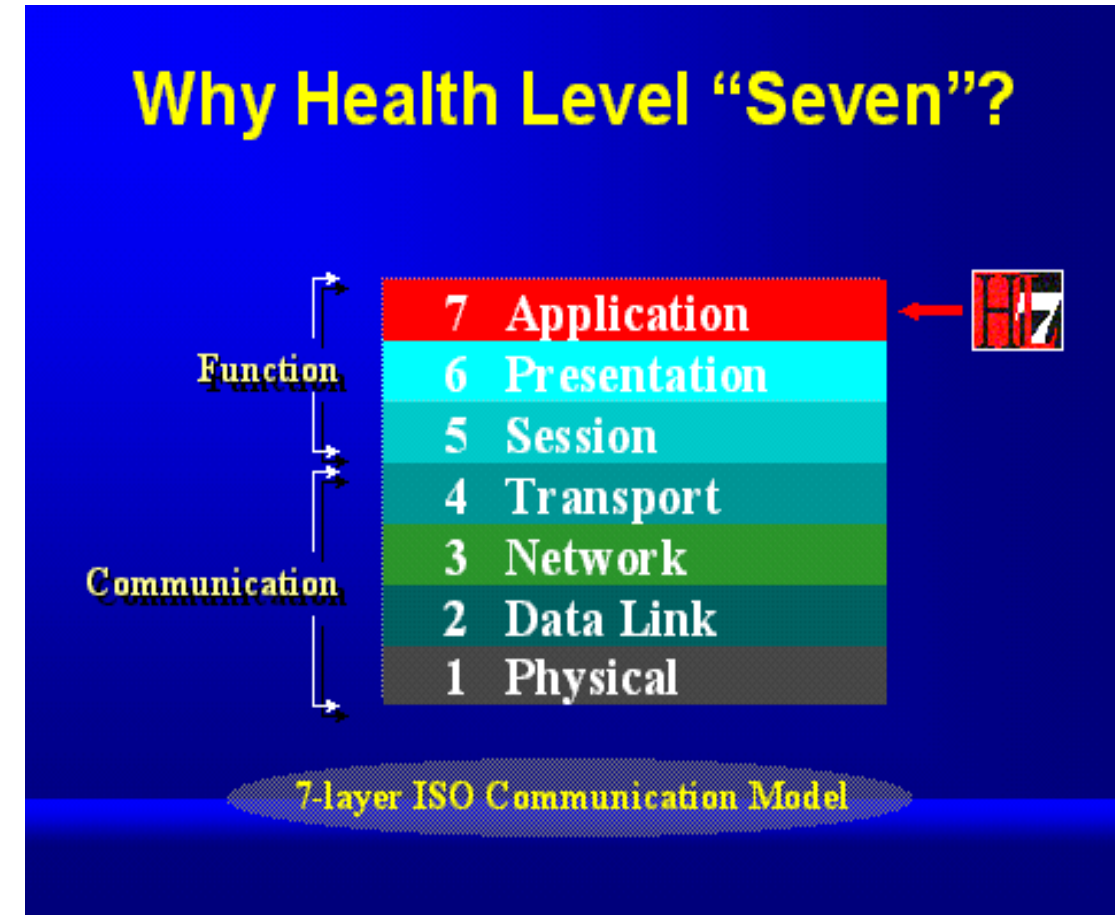
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Is a set of international standards used to provide guidance with transferring and sharing data between various healthcare providers.

Health Level Seven International (HL7) is a non-for-profit, ANSI accredited standards developing organization , dedicted to providing a comprehensive framework and related standards for the exchange integration, sharing and retrieval of electronic helath information that supports clinical practice and the management delivery and evaluation of health services.



- “Level Seven” refers to the seventh level of the International Organization for Standardization (ISO) seven-layer communications model for Open Systems Interconnection (OSI) – the application level.
- The application level interfaces directly to and performs common application services for the application processes.
- Although other protocols have largely superseded it, the OSI model remains valuable as a place to begin the study of network architecture.



- A key difference between an HL7 document (C-CDA) and an HL7 message is that the former is basically an electronic representation of a physical document while the latter is a packet of data sent from one system to another.
- US healthcare relies primarily on version 2 and 2.x messaging that is supported by every EHR system. Version 3 is widely adopted across the world, but not in the USA.
- Each HL7 message does its specific job identified by its name that contains 3 characters. The widely-used message types are

**VXU messages** to send vaccination history,

**ADT messages** so send demographic updates,

**QBP messages** to request immunization history, and

**RSP messages** to return immunization history.

**Each message is composed of several string-like segments, each starting with a 3-character name. Segments, in turn, contain fields that carry data elements.**



### 3-Data exchange or transport standards:

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The Agency for Healthcare Quality and Research (AHQR) in the U.S. identified seven quality criteria to guide . These are:

- **Credibility:** includes the source, currency, relevance and editorial review process
- **Content:** accuracy and completeness
- **Disclosure:** informs the user of the purpose of the site, as well as any profiling or collection of information associated with using the site.
- **Links:** evaluated according to selection, architecture, content, and back linkages.
- **Design:** accessibility, logical organization (navigability) and internal search capability.
- **Interactivity:** feedback mechanisms and means for exchange of information among users.
- **Caveats:** whether site function is to market products and services or is a primary information content provider.

# Examples of practice standards – Information Literacy and Information Quality

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\*FHIR -API patient data exchange



\*Direct -Secure message exchange

\*DICOM- Medical image exchange



\*SCRIPT – e-prescription exchange

\*CDISC – Clinical trial data exchange



## 4-Privacy and security standards:

### Protection of Individuals

- Across the globe clinicians are required to ensure confidentiality, privacy and security of information, irrespective of whether it is held and communicated on paper or electronically.
- When and how to share patient information with others is a major issue for clinicians, including sharing with law enforcement and other non-health agencies.



For example, the **Royal College of Nursing** provides a summary of the scope of the conversation that should be had with the patient regarding their health record, including:



- The kinds of information that is being recorded and retained.
- The purposes for which the information is being recorded and retained.
- The protections that are in place to ensure non-disclosure of their information.
- The kinds of information sharing that will usually occur.
- The choices available to them about how their information may be used and disclosed.
- Their rights to access and where necessary to correct the information held about them on paper or electronic records.



# Examples of practice standards – Confidentiality, privacy and information security



## Organizations:

- **Centre for Disease Control (CDC) and the US Department of Health and Human Services** :HIPAA Privacy Rule and Public Health (2013)

- **College of Registered Nurses of British Columbia** :Practice Standard – Privacy and Confidentiality (2010)



- **Department for Education (England)** :Information Sharing: How to judge a child or young person's capacity to give consent to sharing of personal information (2011)

- **Nursing and Midwifery Council (UK)** :Regulation in Practice: Confidentiality (2012)



- **Royal College of Nursing (UK)** :Consent to create, amend, access and share eHealth records (2012)



Thank  
you

