Integration of eHealth

Foundational Curriculum:
Cluster 6: System Connectivity
Module 10: Interoperability, Interfaces and Integration of eHealth
Unit 3: Integration of eHealth
FC-C6M10U3

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Unit Objectives

• Define health information integration
• Define system integration and interfacing and describe the challenges of integrating disparate but similar systems (KB06)
• Describe the relationship of continuity of care and integration
• List the types of integration
• Describe the integration models
• Explain the concepts of and technologies used in mobile, teleHealth, and system interoperability and describe how these relate to health information exchange (KB05)
• Describe how health information exchanges and telehealth can improve communication between providers (KL02)
Integration in healthcare is defined as the process of linking health information and software applications and systems, physically or functionally.

Integration of diverse data and systems is required in order to evolve eHealth towards a more integrated health environment, both for professionals and patients.

The World Health Organization defines integrated care as the concept of “bringing together inputs, delivery, management and organization of services related to diagnosis, treatment, care, rehabilitation and health promotion”.

Integration is a means to improve services in relation to access, quality, user satisfaction and efficiency.
System Integration

- **System integration** is a process of combining multiple sub-systems into one system. In system integration it needs to be ensured that the sub-systems function together correctly.
- System integration can be either **physical** (ability to integrate with physical components) or **functional** (ability to integrate functionally) or both.
- In healthcare, there are many isolated and individual systems which need to be integrated (or interfaced), for example with the EHR system:
  - Replacing the system would be too expensive, thus the system can usually be interfaced or integrated.
  - Specific requirements of the department/organization need to be met and the system tailored for the purpose.
Developing System Integration

• System integration is a growing trend, but not all systems are yet integrated
  – Integrated systems allow healthcare providers to better coordinate the care of patients that are changing location of care
  – System integrations are provided amongst other regular updates, piece by piece
  – Not all systems can be changed at once, and for patient safety only one system at a time should be affected
• Healthcare organizations are inundated with existing sets of data and information
  – Frequently a summary of a patient’s health record is often ineffective or incomplete because the information is not *longitudinal* (involving information about an individual or group gathered over a long period of time)
  – Integrated summary record views are created with an overall emphasis on continuity of care

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Challenges of Integrating Disparate but Similar Systems

- Data are often arranged in disparate systems, resulting in a barrier to optimal utilization of information.
- For example, laboratory data, radiology data, and demographic data or other data may all be in separate systems, such as in the LISs, RISs, PAISs, or other systems.
- Three primary areas can help improve information management in integration and convert these challenges into opportunities. These areas include:
  1) use of data standards
  2) information integration
  3) provider education
- The main goal of integration is to achieve interoperable information systems, integrated through standardized mechanisms.

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Continuity of Care and Integration

- Continuity of care is closely related to integrated care and emphasizes the patient's perspective through the system of health and social services, providing valuable lessons for the integration of systems.

- Continuity of care is often subdivided into three components: **continuity of information** (by shared records), **continuity across the secondary-primary care interface** (discharge planning from specialist to generalist care), and **provider continuity** (seeing the same professional each time, with value added if there is a therapeutic, trusting relationship).
There are two axes of integration: horizontal and vertical.
Both axes must be combined with both systems and information for integration to be complete.

**Horizontal integration** links similar levels of care, such as multi-professional teams or different provider types.

**Vertical integration** links different levels of care, such as primary, secondary, and tertiary care, or episodes of care.
Integration Models

- Four different models can be used to approach integration solutions for systems and health information:
  - **information-oriented integration**: this model approaches integration with databases and APIs (application programming interfaces) that produce information
  - **process-oriented integration**: this model creates a layer of defined and centrally managed processes on top of existing processes
  - **service-oriented integration**: this model allows applications to share common business methods or logic
  - **user-oriented integration**: with this model, the user receives a consistent view of multiple systems
Integration of Mobile Health and Telemedicine Systems

- Integration and interfacing of various systems, for example, departmental systems, into the EHR system is important, to keep the EHR information up to date
- This also helps coordinate care, contribute to integrated care, and allow care to be provided in remote locations
- Integrated mobile and telemedicine health systems can contribute to continuity of care through use of integrated:
  - Medical devices
  - User interfaces

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Complexity of Systems to Achieve Interoperability, Integration and Interfaces: Different Example Components Sending and Receiving Information

- Holter monitoring at home
- View EHR data
- Update lab results
- Send patient lab work
- Store data into EHR
- Measure and record physiological and medicine information
- Prescribe and give medicine

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Telehealth and HIE Improves Communication Between Providers

• If we consider the previously presented graphic once more, it can be seen that information can be collected in various ways, and also outside of a hospital (e.g., a Holter monitor or lab work)

• These pieces of information might be very important also to the next provider that the patient goes to

• HIE between providers provides information about patients from encounter to encounter, and admission to outpatient setting. It also spans time, continuing over the lifetime of the patient

• Again, processes such as medication reconciliation, problem listing and history taking are important in continuity of care and integration of the complete medical record, and HIE can help in this
Unit Review Checklist

- Defined health information integration
- Defined system integration and interfacing and describe the challenges of integrating disparate but similar systems (KB06)
- Described the relationship of continuity of care and integration
- Listed the types of integration
- Described the integration models
- Explained the concepts of and technologies used in mobile, teleHealth, and system interoperability and describe how these relate to health information exchange (KB05)
- Described how health information exchanges and telehealth can improve communication between providers (KL02)

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Unit Review Exercises

1. Name the two axes of integration
2. Describe the four models of integration
3. How does communication between providers via HIE improve the quality of care?
1. “The process of linking health information and software applications and systems, physically or functionally” best defines:
   a) Integration
   b) Integrated care
   c) System integration
   d) Continuity of Care

2. Which of the following can be either physical or functional, or both?
   a) Integration
   b) Integrated care
   c) System integration
   d) Continuity of Care
3. Continuity across the secondary-primary care interface is defined as:
   a) seeing the same professional each time
   b) discharge planning from specialist to generalist care
   c) a therapeutic, trusting relationship as an added value to care
   d) continuity by shared records

4. “A layer of defined and centrally managed processes on top of existing processes” best defines:
   a) user-oriented integration
   b) service-oriented integration
   c) process-oriented integration
   d) information-oriented integration