



# 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)



# Health Information Integration



- **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) **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



# Continuity of Care and Integration

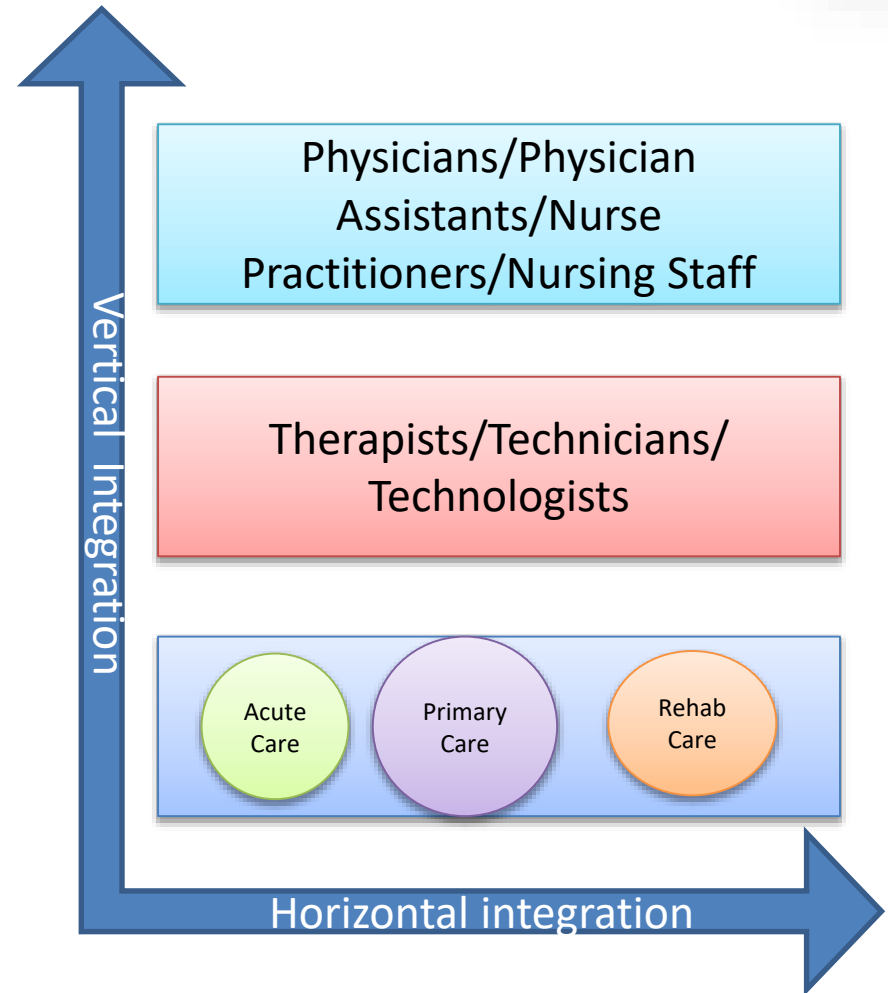


- Continuity of care is closely related to integrated care and emphasizes the patient's perspective through the system of health and social services, providing valuable lessons for the integration of systems
- Continuity of care is often subdivided into three components: **continuity of information** (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)



# Types of Integration

- 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

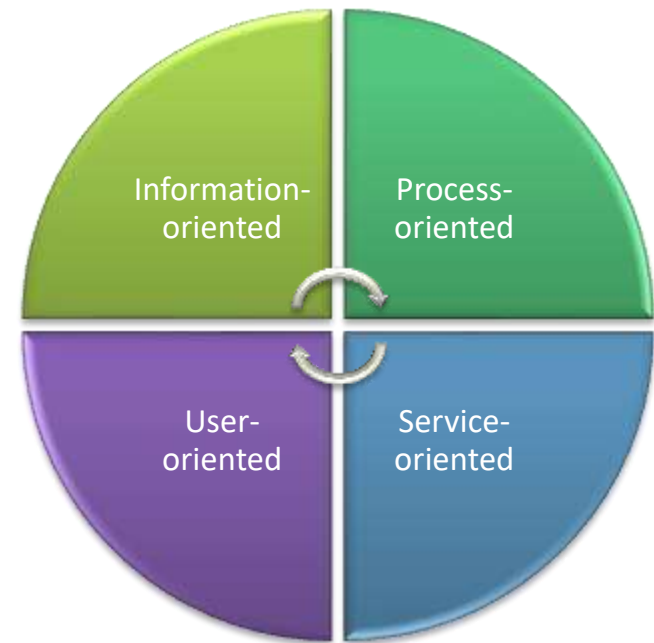






# Integration Models

- 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





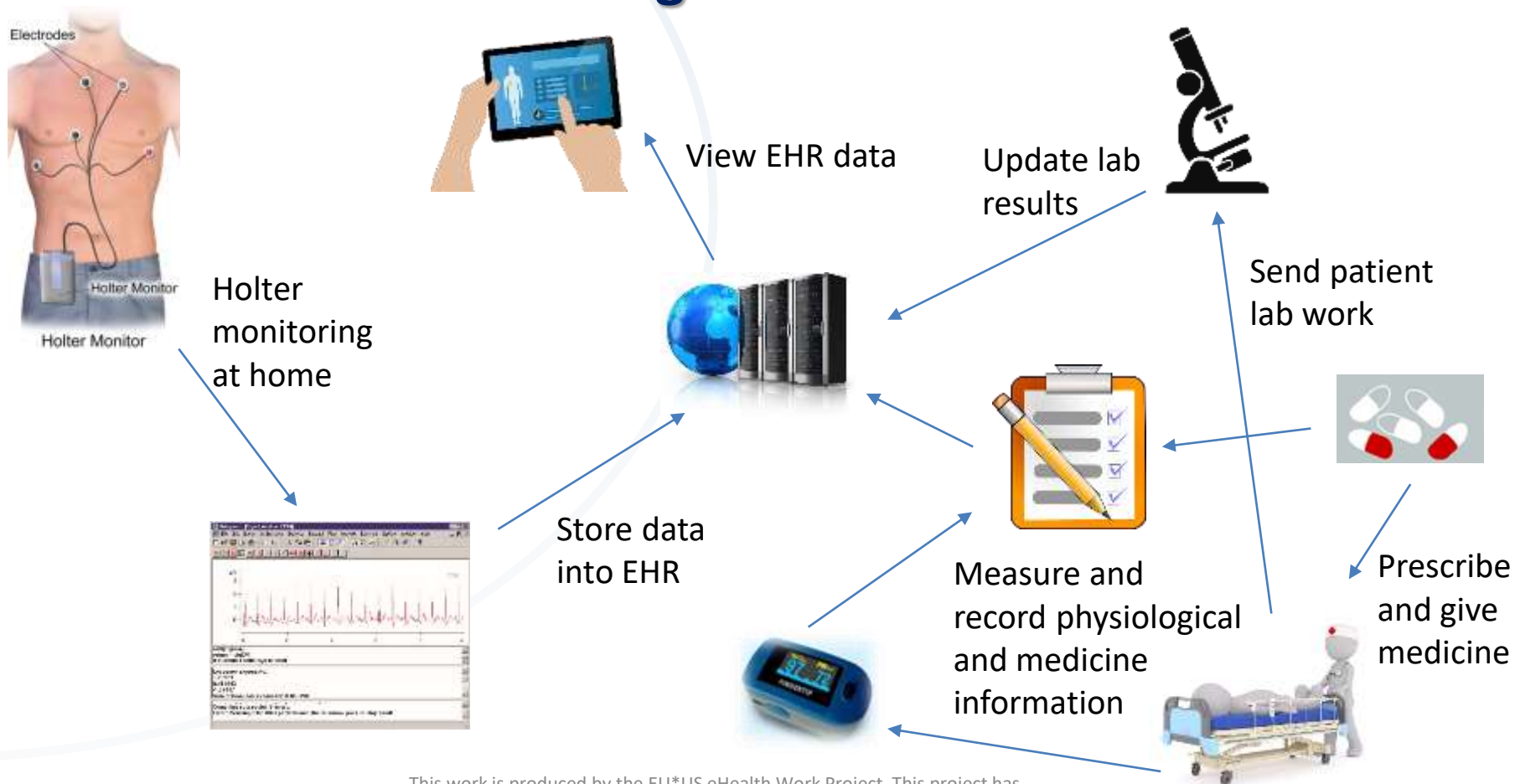
# Integration of Mobile Health and Telemedicine Systems

- 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





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





# 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)



# 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?



# Unit Review Exam



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



# Unit Review Exam (cont'd)



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