UNIT 4 MEDICAL INFORMATION SYSTEMS

Prof. Dr. Horst Kunhardt,THD

4.1 OBJECTIVE MEDICAL INFORMATION SYSTEMS

Documentation support

- increased completeness
- improved readability
- storage and archiving support
- improved evaluation and research
- modular component of practice management software (PVS) and hospital information systems (HIS)

4.1 OBJECTIVE MEDICAL INFORMATION SYSTEMS

Communication support

- within (transmission of laboratory results from the laboratory information system to the medical documentation system of the HIS) and outside (billing with payers) medical facilities
- Exchange of any digital documents

4.1 OBJECTIVE MEDICAL INFORMATION SYSTEMS

Processing support

- Evaluation of medical documentation
- e.g. reports to tumor registries, semi-automated creation of doctor's letters and reports, mandatory statistics, quality assurance in outpatient and inpatient surgery

4.1 OBJECTIVE MEDICAL INFORMATION SYSTEMS

Organisational support

e.g. appointment management in functional areas (endoscopy, radiology, surgery) and booking of associated resources incl. staff or clinical treatment paths with automated reminder function.staff or clinical treatment paths with automated reminder and booking function
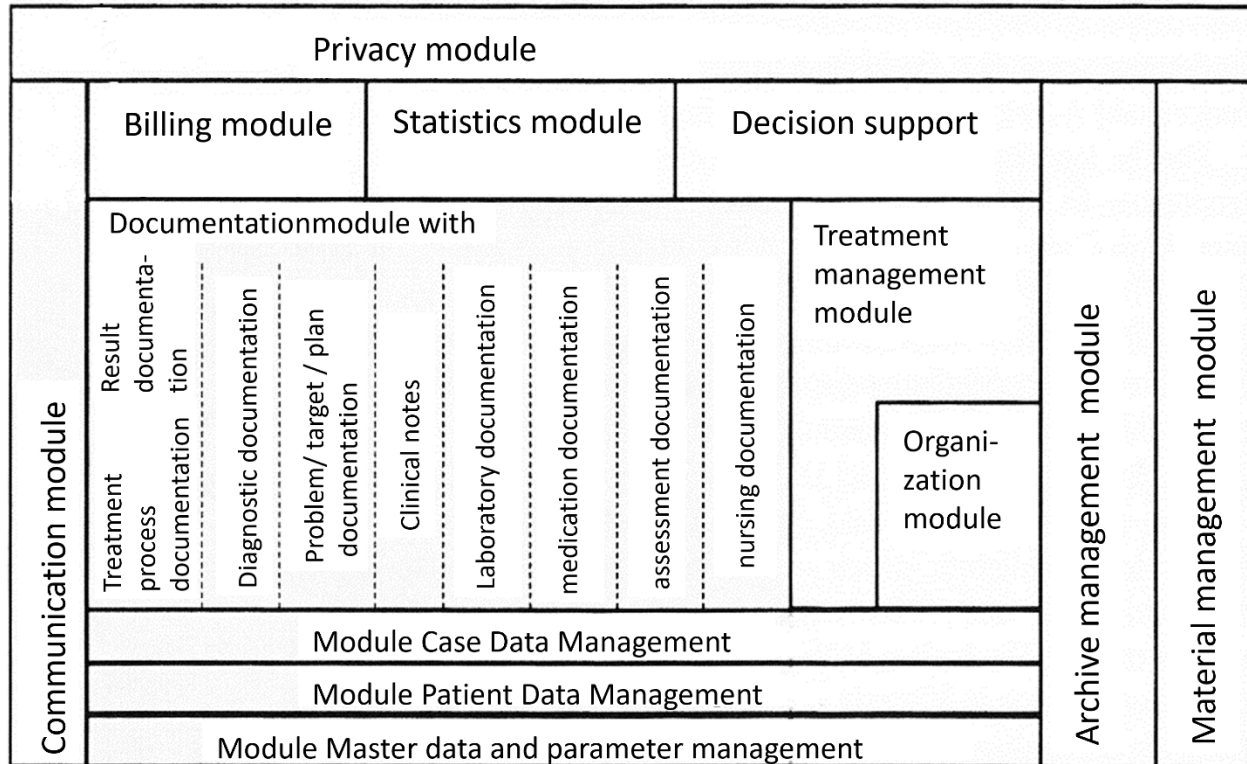
Decision support

Knowledge-based systems generate diagnosis and therapy suggestions through the interaction of medical knowledge (e.g. from treatment guidelines) and patient data.
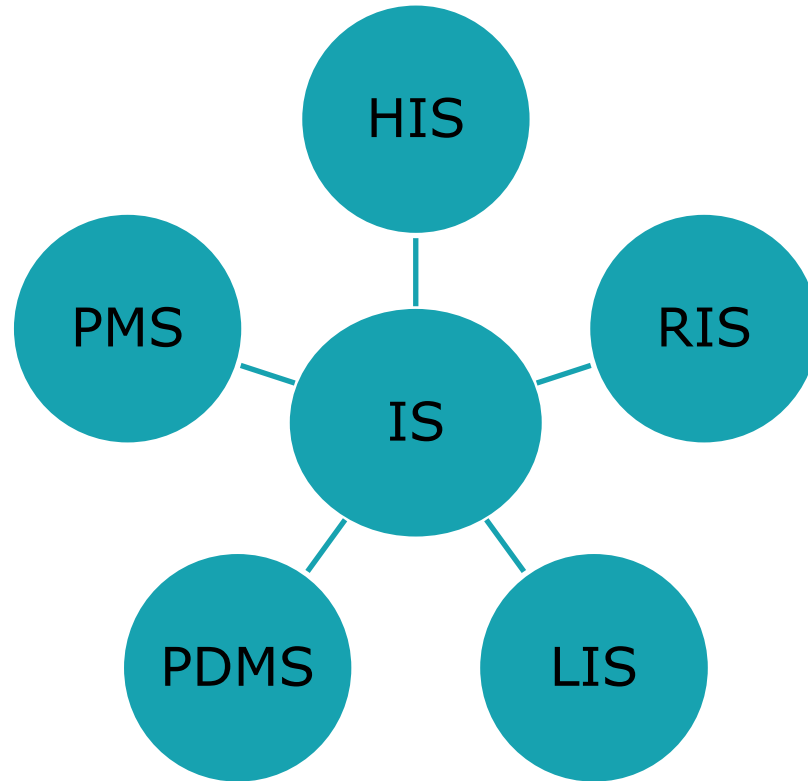
4.1 OBJECTIVE MEDICAL INFORMATION SYSTEMS

Modules of a medical informationsystem

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4.2 PRIMARY SYSTEMS

Source: own presentation

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4.2 PRIMARY SYSTEMS
HOSPITAL INFORMATION SYSTEMS (HIS)

- Administrative modules (accounting, materials management)
- Treatment-related modules (documentation, decision support, billing, patient data management)
- Non-treatment-related modules (data protection module, master data and parameter management)

-> monolithic overall system (without interfaces for data transfer between modules) or systems from different providers

4.2 PRIMARY SYSTEMS
PRACTICE MANAGEMENT SYSTEMS (PMS)

- Support the processes in the practice of the general practitioner or specialist

- Special functions (e.g. endoscopy documentation, PACS)

- In specialized versions e.g. for general practitioners, specialists, dentists and psychotherapists

4.2 PRIMARY SYSTEMS
PICTURE ARCHIVING AND COMMUNICATION SYSTEMS (PACS)

- PACS are used to store radiological and other image data (archiving) and to make them available to external systems (communication).

- PACS servers communicate with the image-generating modalities via local or inter-institutional networks on the basis of the DICOM protocol.

4.2 PRIMARY SYSTEMS

RADIOLOGY INFORMATION SYSTEMS (RIS)

- Responsible for organization and documentation in radiology departments.

Functions:
- E.g., scheduling of radiological examinations
- Provision of a DICOM interface to digital imaging examination equipment (e.g. CT, magnetic resonance imaging)
- Documentation of medical data
- Documentation of services relevant to billing
- Creation of radiological reports

4.2 PRIMARY SYSTEMS
PATIENT DATA MANAGEMENT SYSTEMS (PDMS)

- Part of the HIS as well as the PMS
- Manages and processes patient data in processes such as admissions and discharges, and the creation of patient labels for forms and specimens

Advantages:
- High documentation quality
- Avoidance of documentation errors due to incorrect manual entries
- Transparency
- Relief from documentation obligations

4.2 PRIMARY SYSTEMS
LABORATORY INFORMATION SYSTEMS (LIS)

- Used in analytical laboratories by specialists in laboratory medicine and in hospitals
- control the workflow from the receipt of the order to the transmission of the results to the customer
- control automatic analyzers and support quality assurance
- document analyses and assign patient data from the HIS or PVS to them
- communicate in the hospital with the HIS via the interface HL7 or LDT

4.3 ELECTRONIC FILE AND INFORMATION SYSTEMS
ELECTRONIC HEALTH RECORDS (EHR)

Digital collection of health data i.e. (lab results, x-rays, medications, allergies), and non-medical information (wellness info, diets, physiotherapy advice).
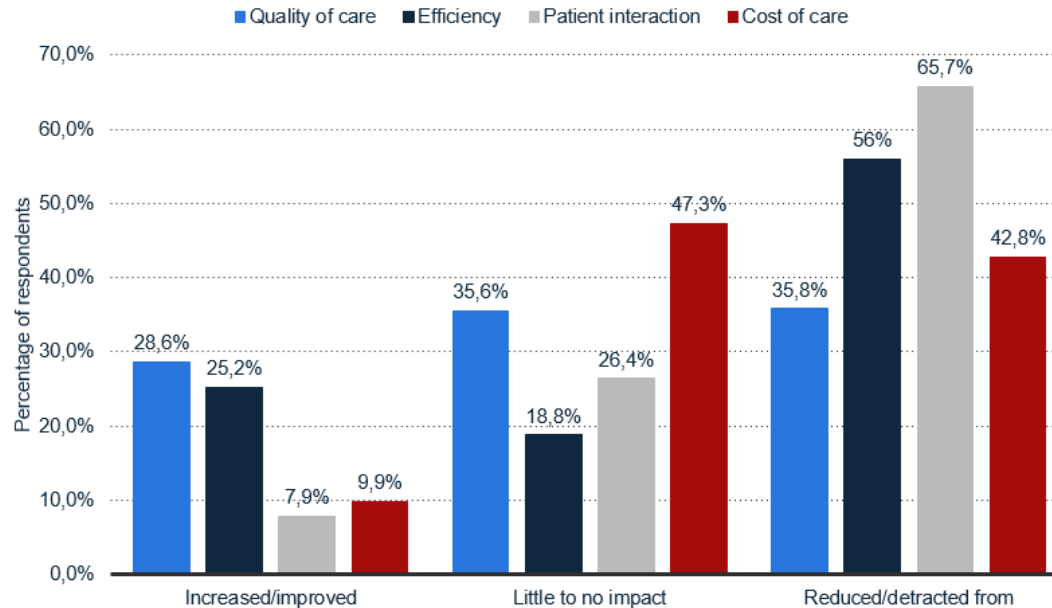
Benefits
- Improving medical treatment
- Collection of health data across facilities and sectors
- Data can be supplemented by medical staff

4.3 ELECTRONIC FILE AND INFORMATION SYSTEMS

Impact of electronic health records on U.S. physicians' practices 2018
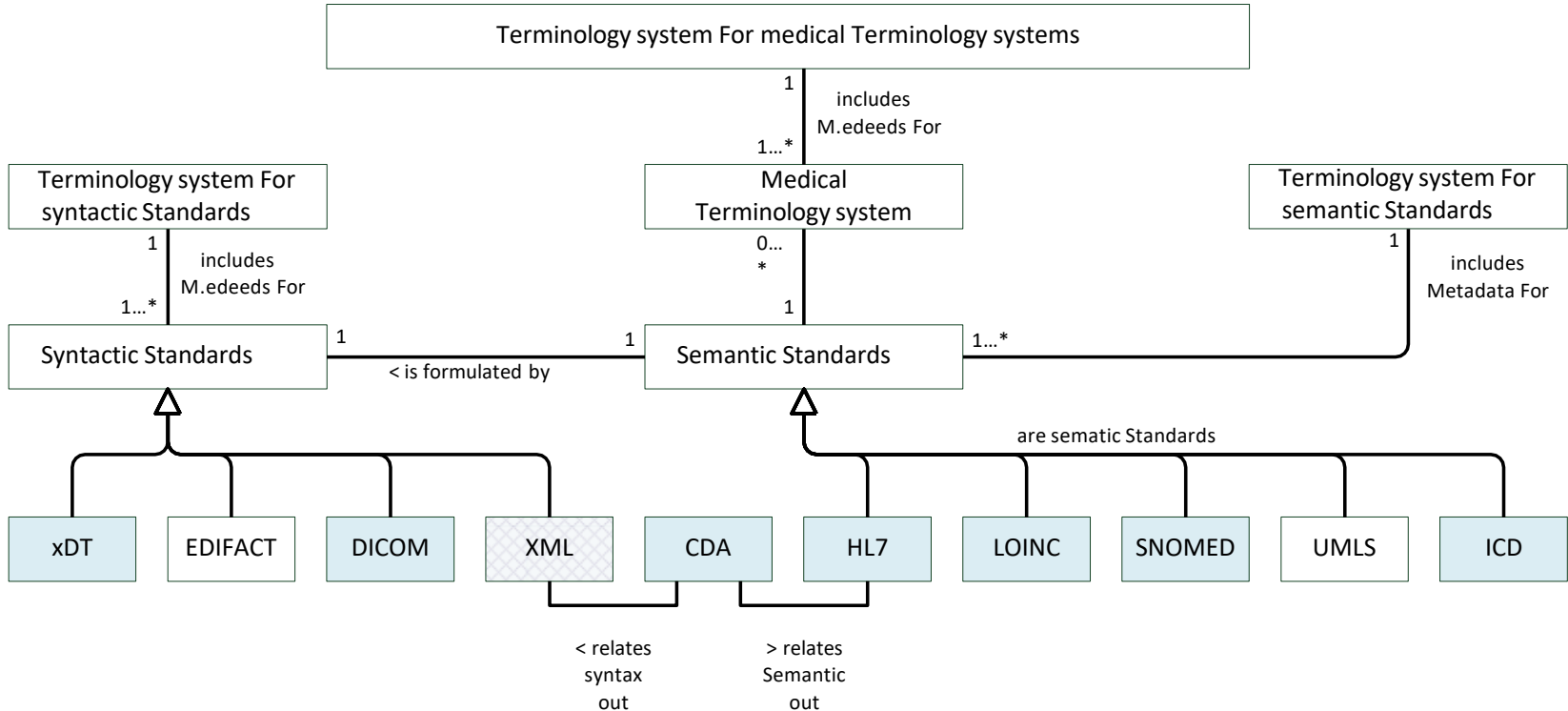
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4.3 ELECTRONIC FILE AND INFORMATION SYSTEMS

ELECTRONIC PATIENT RECORD (EPR) - VIDEO LINKS

[Interoperability of Electronic Health Records – Benefits and Opportunities](#)

4.4 MEDICAL DATA FORMATS / TERMINOLOGIES

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4.4 MEDICAL DATA FORMATS / TERMINOLOGIES
CLINICAL DOCUMENT ARCHITECTURE (CDA)

- Developed by the HL7 group
- Based on the XML standard
- Interview Link Charles Parisot (GE Healthcare)
  https://vimeo.com/11816365
- Electronic creation, storage and exchange of clinically relevant content.
- CDA is an internationally valid system architecture plan
- Describes the structural organization, content, and semantics of documents, as well as electronic exchange

4.4 MEDICAL DATA FORMATS / TERMINOLOGIES

INTERNATIONAL CLASSIFICATION OF DISEASES (ICD)

"International Statistical Classification of Diseases and Related Health Problems": https://youtu.be/tZFcoYfnwiM

- Internationally recognized and world's most important diagnostic classification of diseases

- Published by the WHO

-> Watch the video on and search for "COVID-19 virus" in the ICD-10 Browser

4.4 MEDICAL DATA FORMATS / TERMINOLOGIES

SYSTEMATIZED NOMENCLATURE OF MEDICINE (SNOMED)

- Medical classification system
- Nomenclature indicates medical facts in a way that fully captures the substantive elements of a statement
- In 2002, the nomenclature was expanded to SNOMED-CT (Clinical Terms) through a merger with the Clinical Terms of the NHS.

-> SNOMED-CT Browser, SNOMED starter Tutorial

4.4 MEDICAL DATA FORMATS / TERMINOLOGIES

LOGICAL OBSERVATION IDENTIFIERS NAMES AND CODES (LOINC)

The LOINC terminology is published, regularly updated, and expanded as a database by the Regenstrief Institute (Indianapolis, USA)
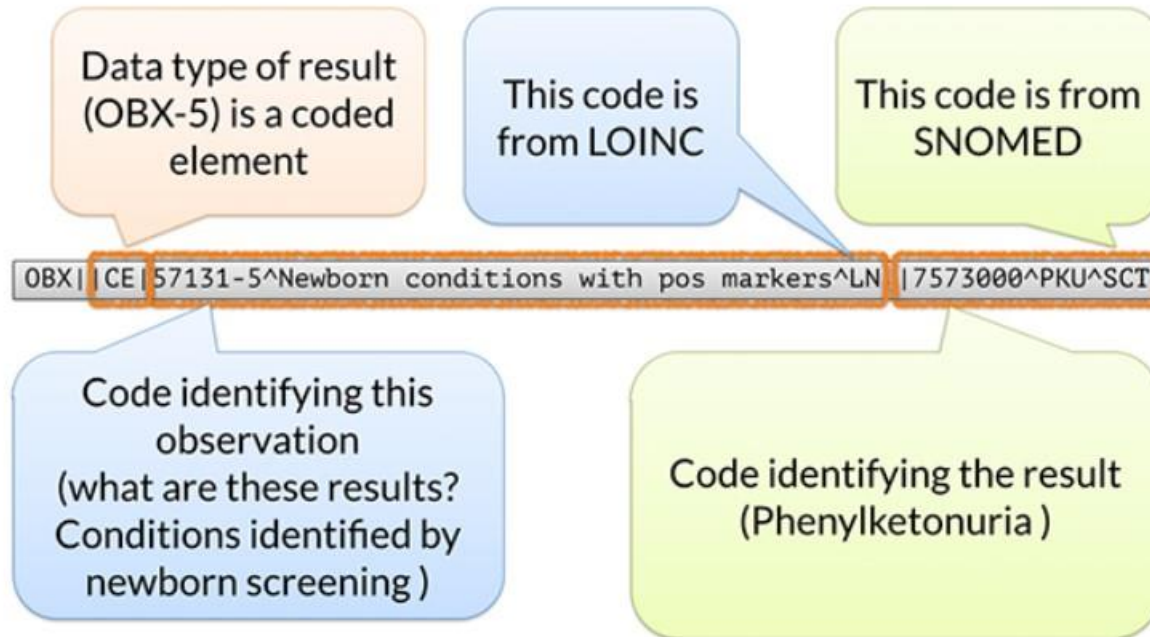
The LOINC database consists of two parts:
- Laboratory Investigations
- Clinical investigations

4.4 MEDICAL DATA FORMATS / TERMINOLOGIES

LOGICAL OBSERVATION IDENTIFIERS NAMES AND CODES (LOINC)

Source: loinc.org/get-started/what-loinc-is/ retrieved on 08.03.2021

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4.5 MEDICAL COMMUNICATION FORMATS
HEALTH LEVEL 7 (HL7)

- "International standard for the exchange of data between healthcare organizations or computer systems.

- Provides interoperability between HIS, PVS, LIS, service billing systems, and systems that function as Electronic Health Records." (wikibooks)

More information on HL7 Introduction:
https://www.hl7.org/implement/standards/index.cfm?ref=nav

4.5 MEDICAL COMMUNICATION FORMATS
FAST HEALTHCARE INTEROPERABILITY RESOURCES (FHIR)

- New data exchange standard from HL7

- Simplified implementation

- Covers the needs of the previous primary HL7
  interoperability standards (HL7 v2 , HL7 v3 and CDA)

4.5 MEDICAL COMMUNICATION FORMATS
DIGITAL IMAGING AND COMMUNICATION IN MEDICINE (DICOM)

- International standard for medical imaging

- Defines the formats for medical images

- Is also a communication protocol for exchanging the data

- Provides storage and interoperability between medical device imaging and medical image data management information systems

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at: http://docs.oracle.com/cd/B28359_01/appdev.111/b28416/ch_cncpt.htm#IMDCM1500 (Accessed: 07.12.2020)