



Data Management for Digital Health
Revision of Exercise 1

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Data Management for Digital Health

Winter 2022

Exercise I

Topics

- Actors in Healthcare
- Iterative Machine Learning Design Process
- Categories of Data
- Health Data Exchange

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2022
2

Exercise I

Key Stats

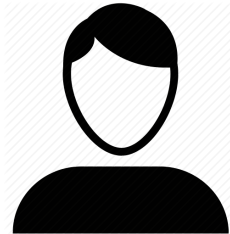
25 Questions
50 Points

47 Students
47 Passed

Average score
43 / 86%

Average time
71 min

<< 3h







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2022

3

Q11: Categories of Data

Please select all correct statements as discussed in class:

-  Blood sugar measurements of diabetes patients conducted at home are an example for semi-structured data.
-  Laboratory and pathology reports are semi-structured data.
-  Semi-structured data requires pre-processing prior to analysis.
-  Daily temperature measurement of COVID-19 patient are longitudinal data.

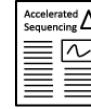
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Data Management for
Digital Health, Winter
2022

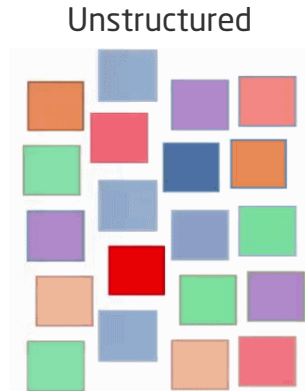
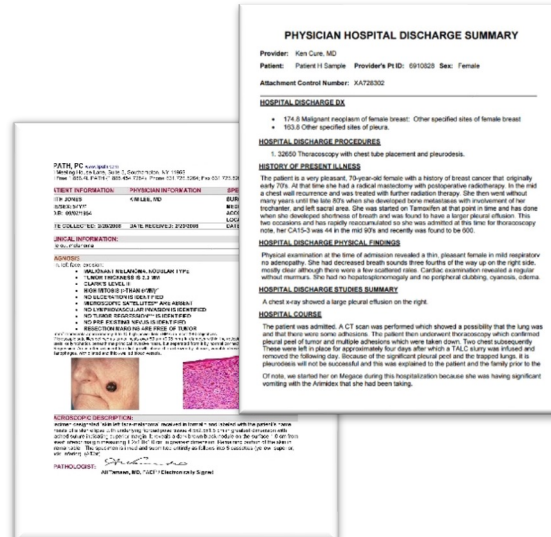
4

Data categories	type	Example of Common data standard	Example
demographics	structured		age, sex, ethnicity
vital signs	structured		weight, height, pulse rate, temperature, blood pressure
laboratory result	structured	LOINC	blood, urine, stool, saliva, spinal fluid (CSF),
prescription and medication	structured	ATC (EU), RxNorm	
diagnoses	structured	ICD9/10 , SNOMED-CT, OPS 301	
procedure	structured	CPT	describes medical, surgical, and diagnostic
sensor data	structured		watch, rem sleep monitor, ECG, EEG
notes and report	Unstructured and semi-structured	SNOMED-CT , RadLex	discharge summary, general doctor and specialist report, Radiology and Pathology report
imaging	unstructured	DICOM	X-ray, CT, MRI, Endoscopy, Ultrasound

Categories of Digital Health Data: Text Documents







- Unstructured data, i.e. not directly machine-readable / -processable
- Examples:
 - Discharge letters
 - Doctor letters
 - Clinical reports, e.g. pathology or radiology
 - Medical literature



Categories of Data in Digital Health

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6

Q16: Please select all appropriate statements for GDPR

-  A European law obliging major browsers to comply on the use of personal data.
-  Collecting name and address information during hospital admission is subject to GDPR.
-  Healthcare data is considered sensitive by GDPR and requires specific protection measures.
-  GDPR applies only to EU citizens.

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Digital Health, Winter
2022
7

Art. 3 GDPR: Territorial Scope

1. This Regulation applies to the processing of personal data in the context of the activities of an establishment of a controller or a processor in the Union, regardless of whether the processing takes place in the Union or not.
2. This Regulation applies to the processing of personal data of data subjects who are in the Union by a controller or processor not established in the Union, where the processing activities are related to:
 - (a) the offering of goods or services, irrespective of whether a payment of the data subject is required, to such data subjects in the Union; or
 - (b) the monitoring of their behaviour as far as their behaviour takes place within the Union.
3. This Regulation applies to the processing of personal data by a controller not established in the Union, but in a place where Member State law applies by virtue of public international law.

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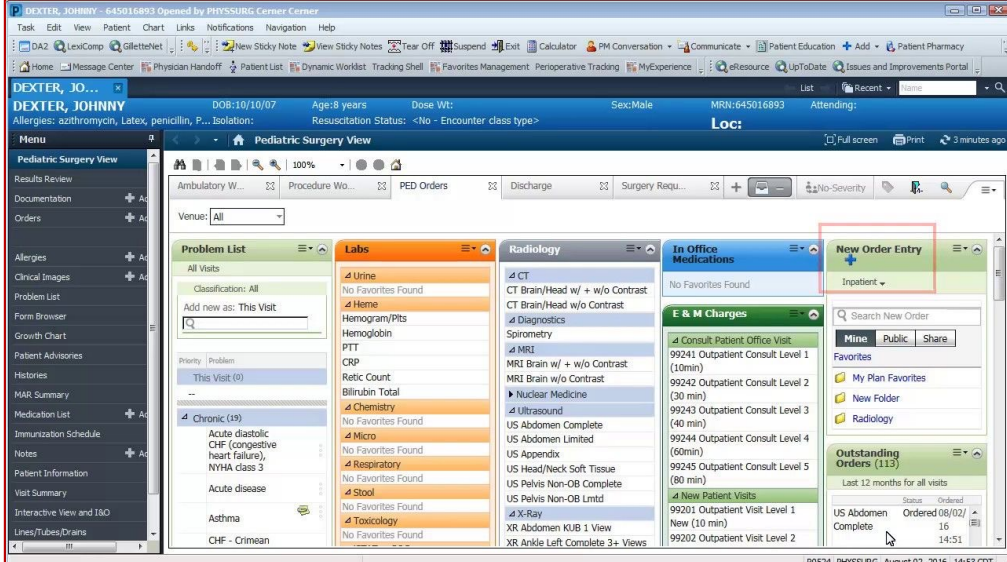
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Digital Health, Winter
2022

Q19: Please select all appropriate statements about IT systems in hospitals as discussed in class.

- ✓ Hospital information systems describe the super class of all IT systems within hospitals independent of their focus.
- ✓ Clinical information systems describe the super class of all IT systems within hospitals focusing on patient care.
- ✗ Laboratory information management systems focus on the documentation of patient specifics from a researcher's perspective.
- ✗ IT systems within one class are required by GDPR to be compatible with each other, e.g., clinical decision support systems from individual vendors.

Hospital Information Systems: Definitions

- **Hospital Information Systems (HIS) :=**
Describes all major IT systems within a hospital
- **Clinical Information Systems (CIS) :=**
Stores and manages data for patient care
- **Clinical Decision Support Systems (CDSS) :=**
Supports medical experts on therapy decisions



The screenshot displays the Cerner Overview Patient Chart for a patient named DEXTER, JOHNNY, DOB: 10/10/07, Age: 8 years, Sex: Male. The interface is divided into several panels: Problem List (All Visits), Labs (Urine, Heme, Hemogram/Pts, Hemoglobin, PTT, CRP, Retic Count, Bilirubin Total, Chemistry, Micro, Respiratory, Stool, Toxology), Radiology (CT, MRI, Ultrasound, US, X-Ray), In Office Medications, and E & M Changes. A red box highlights the 'New Order Entry' button in the top right corner.

Cerner Overview Patient Chart

Exchanging Digital Health Data

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2022
10

Hospital Information Systems: Laboratory Information Management System (LIMS)

- Aim: Support the processes and data management in labs
- Focus: Sample
- Track individual samples across the complete process within the lab
- Support reproducibility and quality management
- Assemble results to support report preparation
- Many special-purpose solutions







<https://www.broadinstitute.org/genomics>

Exchanging Digital Health Data

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2022
11

Q21: Please select all appropriate statements about healthcare apps for citizens as discussed in class.

-  ■ Apps provided by commercial vendors and apps provided by health insurances can make use of personal health information in the same way.
-  ■ Recommendations from patient apps can be directly turned into treatment actions without consulting a medical doctor.
-  ■ Health insurance companies provide electronic services for their insured persons via apps to optimize processes, e.g., reimbursement or request and exchange of administrative documents.
-  ■ The use of the term “healthcare app” is not protected, i.e., there is neither a validation of content nor the involvement of medical experts guaranteed if you find such apps online in an app store.

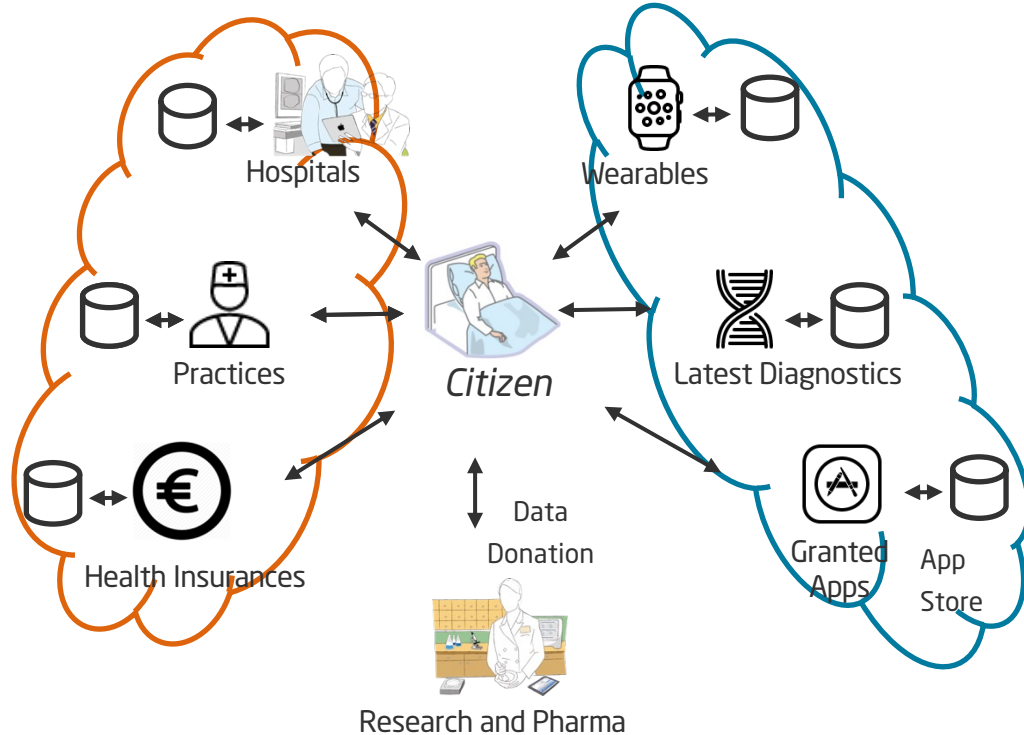
Frequently missed

Frequent incorrect answer

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2022
12

Recap: Healthcare System and Healthcare Data



- Every actor has an individual view / data on the citizens
- Actors need to exchange specific data with each others via secured methods
- Legal regulations for data exchange and data use required
- Risk: Data might get scattered across individual actors

Exchanging Digital Health Data

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2022
13

Q24: You were asked to define a compatible way to exchange the biological sex of patient

- ✗ ■ Defining a new international standard for exchange of biological sex, e.g., following ISO criteria, is appropriate as it can be achieved within few weeks.
- ✓ ■ You select an appropriate encoding system for biological sex and together with management stakeholder you define its use as an organization-wide rule.
- ✓ ■ You select an existing data standard, e.g., FHIR, for exchange of biological sex.
- ✓ ■ You check existing hospital information systems for compatibility with your criteria: if missing, you develop specific adapters to transform proprietary data formats.

Frequently missed

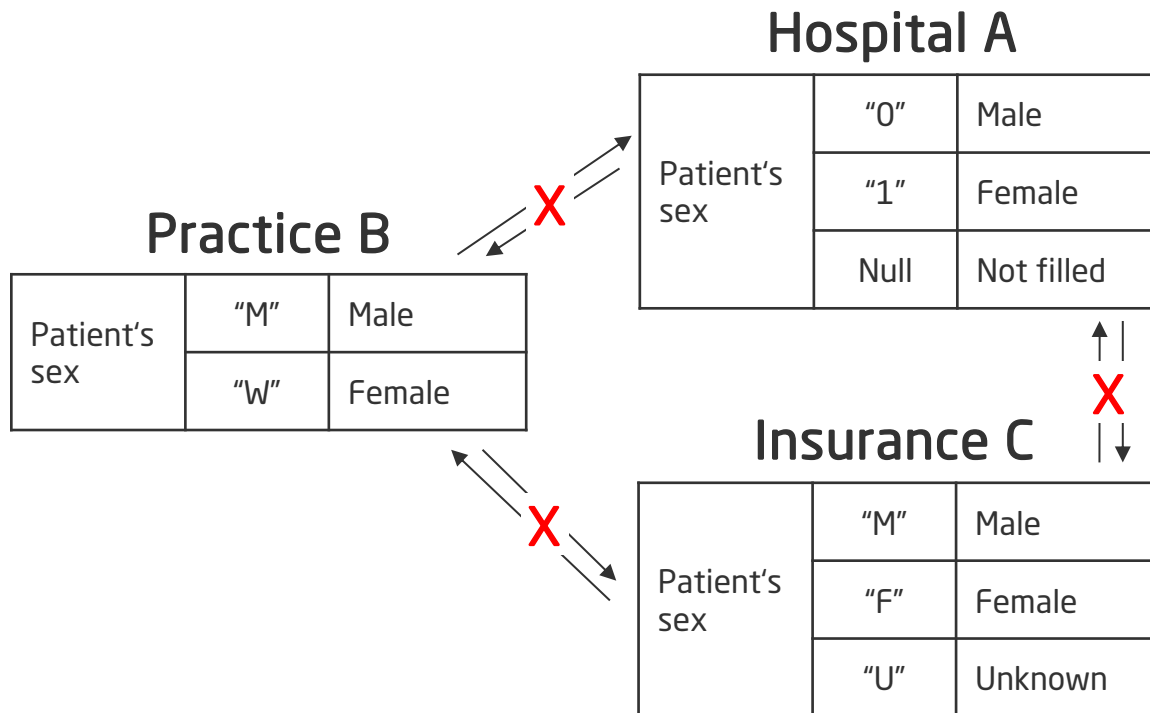
Frequent incorrect answer

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Data Management for
Digital Health, Winter
2022

14

Interoperability: Example: Patient's Sex (cont'd)



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Digital Health, Winter
2022
15