Goodbye Electronic Health Record?

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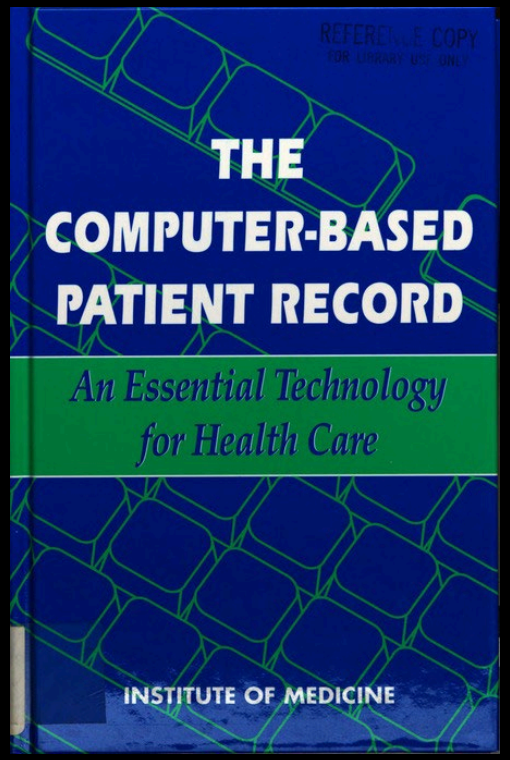
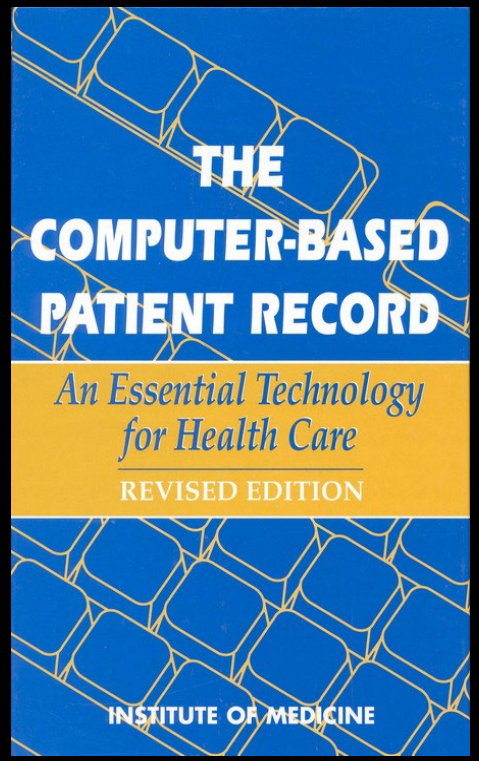
THE COMPUTER-BASED PATIENT RECORD



1991

Published by the Institute of Medicine – now the National Academies of Medicine



1997

Requirements for Computer-based Patient Record

- Support patient care and improve quality
- Enhance productivity of health practitioners
- Reduce administrative costs
- Support clinical and health services research
- Accommodate future developments in health care technology, policy, management, and finance
- Insure patient data confidentiality

Today's EHR has not met these expectations!

Source: Johnson, KB and Stead, WW. Viewpoint AMA. July 14, 2022

Different Users Have Different Requirements

- Primary care –manage different aspects of the case
- Specialists – focus on specific diseases
- Chief resident – focus on teaching during rounds
- Pharmacy's view – focus on medications
- Dietitian view – support diet and nutrition
- Security department – identifies security risks
- Accounting department – focus on what should be charged
- Research view – access to data without violating patient privacy
- Policy makers – reporting views to prepare reports relating to privacy

EHR Was Doomed From The Start

- Systems were designed by computer engineers with little input from the medical community.
- Systems designed exclusively for inpatient systems.
- Systems were very expensive and only large hospitals could afford them.
- Systems focused on service functions not using data for improving patient care.
- Laboratory systems were developed separately with separate databases.
- Financial systems were developed separately with their own databases.
- Patient management systems largely duplicated the patient chart.
- Architectural framework has remained unchanged. Systems have evolved from the beginning, not restarted.

Proposal for change

- Replace the current EHR model
- Adopt a single common set of data elements
  - Single data element for each concept with a unique definition
  - Rich set of attributes for each data element
  - Attributes include computable knowledge for data elements
  - Build structures based on atomic data elements
- Functional and cognizant-based application program interfaces (API)

Different approaches to data storage

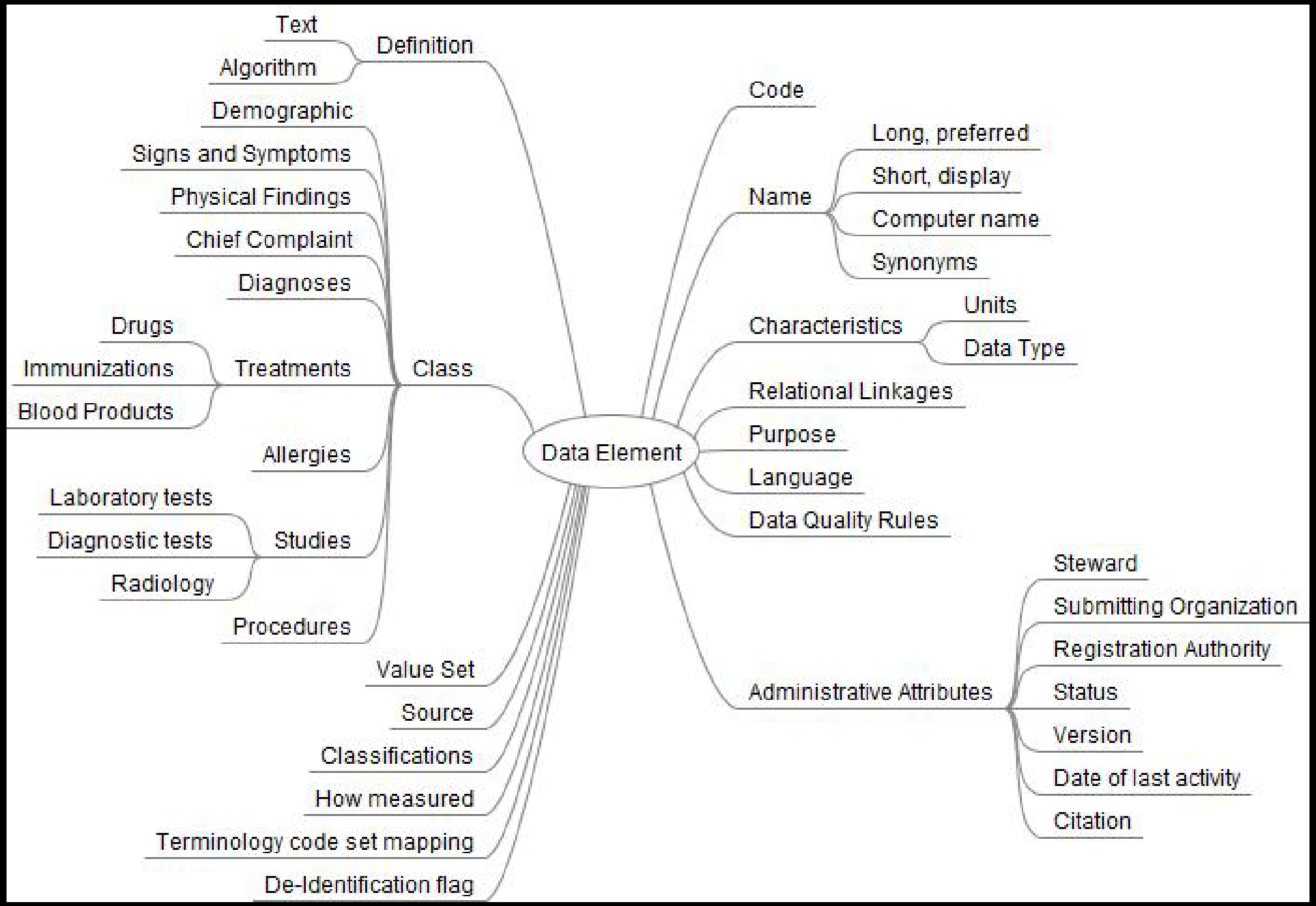
- All data about a patient is stored in a single data cell.
  - Clinical, genomic, behavior, social, economic, environment, family history
  - May contain multiple databases, but data is managed by knowing precisely where data is located.
  - Instantly knowing if data element exists.
- Data is stored as data – not as a function of use.
- All functionality for using the data is external to the data cell.
- Interaction with the data is through Representational State Transfer (REST) – Create, Read, Update, Delete

Making data work

- There are so many common data models, they are uncommon.
- Mapping between common data models is wasted energy. Mapping always results in a loss of information.
- Data sharing and data aggregation are becoming mandatory in health care.
- Goal is a single, common set of data elements with a rich set of attributes used nationally and, perhaps, internationally.
- Attributes provide an opportunity to add computable knowledge and controls to data. Examples include ontology, linkages, decision support links, quality assurance, risk factors, phenotypes, and management data.

Doing the impossible

- HL7/FHIR and OHDSI/OMOP have entered an agreement to create a common set of data elements and a common data model.
- PCORI has now joined the group working on a common set of data elements.
- ONC is supportive of the idea, and we are looking to integrate USCDI.
- Other groups we plan to recruit include CDISC, NLM VSEC, CMS, CDC, FDA, CMS, LOINC, SNOMED, CodeX, i2b2/ACT, caDSR, others
- We are proposing using the Clinical Societies as the doorway to creating data elements and being the stewards of data elements.


Data Element
Definition
Text
Algorithm
Class
Demographic
Signs and Symptoms
Physical Findings
Chief Complaint
Diagnoses
Treatments
Drugs
Immunizations
Blood Products
Allergies
Studies
Laboratory tests
Diagnostic tests
Radiology
Procedures
Value Set
Source
Classifications
How measured
Terminology code set mapping
De-Identification flag
Code
Name
Long, preferred
Short, display
Computer name
Synonyms
Characteristics
Units
Data Type
Relational Linkages
Purpose
Language
Data Quality Rules
Administrative Attributes
Steward
Submitting Organization
Registration Authority
Status
Version
Date of last activity
Citation

Data elements value enhanced

- Create structured sets of data elements into larger groupings
  - Simple cases such as blood pressure, heart murmurs, BMI
  - More complex sets such as an echocardiogram, cardiopulmonary exercise testing
  - Structures to capture complex phenomena yet are easy to work with
  - Functional sets such as well baby work-up, pediatric growth, kidney function, maternal health
  - Phenotypes – diagnostic, treatment, monitoring
  - Tracking Covid patients (and others) across time and space
  - Registries
  - Computable knowledge built into the data element
  - Any defined purpose for a standardized grouping of data elements

Use of data

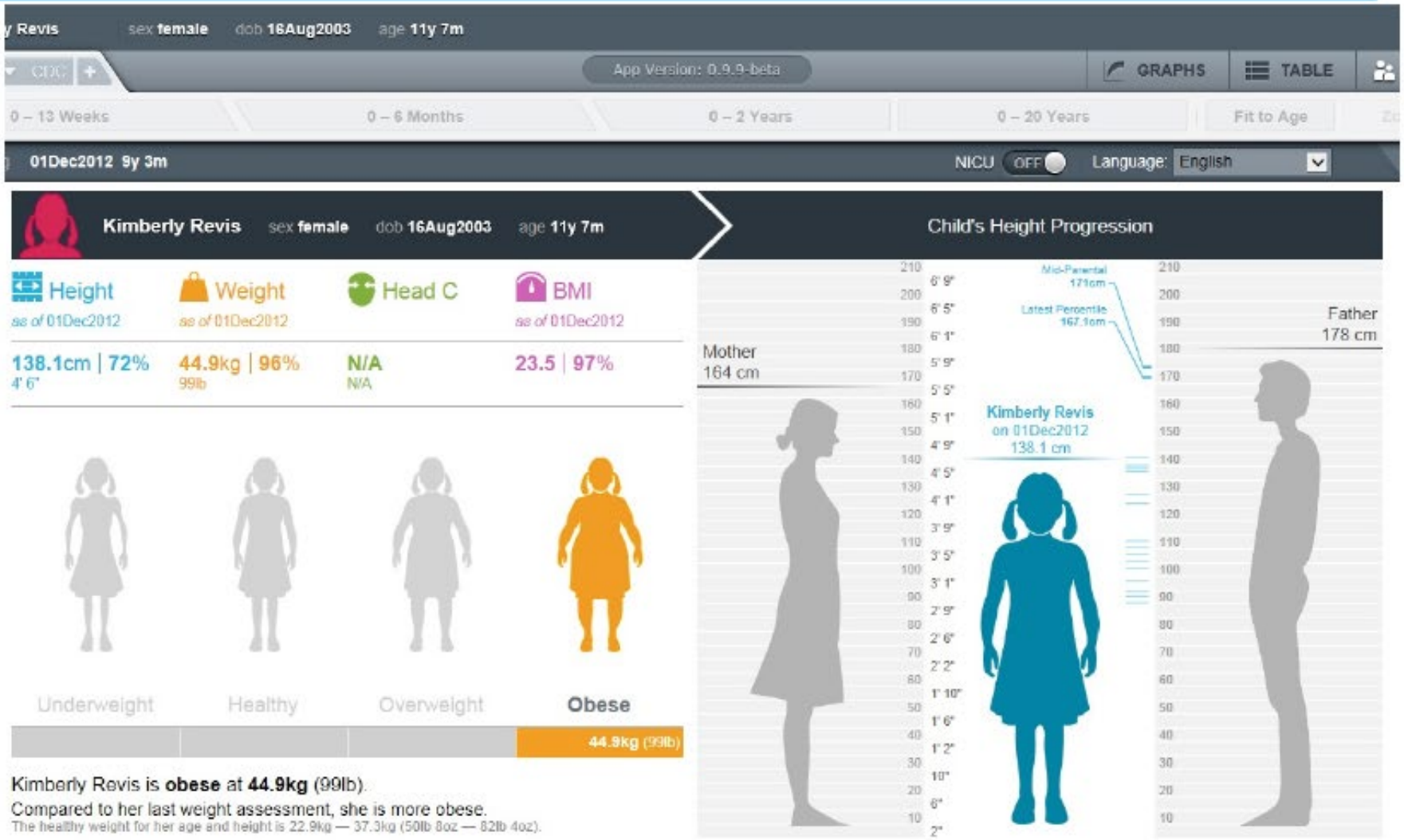
- Use functionality is performed independently by functional apps.
  - Permits keeping up with new technology and new requirements
  - Allows specialization of data presentation and use
  - Enables competitive market
- Supports query-based interactions: pull over push
- Permits cognitive use of the data through Application Program Interfaces (API)
- HL7 International ® SMART on FHIR ® provides a standard for developing these APIs.

SMART ®

- Enables vendors to create apps that seamlessly and securely run across healthcare systems
- Defines a health data layer that builds on FHIR and resource definitions
- Applies set of profiles used to express meds, problems, labs and other clinical data
- Patients, clinicians, others can draw on library of apps to improve clinical care , research, and public health

Pediatric growth chart – innovative parent's view

- Custom view optimized for communication with parents and child
- Visually project height in terms of parent's height
- Print copy for parents, or email via portal



Source: Josh Mandel, MD

Examples of Cognitive APIs

- Functional and productive problem list
  - Problem list can drive activities and clinical behavior
- Support or do documentation
- Link different types of data in innovative ways
- Use phenotypes to drive effective use of knowledge along with patient data to reduce uncertainty and aid decision-making
- Change passive data storage to innovative partnerships in patient care

What does this mean to the health system?

- Access to more data of higher quality and consistency establishing trust.
- Receiving data from clinical trials directly and automated.
- Increasing use of AI with decisions and contact directly involving patients new regulations and responsibilities.
- New tools to more quickly make decisions?
- Constant vigilance to make sure regulations enhance and not limit of delay advances in health and health care.
- You are the experts. What do you think?

DISCUSSION

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