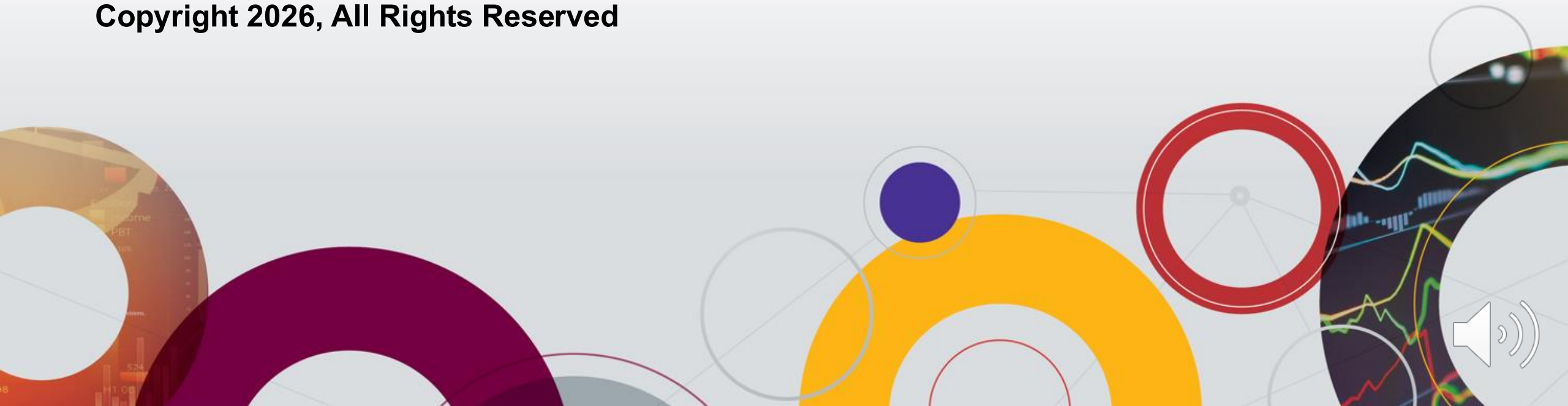


3.2 History and Perspective of the Health (Medical) Record

10x10 – Introduction to Biomedical Informatics & Artificial Intelligence
William Hersh, MD, FACMI, FAMIA, FIAHSI
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History and perspective of the medical record

Data can be organized as

- Practitioner (physician)-centered
- Patient-centered

Orientations (not mutually exclusive) include

- Time-oriented – organized chronologically
- Department-oriented – organized by department
- Problem-oriented – organized by focus on problems

[illegible]

History and perspective (cont.)

Earliest medical records were physician-centric

Hippocrates said over 2,500 years ago that the medical record should

- Accurately reflect course of disease
- Indicate possible causes of disease

Before era of widespread medical diagnostic testing, record consisted mostly of observations

Perspective of its evolution over the centuries (Siegler, 2010)

Anticipating coming computer-based era (Fries, 1974)

[Overview video](#)

Some early innovations came from Mayo Clinic

All physicians kept all their notes in leather-bound ledger

In 1907, Dr. Henry Plummer led move from physician-centered to patient-centered record (Sparks, 2015)

Mayo was also pioneer in defining data elements to be recorded, forerunner of modern efforts in epidemiology and classification

Some terminology of the medical record

Electronic health record (EHR) – subsumes

- Electronic medical record (EMR)
- Computer-based patient record (CPR)

Some other terms of note

- Problem-oriented medical record (POMR)
- Legacy system
- Practice management system
- Registry
- Personal health record (PHR)

Problem-oriented medical record (POMR)

Proposed by Weed (1969)

All entries grouped under particular problems

An encounter for each problem is organized under four headings (SOAP)

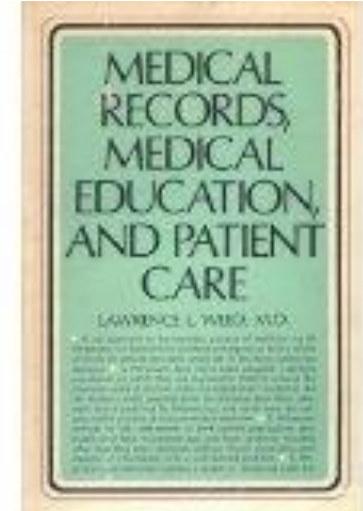
- Subjective – what patient reports
- Objective – what clinician observes or measures
- Assessment – what clinician assesses
- Plan – what clinician plans to do

Most common usage is to have entire encounter organized by SOAP format, not individual problems

Just one of many contributions of Weed (Wright, 2014)

- Also advocated for “problem-knowledge coupling” (Weed, 1989), implemented in Problem-Oriented Medical Record System (PROMIS) (2019)

Famous Grand Rounds from 1971 – [video](#) and [transcript](#)



Changes to the POMR

Rethink some language (Donnelley, 2005)?

- Chief complaint → Chief concern
- Present illness should be described from both biological and patient experience perspectives
- SOAP should be HOAP – history, observations, assessment, plan

Need to reorganize for easier reading the EHR (Lin, 2013)?

- Several practices found to prefer APSO over SOAP for authoring and reading

Should SOAP be washed away or merely rinsed (Rodman, 2023)?

- Leads to note bloat and complex stories being reduced to overly simple categories
- But does facilitate structure of historical record and clinical reasoning

Modern-day medical record

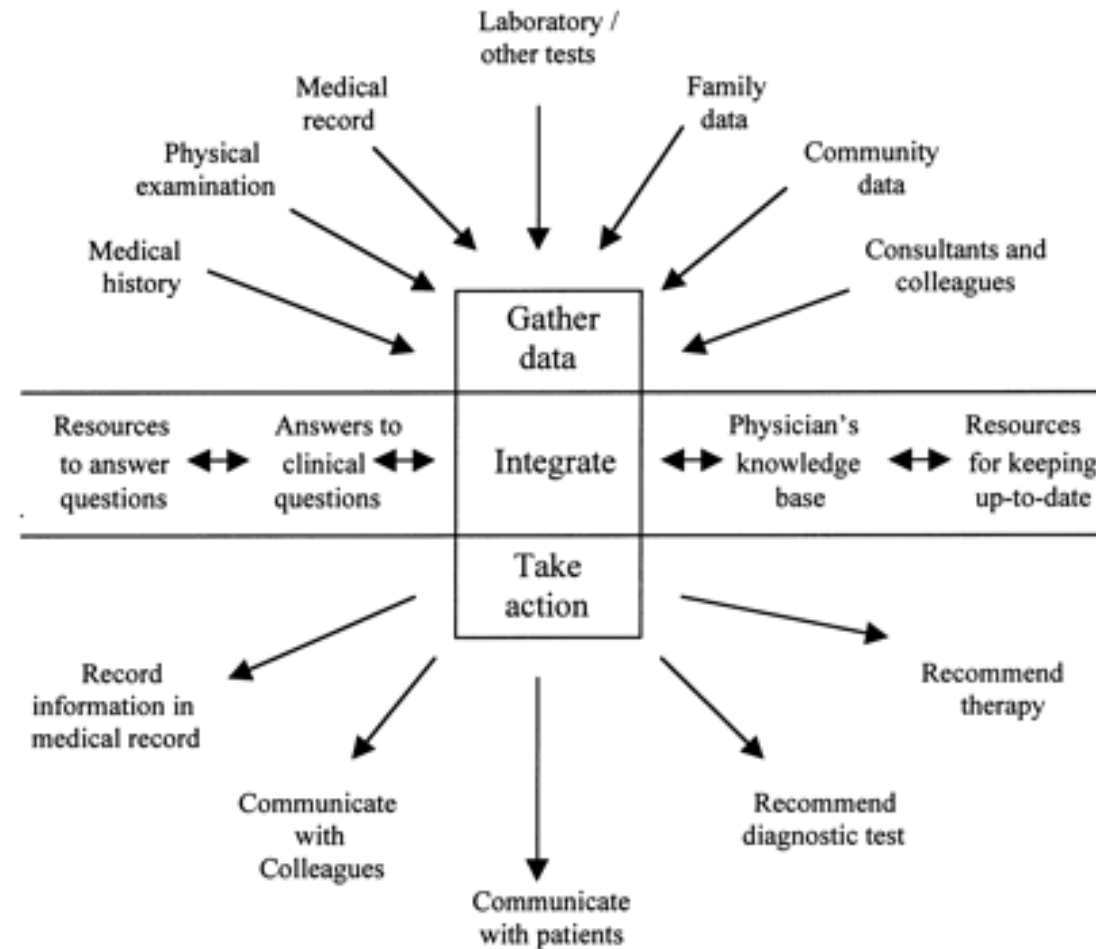
Mixture of patient- and problem-oriented approaches

- Usually has problem list, which may or may not be well-kept (Wright, 2014)

In general, each provider or institution maintains its own record

Creator of the medical record is assumed to be “owner,” although patients can request access

Flow of information in primary care practice (Bates, 2002)



Additional challenges in the modern era

Coordinating care requires better communication among providers

Increasing cost of care requires justification and documentation of expenditures

Patients change plans, so their records should be portable

Informed consumers desire more participation in care decisions, which includes access to their records

- Also want security and other protections of their information

Cannot forget limitations of paper-based record

Summarized by IOM report (1997)

Single user – one person at a time

Disorganized – especially for complex patients

Incomplete – reports missing or lost, some providers not sharing their reports with the rest

Insecure – no audit trail, easily copied or stolen

And then there is handwriting...

Can you decipher these orders?

Acetaminophen 4 mg po qd

25 cc/hr

Zendol 20mg # 120
20mg po q6hr

Deciphering...

Coumadin vs. Avandia (courtesy of David Bates, MD)

Avandia 4 mg po qd

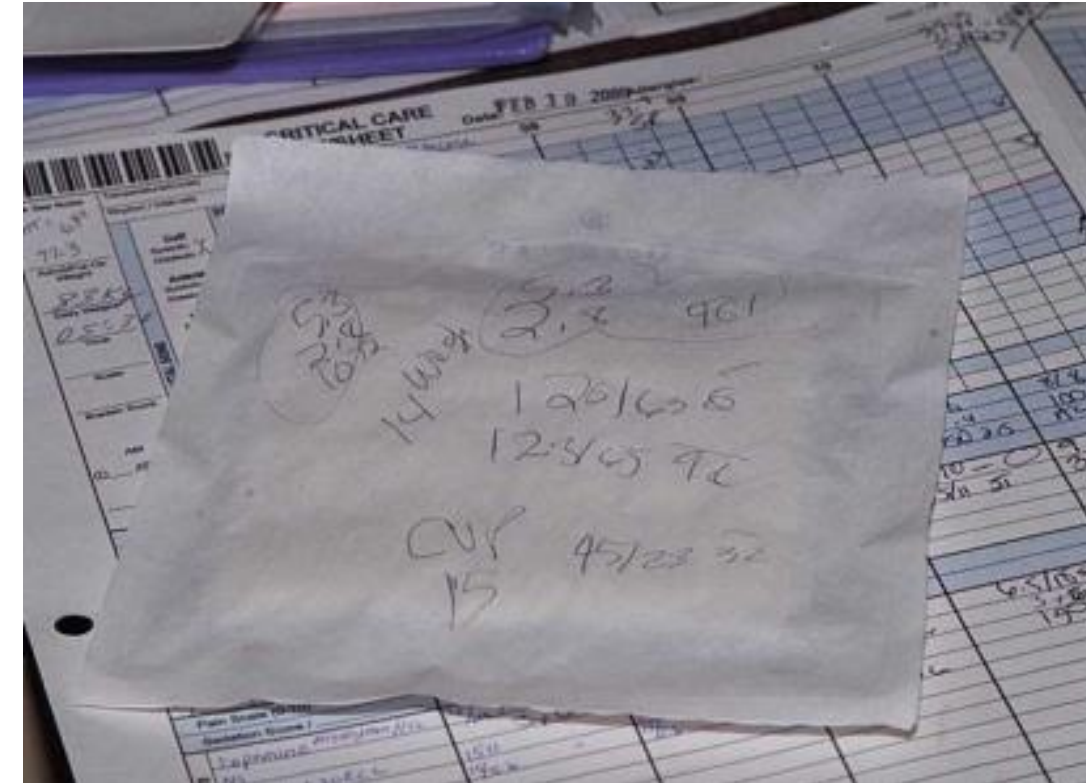
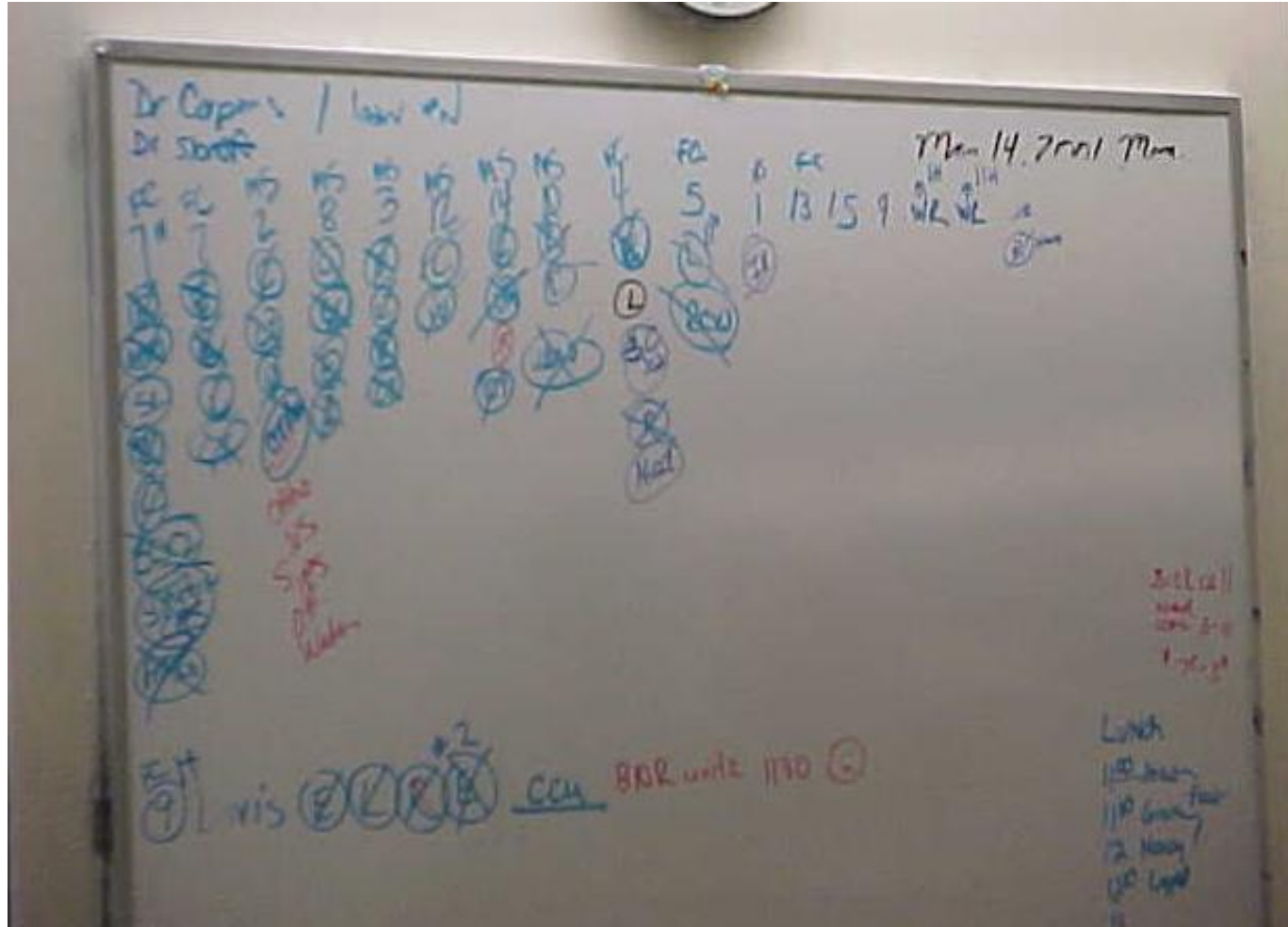
25 U/hr vs. 25 cc/hr vs. ??? (courtesy of Rainu Kaushal, MD, MPH)

25 u/hr

Isordil vs. Plendil (Charatan, 2000)

Plendil 20mg # 120
20mg po q6hr

But there are still many conveniences with paper and/or writing...



Towards the EHR

Multi-user ubiquitous access to patient data

Multiple views of data

Better communication with other providers and with patients

Re-uses of clinical data, e.g.,

- Applying data science, analytics, and AI
- Quality measurement and improvement
- Population and public health
- Clinical research

Some early (1960s) visions of the “computerized” medical record from [Technicon](#) and [IBM](#)

Transformation to EHRs enabled by perfect storm of recession and healthcare reform



“To improve the quality of our health care while lowering its cost, we will make the immediate investments necessary to ensure that within five years, all of America’s medical records are computerized ... It just won’t save billions of dollars and thousands of jobs – it will save lives by reducing the deadly but preventable medical errors that pervade our health care system.”

January 5, 2009

Entering new “ARRA” of informatics in 2009

Health Information Technology for Economic and Clinical Health (HITECH) Act of the American Recovery and Reinvestment Act (ARRA)

- Incentives for EHR adoption and more
- (Washington, 2017)

United the “tribes” of health system improvement (McKethan, 2010)

- Quality improvement
- Payment reform
- Consumer/patient engagement
- Health IT

INFORMATICS PROFESSOR

THIS BLOG MAINTAINS THE THOUGHTS ON VARIOUS TOPICS RELATED TO BIOMEDICAL AND HEALTH INFORMATICS BY DR. WILLIAM HERSH, PROFESSOR AND CHAIR, DEPARTMENT OF MEDICAL INFORMATICS & CLINICAL EPIDEMIOLOGY, OREGON HEALTH & SCIENCE UNIVERSITY.

SUNDAY, JANUARY 24, 2010

Informatics Now Lives in a HITECH World

The flurry of activity from the Office of the National Coordinator for Health IT (ONC) in late 2009 laid out the implementation plans of the Health Information Technology for Economic and Clinical Health (HITECH) Act of the American Recovery and Reinvestment Act (ARRA, also known as the economic stimulus package). The scope of programs was so immense that few aspects of the biomedical and health informatics field will be unaffected by HITECH. I think we can plainly say that informatics now lives in a HITECH world.

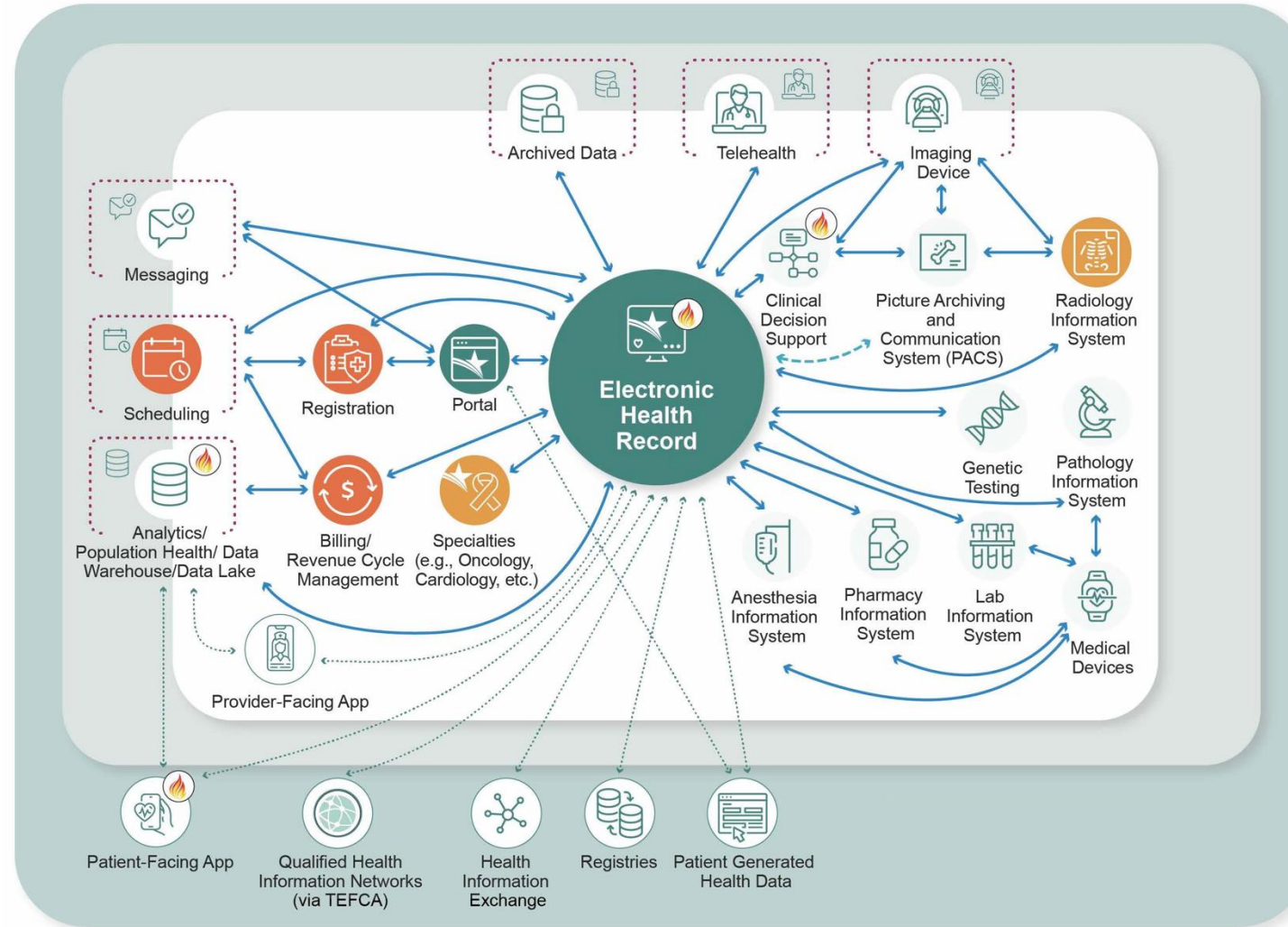
WILLIAM HERSH



<http://www.billhersh.info/>

This is a defining moment for the informatics field. Never before has such money and attention been lavished on it. HITECH provides a clear challenge for the field to "get it right." It will be interesting to look back on this time in the years ahead and see what worked and did not work. Whatever does happen, it is clear that informatics lives in a HITECH world now.

Central role of modern EHR (Sequoia, 2022)



Other definitions related to the EHR

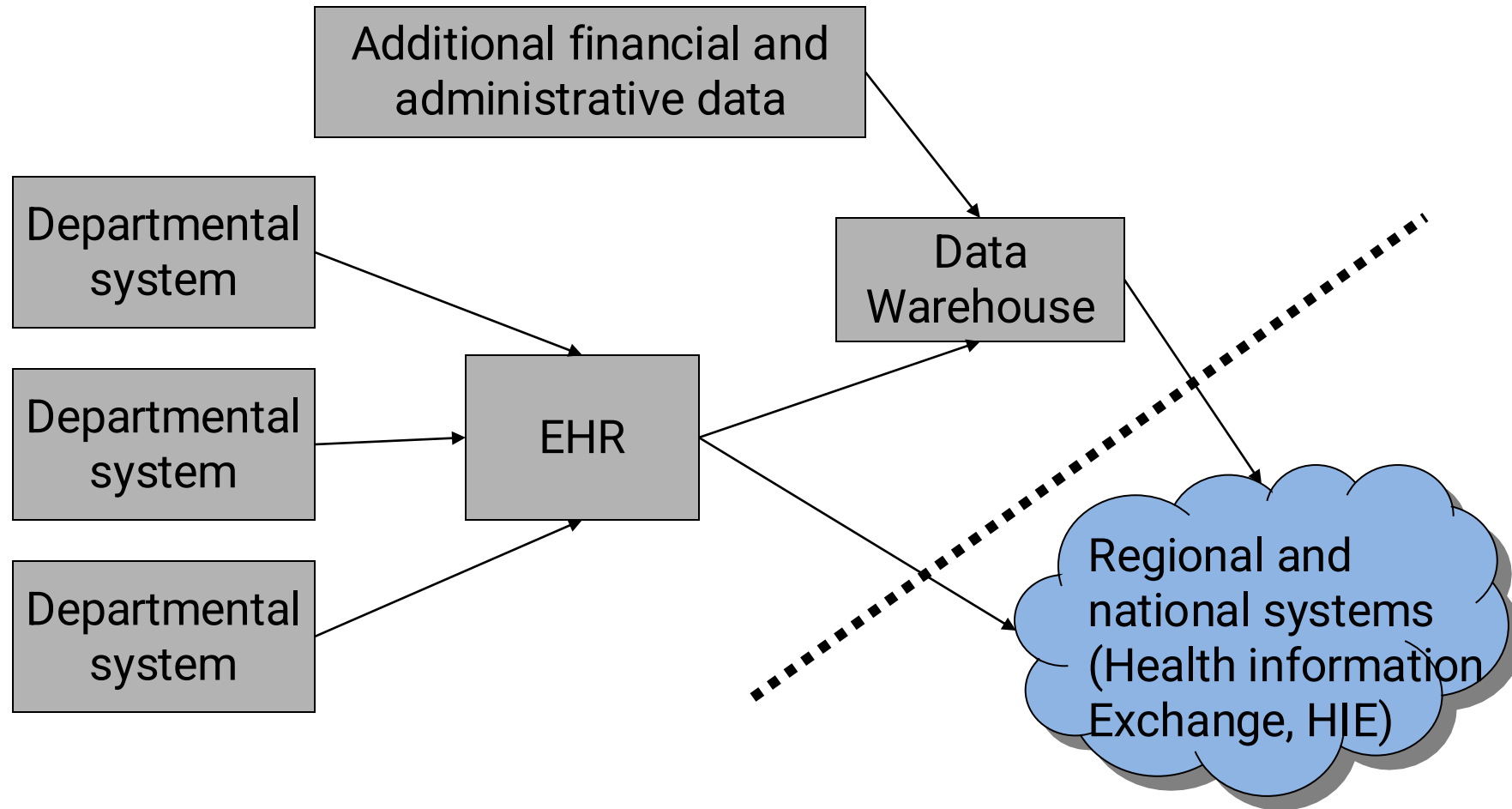
Data flow

Practice management systems

Registries



EHR data flow (typically in hospitals or large clinics)



Other definitions

Practice management systems – often built into EHR; handle non-clinical functions of medical practices, e.g.,

- Scheduling
- Billing
- Eligibility verification

Registries – more limited collection of data (AHRQ, 2020)

- Can be separate from EHR or extract of data from it (Dreyer, 2009; Hersh, 2011)
- Typically oriented to one or small number of diseases, most often chronic diseases
- Usual functions (Blumenthal, 2017)
 - Patient reports – status of monitored conditions
 - Exception reports – outliers, overdue for care
 - Aggregate reports – how is care team delivering recommended care

Benefits and challenges of EHR

Benefits (unit)

- Improved patient care (3)
- Clinical decision support (3)
- Personal health records (3)
- Artificial intelligence (5)
- Protecting patient safety (6)
- Quality measurement and improvement (6)
- Health information exchange (6)
- Population health (6)
- Clinical research (9)
- Improved nursing care (10)
- Public health (10)

Challenges (unit)

- Data quality (3)
- Data entry (3)
- Standards and interoperability (4)
- Bias in data and algorithms (5)
- Understanding clinical narrative text (6)
- Undermining patient safety (6)
- Implementation (7)
- Privacy, confidentiality, and security (7)