Biomedical Informatics

discovery and impact

Nat'l Academies Workshop Session 2: Next-generation EHRs to facilitate oncology care

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Disclosures

- I have nothing to disclose
- There is no discussion of unlabeled uses

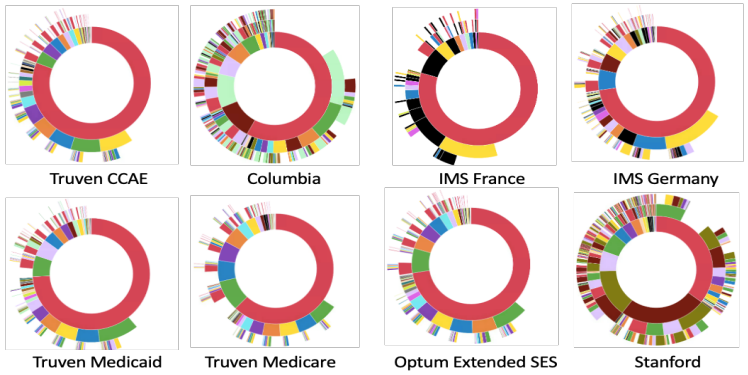
Status of electronic health records (EHRs) and cancer

- The data are informative and can be used to track therapy over time

	PPV	Sensitivity	Specificity
Any cancer	95.9%	98.9%	99.87%
AML	70.6%	96.8%	99.9%
CLL	77.8%	95.7%	99.9%
Pancreatic	88.0%	99.0%	99.9%
Prostate	94.0%	99.6%	99.9%

	PPV (from chart review)	Sensitivity (from registry)	Prevalence	Specificity
Chemotherapy	100%	68.4%	0.23%	99.9%
Hormone therapy	98%	49.0%	0.11%	99.9%
Immuno- therapy	100%	15.8%/50.1%*	0.03%	99.9%
Radiation therapy	86%	67.4%	0.14%	99.9%

Cancer patients with type 2 DM



Chen R. JCO Clin Cancer Inform 2020

Status of EHRs and cancer

- Better than paper
- Documentation burden
  - 2011 AMIA Policy Mtg
  - Multi-use of EHRs (billing, litigation, etc.)
  - How to capture the intricacies of cancer

Box 1 Proposed guiding principles for clinical data capture and documentation

Clinical data capture and documentation should:

1. Be clinically pertinent, patient-centric, and represent an individual's lifetime health and healthcare.
2. Support capture of high quality information that is accurate, relevant, confidential, reliable, valid, complete, and secure.
3. Be efficient and usable while enhancing the healthcare organization's and the care team's overall efficiency, effectiveness and productivity.
4. Support multiple downstream uses as a byproduct of the recording of care delivery including quality measurement, performance improvement, population health care delivery, policymaking, research, education, and reimbursement.
5. Enable joint patient-provider decision making, team collaboration, care process management, and advanced clinical decision support.
6. Enable collection of data and interpretation of information from multiple sources as appropriate and necessary, including nuanced medical discourse, structured items, and data captured in other systems and devices.
7. Automation of data capture and documentation should be optimized whenever appropriate, allowing human beings to focus on gathering and entering data that cannot be effectively collected by automated tools (eg, automated acquisition of data from biomedical devices).

Cusack CM. JAMIA 2013

Fixing EHRs today

- Documentation burden
  - AMIA 25x5 Initiative
  - Not just billing; int'l similarly challenged

82 Action Items

4 Themes

- **Accountability**
  - "Not working in silos"
  - Clarity of roles
  - Cohesive understanding/requirements among agencies and stakeholders
- **Evidence matters**
  - Evidence-based practice informing measures
  - Generation of evidence
  - Clinician input
- **Education and training**
  - Documentation requirements and standards
  - Brevity and clarity training for new clinicians
  - Focus on quality over quantity
  - Incentivize training
- **Innovation of technology**
  - Integration of tech variety
  - Increased interoperability

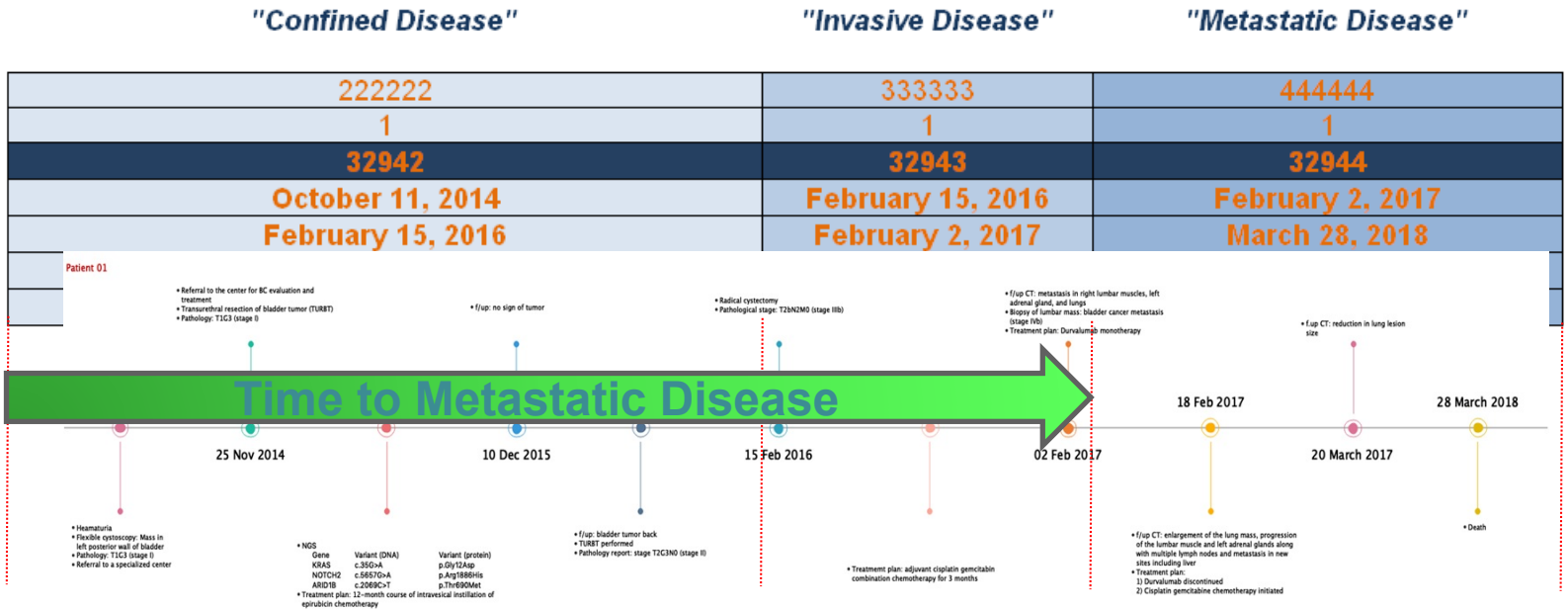
3 Stakeholder Groups

1. **Provider and Health System Calls to Action**
2. **Vendor Calls to Action**
3. **Policy Advocacy Calls to Action**

Rossetti S. dbmi.columbia.edu 2021

Fixing EHRs today

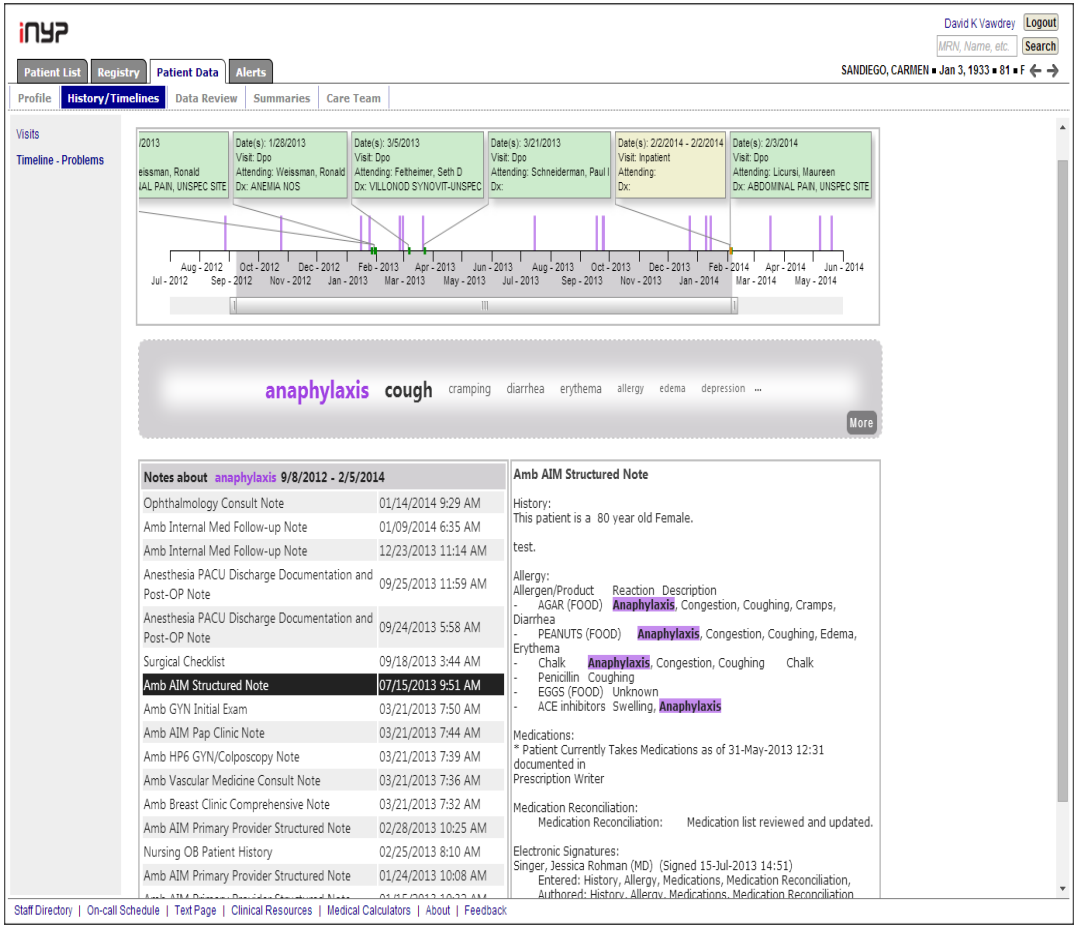
- Observational Health Data Sciences and Informatics (OHDSI) Oncology WG
  - Complexity of cancer progression



Belenkaya R. JCO Clinical Cancer Informatics 2021

Fixing EHRs today

- Data science to help review information



Hirsch J. JAMIA 2015

Future of EHRs

- We have not reached the tipping point on EHRs
- Major usability breakthrough pending

Future of EHRs in oncology

- More patient focused
  - Help patients handle toxic therapy?
- Targeted therapy that is less toxic
- Prevention

Shift in EHR focus

- Person focused
- If “EHR” stays records of hospitalization and office visits
  - May matter less to patients over time
- If EHRs evolve to life records
  - Mobile computing
  - Physiological monitoring
  - Social media
- Inform, advise, educate

Shift in EHR focus

- Genomic baseline
- Periodic sampling and imaging
- Ongoing monitoring
  - Chem 7
- Environment
  - Carcinogens
  - Allergens
  - Microbes
  - O_2, CO_2, CO
  - Meals

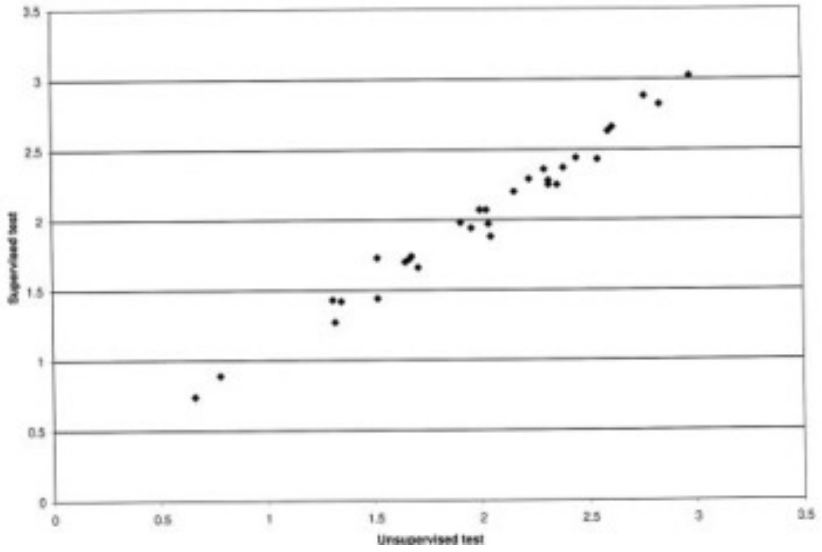
Shift in EHR focus

- Engaging patients in their care, even inpatient

Prey JE. JAMIA 2018

Can patients handle the technology?

- No experience with computers or ATMs
  - Self-administered home pulmonary function test
  - Laboratory-level pulmonary function test



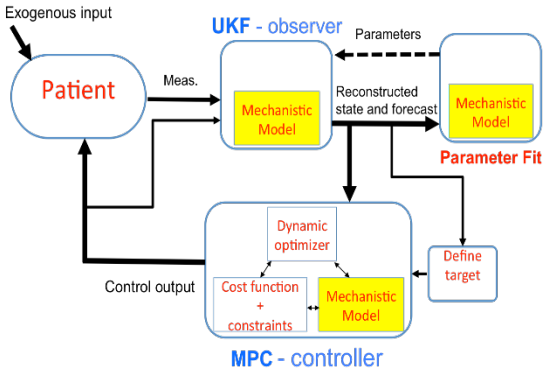
Finkelstein J. Chest 2000

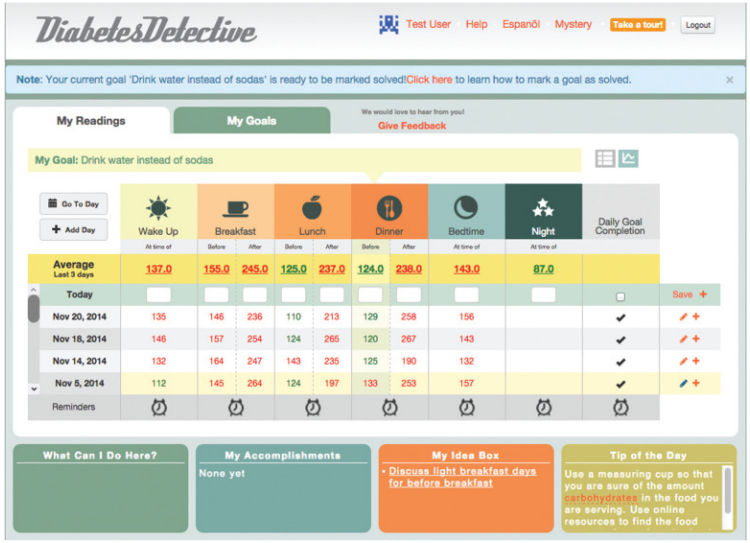
Challenge in future EHRs

- How to prioritize deviations
  - Cannot send everyone for appointments
  - Cannot alert all day long

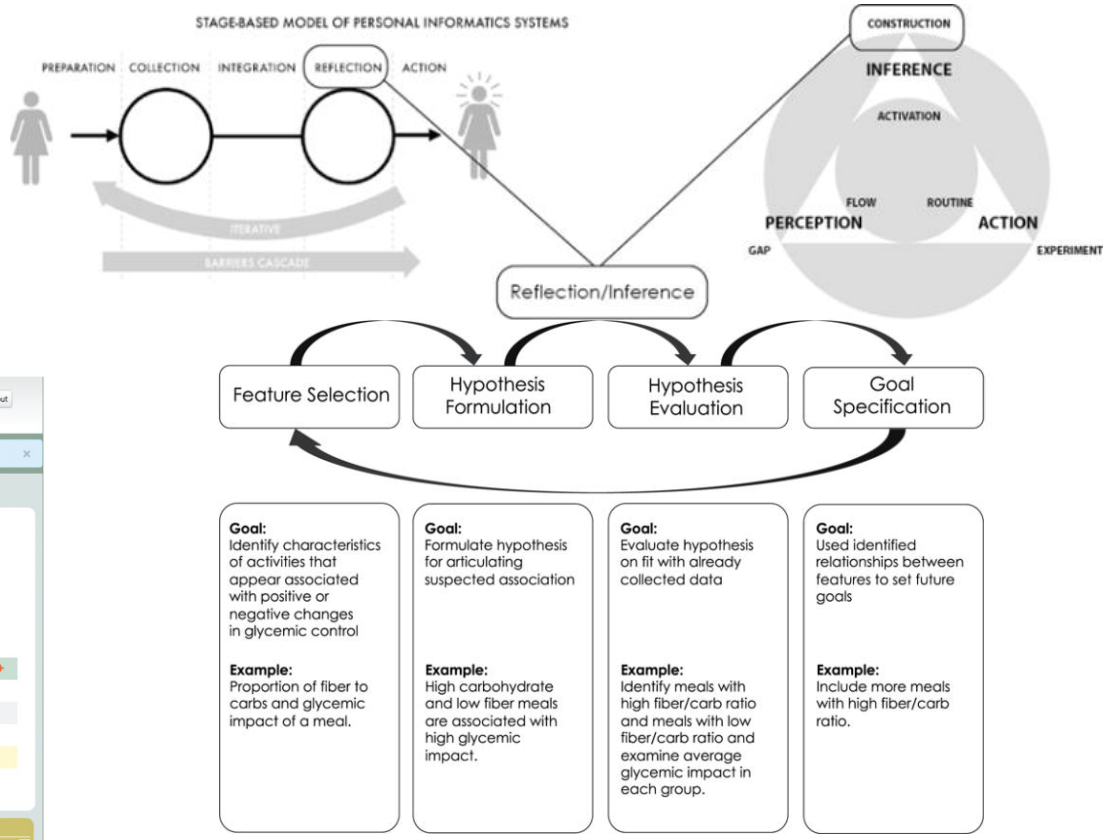
Data science and human-computer interaction

Albers DJ. PLOS Comp Bio 2017



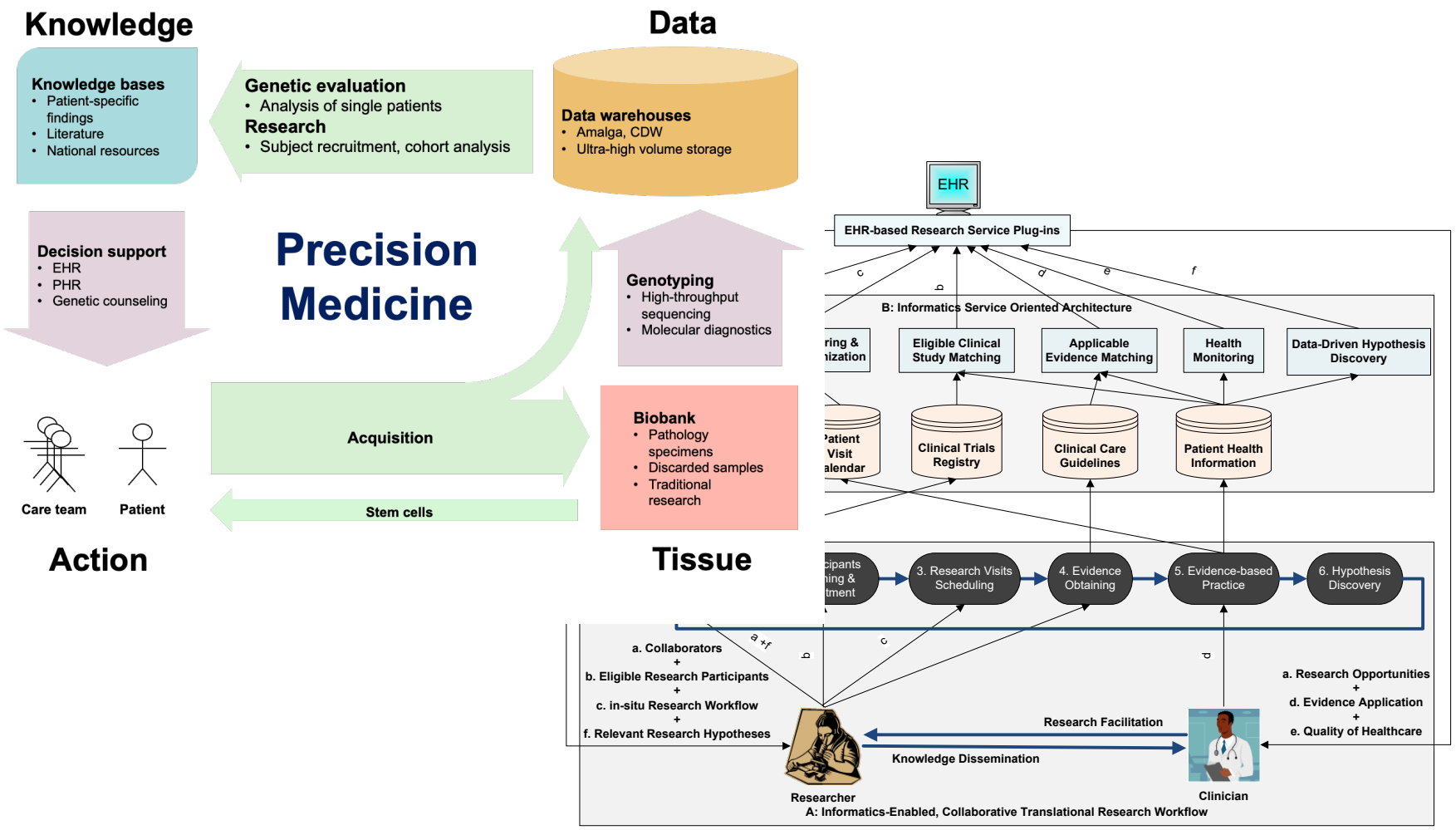


Mamykina L. JBI 2017



Mamykina L. JAMIA 2016

Learning health system



Weng C. 2018