



National Drug Abuse Treatment Clinical Trials Network

September 15, 2010

Betty Tai, Ph.D.
Director, Center for the Clinical Trials Network
NIDA/NIH/DHHS

Development of an Electronic Medical Record (EMR) in Substance Use Disorders

**Ramifications for
Research and Clinical Practice**

1991

- Per IOM report, development of computerized patient records was considered a key infrastructural requirement for supporting national health information management needs
- Per US Congressional mandate, NLM/NIH issued BBA on research/development to explore utility of health information technology (HIT) for healthcare applications

B. Tai 2010

2007

National survey of 2758 physicians (NEJM 2008; 359:50-60)

- 4% have extensive, functional EMRs
- 13% have basic system
- Physicians most likely to use EMR:
 - Primary care
 - Large groups
 - Hospital or Medical center
 - Western US
- Those who use EMR reported positive effects
- Decisions on adoption largely financial

B. Tai 2010

2009

2009 US Hospital Survey (NEJM 2009; 360(16): 1626-1638)

- Response rate: 63.1%
- Only 1.5% has comprehensive EMR system
- Another 7.6% has basic system
- Computerized medicine order only 17%
- Large Urban teaching hospitals are more likely to have EMR
- Cost: major barrier

B. Tai 2010

2009

2009 ARRA (NEJM 2009; 360(15): 1477-1479)

- DHHS Office of National Coordinator of HIT (ONC) with \$19 billion program
- Definitions on “certified EHR” & “meaningful use”
- Financial incentives to promote the adoption and meaningful use of certified EHRs
- All medical records must be digitized by 2015

B. Tai 2010

EMR landscape in US Substance Use Treatment Programs

- Durcharme, et al. (Eval & Prog Plan 2005; 28, 368-378)
 - Surveyed 763 treatment programs, <30% have “EMR”
- Wisdom et.al. (2010, submitted for pub)
 - In a pilot sample, no substance use treatment agency has capability to communicate electronically across programs
- Pincus et al. (Am J of Psy, 2007; 164, 712-719)
 - Mental health and substance use treatment must improve their health information infrastructure to be assimilated into general health care

B. Tai 2010

What is an EMR?

*“aggregated electronic record of health-related information on an individual that is created and gathered cumulatively **across more than one health care organization** and is managed and consulted by licensed clinicians and staff involved in the individual’s health and care”*

National Alliance for Health Information Technology

EMR vs. EHR:

Same data elements, but varies on who owns it and where it is stored.

B. Tai 2010

Electronic Medical Records

In Health Care Delivery

- Improve care quality, reduce costs, and **integrate care**
- Provide clinical decision support and aid **guideline implementation**
- Provide population- and panel-based care
- Monitor outcomes and foster clinical and population-based research
 - bio-surveillance & adverse events reporting
- Aid in billing, reimbursement and other administrative processes

B. Tai 2000

Electronic Medical Records

In Clinical Research

- Advancement in health care informatics could allow real-time, on-site collection of large data sets
- Massive data could be used to support
 - Structured clinical trials
 - Track longitudinal consequences of medical interventions
 - Genomic and genetic studies
 - Innovative ways to find unforeseen correlations e.g. post marketing safety of new meds

B. Tai 2000

Challenges of Planning in Times of Uncertainty

IT

- Technology – massive deployment across diffuse networks and systems in widely diverse platforms and states of readiness

Human Factors

- Diverse users with widely variable skill sets and workflows
 - clinicians, nurses, PA
 - primary care, specialty care
- Variability of evidence base, multiple guidelines
 - conversion of machine and human readable information into executable actions

Gov't Policy

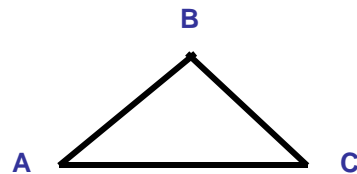
- Moving target of reimbursement models for patient care
- Incentives for physician and health system EHR adoption
- Performance-based practice measures
- Application of EHRs in measures of quality performance

B. Tai 2010



The Interface Battle

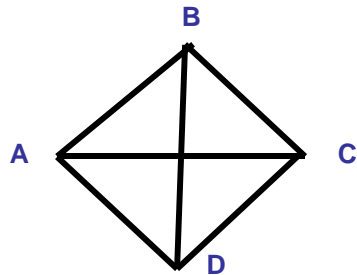
System A — System B 2 systems, 1 interface



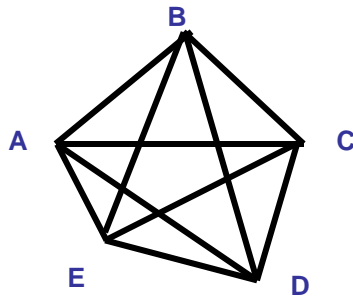
3 systems, 3 interfaces



The Battle Lines are Drawn



4 systems, 6 interfaces



5 systems,
10 interfaces



...And so on!

Systems	Interfaces
6	15
8	28
10	45
20	190
30	435
40	780
50	1225
100	4950

And the math gets *really* ugly after that!



Syntax vs Semantics

- The dog eats **red meat**.
- The dog eats **blue trees**.

- **Time** flies like an **arrow**.
- **Fruit** flies like a **banana**.

- **Syntax** → *Structure*
- **Semantics** → *Meaning*

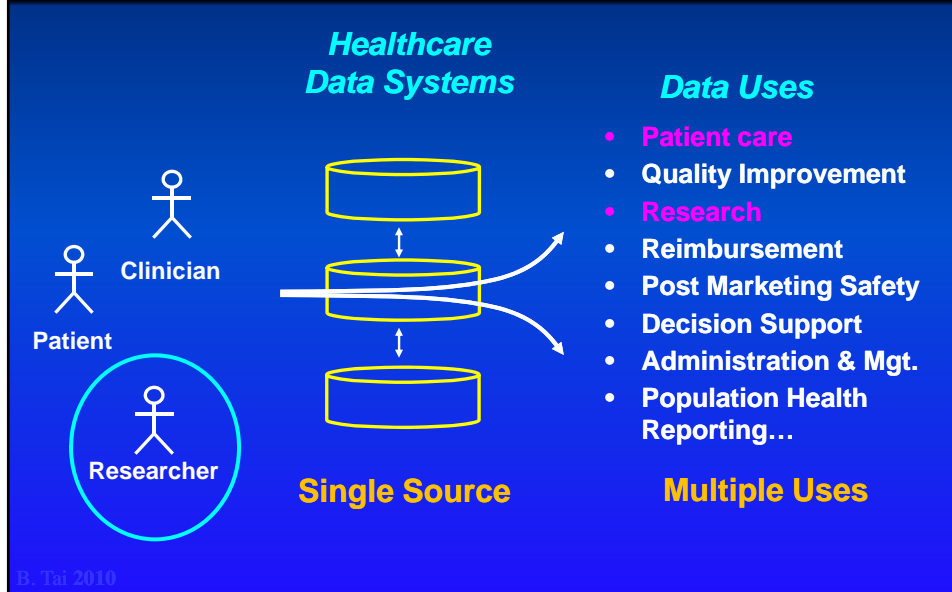
- *....and then there's Context*
'He threw his hat into the ring....'
'He's got a chip on his shoulder...'

Challenges of Planning in Times of Uncertainty

- IT**
 - Technology – massive deployment across diffuse networks and systems in widely diverse platforms and states of readiness
- Human Factors**
 - **Diverse users with widely variable skill sets and workflows**
 - clinicians, nurses, PA
 - primary care, specialty care
 - **Variability of evidence base, multiple guidelines**
 - conversion of machine and human readable information into executable actions
- Gov't Policy**
 - Moving target of reimbursement models for patient care
 - Incentives for physician and health system EHR adoption
 - Performance-based practice measures
 - Application of EHRs in measures of quality performance

B. T'el 2010

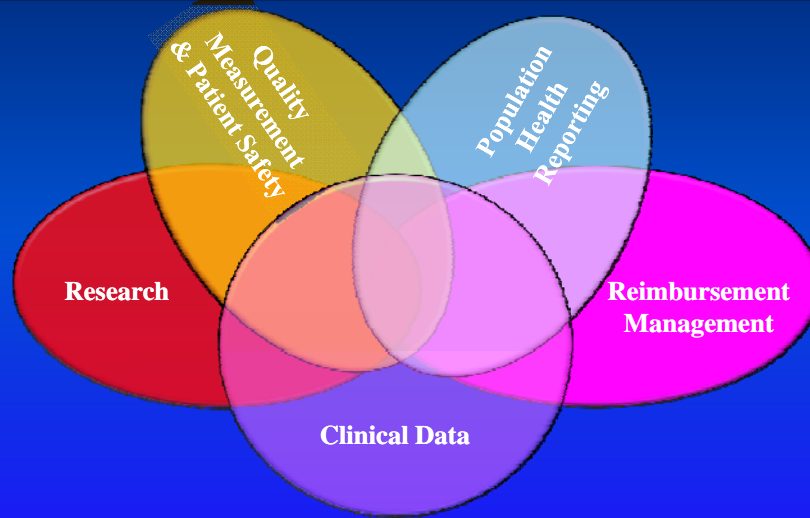
Goal: Exchange and Use of Data



Clinical Research means Paper

- **Healthcare** information is found in:
 - Paper medical records
 - Disparate databases
 - Hospital-based information systems
- **Clinical research** data exists in:
 - Incompatible databases
 - Research notebooks
- **Clinical trial data** collection:
 - Multitude of electronic data capture form applications (eCRF)

Uses of Data Have Significant Overlap



B. Tai 2010

The Problem

Data Collected or
Generated During
Patient Care

Data Used

B. Tai 2010



Interchange vs. Interoperability

- **in-ter-op-er-a-bil-i-ty**

: ability of a system (as a weapons system) to use the parts or equipment of another system

Source: Merriam-Webster web site

- **Interoperability**

: ability of two or more systems or components to exchange information and to use the information that has been exchanged.

Source: IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries, IEEE, 1990]

Functional interoperability

Semantic interoperability

Why Standards?

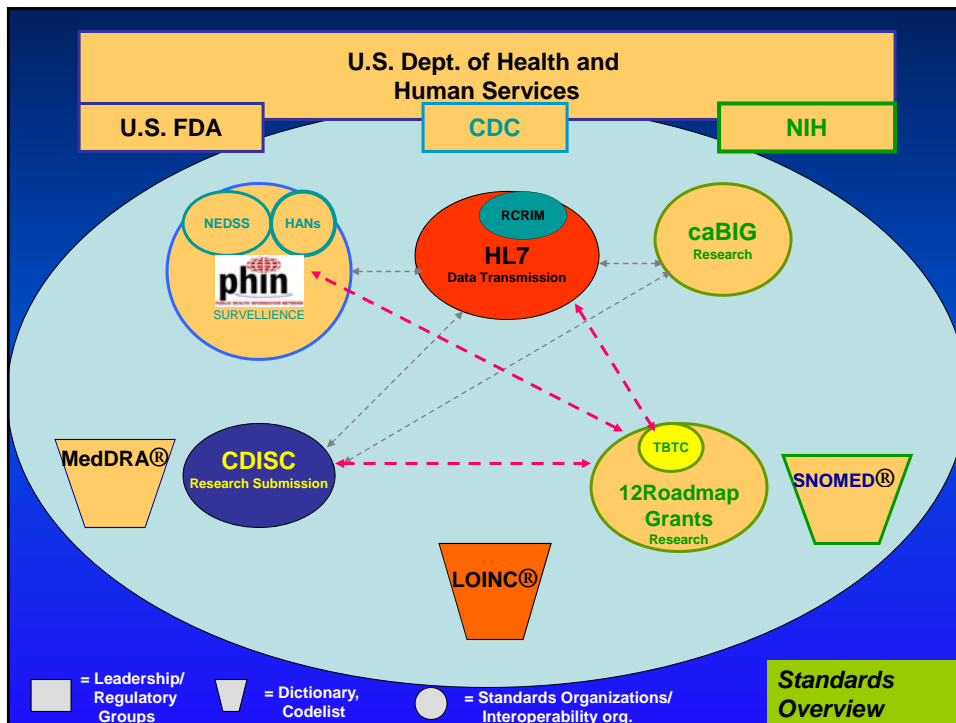
- Standards enable interoperability of healthcare information
- Three aspects of interoperability
 - **Technical:**
 - Moving data from system A to system B
 - **Semantic:**
 - Ensuring that system A and system B understand the data in the same way
 - **Process:**
 - Enabling business processes at organizations housing system A and system B to work together

B. Tai 2010



Keeping Track of Standards

- **Messaging standards**
 - HL7 – Clinical data
 - X12 – Financial data, HIPAA–mandated transactions
 - DICOM – Images
 - IEEE – Bedside instruments
- **Terminology standards**
 - LOINC – Logical observation identifier names and codes
 - Drugs – RxNorm, NDF-RT
 - Billing – CPT, ICD-9CM
 - Clinical – UMLS, SNOMED and others



Acknowledgements

- **EMMES Corp**
 - Bob Lindblad, M.D.
 - Paul Van Veldhuisen, Ph.D.
 - Rob Gore-Langton, Ph.D.
 - Brian Campbell
- **NIDA CCTN**
 - Udi Ghitza, Ph.D.
 - Steve Sparenborg, Ph.D.
 - Paul Wakim, Ph.D.
 - Carol Cushing, R.N.
- **NIDA CTN**
 - John Rotrosen, M.D.
 - CTN Special Interest Group on EMR
 - CTN CTPs
- **NIDA DESPR**
 - Sara Duffy, Ph.D.

B. Tai 2010