Evidence-based Design for Health Information Technology (HIT)

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Complaint –
U.S. health care most costly in the world

Complication -

HIT has great potential that can’t be realized with conventional, hit-or-miss methods

- HIT has powerful impact on the way care can be practiced
- Unpredictable HIT impact on workflow can -
  - risk patient safety
  - disrupt appropriate care
  - undermine needed efficiency gains
Diagnosis -

Conventional HIT functions are not co-designed to work smoothly with important, manual activities in the workflow of care

• usability testing only covers the user interface, not the workflow
Ineffective treatment -

Just pave the cow paths
**Rx** – make improvement of clinical workflow integral to the way HIT systems are created

Co-design care workflow & HIT . .

. . to form a matched pair . .

. . that work together for measurably better care
Protocol -

Use MATH\textsuperscript{1} to co-design HIT with workflow

- MATH extends easily understood BPMN standard
- Better information resources can be traded-off for less physical resource use

MATH makes beneficial impact to workflow a quantifiable, predictable part of HIT system design

1. Modeling & Analysis Toolsuite for Healthcare – patent pending 13/740,681
Case Study - *Priority Contact*

Reduces unproductive clinician time to contact patients quickly about test results

- harvests EHR data to carry out appropriate procedures
- can improve quality measures for patient contact
- won award in national SMART Apps competition
Clinicians participated in concept design and critique impact on quality

Part of as-is manual workflow to contact patients

Streamlined with *Priority Contact*
Formative evidence for efficiency impact of **Priority Contact** - discrete-event simulation

1. Re-assign manual tasks to **HIT services** in MATHflow

2. Run MATHsim to analyze efficiency impact of new system on workflow
Evidence Progression for *Priority Contact*

Data that guided design: Formative comparison of monthly hours spent contacting patients

- As-is: 39 hours
- To-be: 25 hours

Revised comparison from measured alpha test results

- As-is: 42 hours
- To-be: 20 hours

Demonstrates technical feasibility of evidence-based design of HIT
- Detailed model provides accuracy
Side Effects -

- Labor intensive
  - MATH projects require 15-20 hours of clinician interviews and observations

- Skill level need for MATH projects is still high
  - Ethnographic research
  - Clinical experience
  - Systems modeling & simulation
  - Impact evaluation
  - Software design/implementation

- Mitigation
  - 1.5-day training course for MATH is available and several BPMN tutorials are online
  - Each subsequent project can help build a library of reusable model components
Summary -

• MATH models the workflow of clinical care to understand how it should be improved with HIT
• Credible proxy measures of HIT impact can be derived from workflow models to guide design
All models are wrong . .
. . but some are useful.

- George Box, distinguished statistician

Thank you.