Designing for Medication Safety
A Sociotechnical Perspective on Medication Reconciliation

Jos Aarts, PhD, FACMI

I-PrACTISE 2016
Madison, WI
April 25, 2016
Medication Reconciliation (MedRec)

MedRec is a process of identifying the most accurate list of all medications a patient is taking—including name, dosage, frequency, and route—and using this list to provide correct medications for patients anywhere within the health care system.

_Bassi et al., Ann Pharmacother 2010;44:885-97_
MedRec

Continuum of care

patient

A

B

C

Transition point

Transition point
WHAT MEDICATION ARE YOU TAKING FOR YOUR BLOOD PRESSURE?

IT'S A SMALL WHITE PILL...

IT STARTS WITH THE LETTER E*

* HAS ~25% CHANCE OF STARTING WITH E

IT'S ONE OF THE MEDS IN THIS SACK
MedRec

• Medication omissions and dosing failures are frequent during transitions
  • Clay et al., J Hosp Med 2008;3:465-72

• Source:
  • Interviews
  • Chart review
MedRec: Rush to the Tools

• Formal process mandated by Joint Commission (2006); part of requirements of Meaningful Use
  • Checklists
    • Pronovost et al., J Crit Care 2009;18:201-5
  • Specific IT applications
    • Schnipper et al., Arch Intern Med 2009;169:771-80
  • CPOE / EHR
    • Lee et al., Ann Pharmacother 2010;44:1887-95
MedRec Process (Tools): Do They Impact Clinical Outcomes?

- Some evidence
  - Pronovost; Schnipper
- Scant evidence
  - Lehnbom et al., Ann Pharmacother 2014;48:1298-312
Methodological Challenges

- Defining errors
- Finding errors
- Is a study that attempts to correct errors doomed to fail?
- Optimists: accurate drug history key to medication safety
MedRec Challenges

• Health care system is fragmented
  • System A: process D, (IT) tool X
  • System B: process E, (IT) tool Y
  • System C: process F, (IT) tool Z
• Processes and tools are not compatible
• Patient falls through the cracks
A Sociotechnical Perspective on MedRec

• MedRec is a process, not a tool
• MedRec is embedded in health care practices
• Health care practices are facilitated and constrained by organizational structures, norms and values, and technological affordances
• So is MedRec
Challenging Some Wisdoms of Safety

- Human error is the largest single cause of incidents and accidents
- Systems will be safe if people comply with procedures
- Safety can be improved by barriers and protection
- Root cause analysis can identify why mishaps happen in complex sociotechnical systems
- Accident investigation is the logical and rational identification of causes based on facts
  - Besnard and Hollnagel, Cogn Technol Work 2014;16:13-23
Concept of Resilience

Resilience is a property of sociotechnical systems that confers on them to remain intact and functional despite the presence of threats to their integrity and function.

Hollnagel et al., 2013
MedRec is Resilient

• Most of the time MedRec goes well
• Humans are excellent in mitigating unexpected and unanticipated events by workarounds
• People complain, but get their work done
• MedRec is suboptimal
Aim of the Study

What are the requirements of safe health information technology to support medication reconciliation as a resilient process?
Outcomes of the Study

- A process model of medication reconciliation across organizational boundaries
- Focus on providers and patients and their families
- An analysis of required IT support
  - Organizational infrastructures
- A toolbox for appropriate IT support
Empirical Research Methods

• Understanding MedRec as a process requires qualitative research methods
• Qualitative research is about fieldwork (naturalistic settings)
• Data collection:
  • Observations
  • Interviews
  • Documents
Methodological Rigor of Qualitative Studies

• Theory driven
  • Bruins, Ruijs, Wolfhagen, Bloembergen, Aarts, BMC Med Inform Decis Making 2011;11:19
  • Van der Sijs, Aarts, et al. J Am Med Inform Assoc 2006;13;138-47

• Thematic analysis by concept coding
• Mapping of results on theory
Research Setting and Sites

- Naturalistic settings: ECMC Emergency Department and primary care practices
- Providers are focus of analysis
- Tracking patients
  - Eligibility: >75 years; polypharmacy
ECMC sites
Research Funding

- AHRQ NOT-HS-15-005
Research Collaborators

- Amanda Hassinger, MD, MS (Assistant Professor of Pediatrics)
- Ranjit Singh, MB, BChir, MBA (Associate Professor of Family Medicine)
- Maureen Evans, RPh, ECMC
- Ann Bisantz, PhD (Professor of Industrial and Systems Engineering)
External Collaborators

• Ross Koppel, PhD, FACMI, Department of Sociology, University of Pennsylvania, Philadelphia, PA
• Gordon Schiff, MD, Brigham and Women’s Hospital - Harvard Medical School, Boston, MA
• Robert L. Wears, MD, PhD, MS, University of Florida, Jacksonville, FL
Suggestions, Ideas, Questions, Discussions

Jos Aarts, PhD, FACMI
E: jaarts@buffalo.edu