# Implementation as a Central Problem in Patient Safety

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## Overview

- This session focuses on implementation issues
  - Will give many examples and some pointers from the ‘school of hard knocks
- But, minimizing implementation difficulties begins with picking the right safety problems to solve and the right solutions for them

## Implementation Principles to Keep in Mind

- Determine basis of a given safety problem
  - *Don’t assume you know the answer*
- Match proposed solution to the problem
- Anticipate barriers to implementation
- Pilot test
- More formal evaluation

} *More on these later*

## Example Problem: Overuse of Urinary Catheters → Nosocomial UTIs

- Organisational – e.g. inadequate staffing
- Professional
  - Knowledge/skills
  - Attitudes, peer opinion
  - Memory, time factors
- Patient -- e.g. knowledge, expectations

Probably contributes, but hard to fix

Likely not a major factor in this case

... much catheters bother

Probably a major factor: MDs often unaware of catheters

... factor in this case

Catheter use was inappropriate in 31% of patients with a catheter. Providers were unaware of catheter use for 41% of the provider-patient observations of patients who were inappropriately catheterized. Catheterization was more likely to be appropriate if respondents were aware of the catheter (odds ratio = 3.7; 95% CI 2.1 to 6.7).

## Successful Application of Matching Solution to Problem : reduction of nosocomial UTIs

Target: decreased use of Foley catheters

- Insertion not indicated 25% of the time
- *But*, often placed in Emerg before MDs see patients
- Continued use not indicated 50% of time
- MDs unaware of catheter 30-50% of time

Interventions directed at decreased insertion likely to be ineffective; *decreasing duration seems more promising*

## Automatic Stop Orders for Urinary Catheters

| | Control Ward | Study Ward | Difference |
|---|---|---|---|
| Catheter Duration | 8 ± 5 days | 5 ± 3 days | 3 days ($p = 0.03$) |

Cornia et al. *Am J Med.* 2003

## Importance of Example

- Educational initiatives – almost certainly would have had no effect
- Local champions, opinion leaders - ditto
- Audit & feedback – possibly could have had an effect, but likely weak but would still rely on sustained vigilance by clinicians

*In this case, a reminder that targeted decreased duration of catheterization was more appropriate than other potential strategies, but each problem will be different.*

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## Computerized Provider Order Entry

- Reports of complete implementation failures
  - Cedars-Sinai in LA (2004), CHEO here in Ottawa
- Survey of 1000 randomly selected US hospitals
- CPOE completely available at 10%
  - 50% reported participation by <50% of physicians
  - 30% reported >90% of all orders remain handwritten

Ash et al. *J Am Med Inform Assoc* 2004

## Why so hard to implement?

- Many vendors have had ≤1 previous clients
  - Technical hurdles often not appreciated by IT companies coming from non-healthcare sectors
- Incompatibility with existing systems (even from the same vendor)
- Impact on workflow often ignored

Poon et al. *Health Affairs* 2004.

JAMA

"Role of computerized physician order entry systems in facilitating medication errors"

**Role of Computerized Physician Order Entry Systems in Facilitating Medication Errors**

## Example error types

- Medications discontinued without clinicians being aware
- Delays in orders when patients not yet entered into system
  - One fatal example reported in previous *JAMA* piece
- Incorrect default dosing or protocol
- Overloading users with alerts and reminders for completeness
  - → ignoring/over-riding all alerts and requests
- Entering order for wrong patient due to interruption

Koppel et al. Role of CPOE in facilitating medication errors. *JAMA* 2005.
Ash J et al. Unintended Consequences of IT in Health Care *J Am Med Inform Assoc* 2004

Institute for Safe Medication Practices

Remote CPOE error: a situation that's more than remotely possible

Case in which a resident ordered vecuronium infusion for a patient on med/surg ward instead of intended ICU patient (!)

- Two nurses verified drug, pump settings, and patient. Infusion was started, after which the patient began walking to the bathroom.
- Patient fell to the floor, but fortunately was able to call out for help.
- Resident was called, along with the rapid response team.
- Luckily one of the nurses questioned whether the "new drug" she had just hung could be responsible

"Improving patient safety by identifying side effects from introducing bar coding in medication administration. Patterson et al. *J Am Med Inform Assoc.* 2002

**Improving patient safety by identifying side effects from introducing bar coding in medication administration.**

Patterson ES, Cook RI, Render ML.

Ohio State University, Columbus, Ohio, USA. patterson.150@osu.edu

PMID: 12223506 [PubMed - indexed for MEDLINE]

## Example problems during bar-coding implementation

- Administration of chemotherapy prevented because staff could not place IV fast enough and originally scheduled dosing time had passed
- Nurses thought it was faster to key the patient ID in manually despite wanding speed being touted by vendors.
- One mis-identification (in only 67 hours of observation)

Patterson et al. *J Am Med Inform Assoc.* 2002

JAMA

"Safety of Patients Isolated for Infection Control"

Isolated patients twice as likely to experience adverse events (31 vs 15 adverse events per 1000 days; $P<.001$).

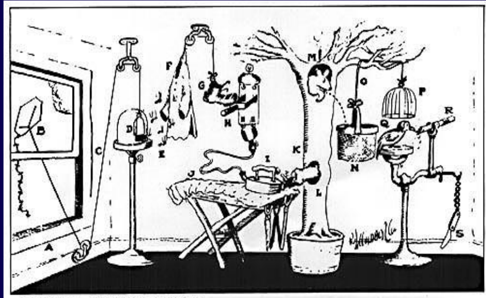
Isolated patients also more likely to

- formally complain to the hospital about their care than control patients (8% vs 1%; $P<.001$)
- have no vital signs recorded as ordered (51% vs 31%; $P<.001$)
- have days with no physician progress note (26% vs 13%; $P<.001$)

## Recurring Themes In Patient Safety

- Murphy's Law
- Technologic "Revenge Effects"
- Law of Unintended Consequences

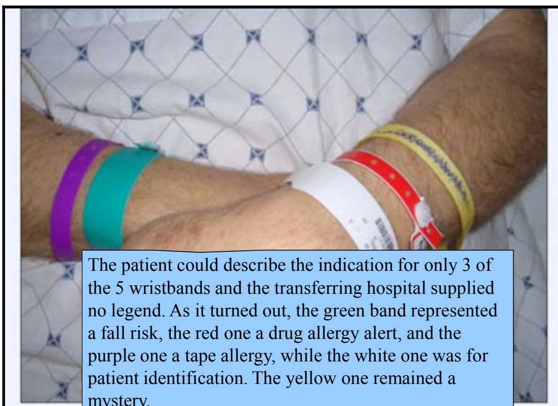
## Rube Goldberg Pencil Sharpener




## The Connection to Patient Safety

- This more or less captures the medication process in a typical hospital
- Most improvement efforts amount to changing the boot that throws the switch on the iron or adding another woodpecker
- These apparently simple changes can have unintended effects elsewhere in the process

***These types of unintended consequences to changes in complex processes represent one of biggest barriers to improving healthcare quality and safety***



## Three Apparently Simple Examples

## Head-of Bed Elevation in the ICU

- Semi-recumbent position (elevation of the head of the bed to 30°-45°) to reduce risk of ventilator association pneumonia (VAP)
  - Widely recommend as one of the ICU "bundles" in the Save 100K Lives and Safer Healthcare Now Campaigns
  - Seems like a very simple intervention

In a prospective multicentered trial, patients undergoing mechanical ventilation randomly assigned to backrest elevation of 45 degrees or supine position

Backrest elevation was measured continuously during the first week of ventilation with a monitor-linked device…In each ICU, one dedicated research nurse controlled patient position 2–3 times daily and restored backrest elevation to the randomized position when possible.

The target semirecumbent position of 45 degrees was not achieved for 85% of the study time…The achieved difference in treatment position (28 degrees vs. 10 degrees ) did not prevent the development of VAP.

## How could this have happened?

- How could contraindications to head-of-bed elevation occur so frequently?
- Implies perceptions of contra-indications by many staff may not be accurate
- Intervention should have been accompanied by some staff education
  - Maybe research nurse should have been tasked with educating individual clinicians as issues arose

- Husband and wife brought to ED after MVA
- Cross-match samples sent for both patients
- Mr. M's cross match tube was labeled with sticker for Mrs. M
- *Fortunately, Mrs. M had undergone a C-section at same hospital and Lab Technologist noticed 'change' in her blood type from Type O to Type A*

  → *called the ED immediately*

"We had a similar incident…

*The solution here has been that all blood needs two screens*. Unfortunately, patients routinely have both samples taken at once (i.e., at the same draw), thus undermining the safety of double samples to avoid patient labeling confusion."

## Potassium Chloride Safety

Concentrated KCl resembles other iv solutions → Lethal errors involving injections of concentrated KCl

Sobering example of hospital where delays in receiving KCl from Pharmacy resulted in surreptitious hording of KCl on wards

→ ***Increase, rather than decrease in hazard***

## Implementation Issues

- Expect to occur with any new technology
  - CPOE, barcoding, smart pumps
- Expect to occur with any intervention involving reorganization of care
- Expect with any intervention that requires additional work for frontline personnel
- Expect with any 'add-on' policy

## When Will Implementation Issues Not Arise?

- Basically never
- Always expect them
- Only potential exception is where you are simply throwing money at a problem to pay for more of what you already have
  - More RNs
  - More pharmacists

## From the School of Hard Knocks

- Don’t even attempt to solve problems that don't interest front line personnel
  - Or, at least, don’t expect them to participate in the solution
- Assuming they are interested, solution must be “effort neutral”
  - Don’t ask them to work harder or be more careful
- Interventions involving reorganization of work flow or major new technology require extensive ground work & early input from all personnel affected