



Center for Medication Safety Advancement

Simulating the Medication Use Process

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Objectives

- Identify the medication use process within the health care system
- Describe medication errors within the medication use system
- Synthesize a “dashboard” of safety measures
- Illustrate the tablet-based safety simulation research program in development

Third baby dies after error at Indiana hospital *Updated*

9/20/2006 11:20 PM ET

By Theodore Kim and Tammy Webber, USA TODAY

INDIANAPOLIS — A third premature baby has died in a case of medical error here that has shaken one of Indiana's largest hospitals.



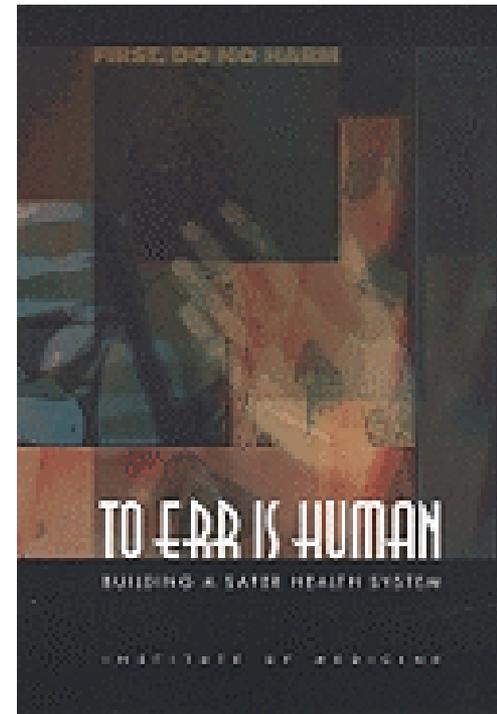
Medication Errors

"A medication error is any **preventable event** that may cause or lead to **inappropriate medication use** or **patient harm** while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to **professional practice, health care products, procedures, and systems, including prescribing; order communication; product labeling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use.**"

- National Coordinating Council on Medication Error Reporting and Prevention (NCC MERP)

Medication Errors

- 1999 Institute of Medicine (IOM) report
- 44,000 – 98,000 people per year die as a direct result of medical errors



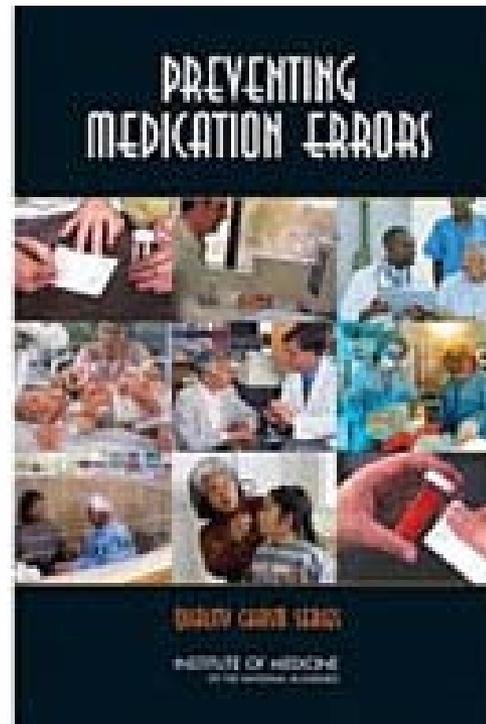
Airline Safety

Year	Fatalities	Total Passengers (millions)	Millions of Passengers per Fatality
2000	83	701	8.4
2001	483	629	1.3
2002	0	619	No Fatalities
2003	19	654	34.4
2004	11	711	64.6
2005	18	743	41.3
2006	47	747	15.9
2007	0	770	No Fatalities
2008	0	744	No Fatalities
2009	45	711	15.8

Source: NTSB - Table 3. Passenger Injuries and Injury Rates, 1990 through 2009, for U.S. Air Carriers Operating Under 14 CFR 121

Medication Errors

- 2006 IOM report
- 1.5 million *preventable* adverse drug events (ADE) annually in the United States
- Each costs ~\$8,750



Medication Errors

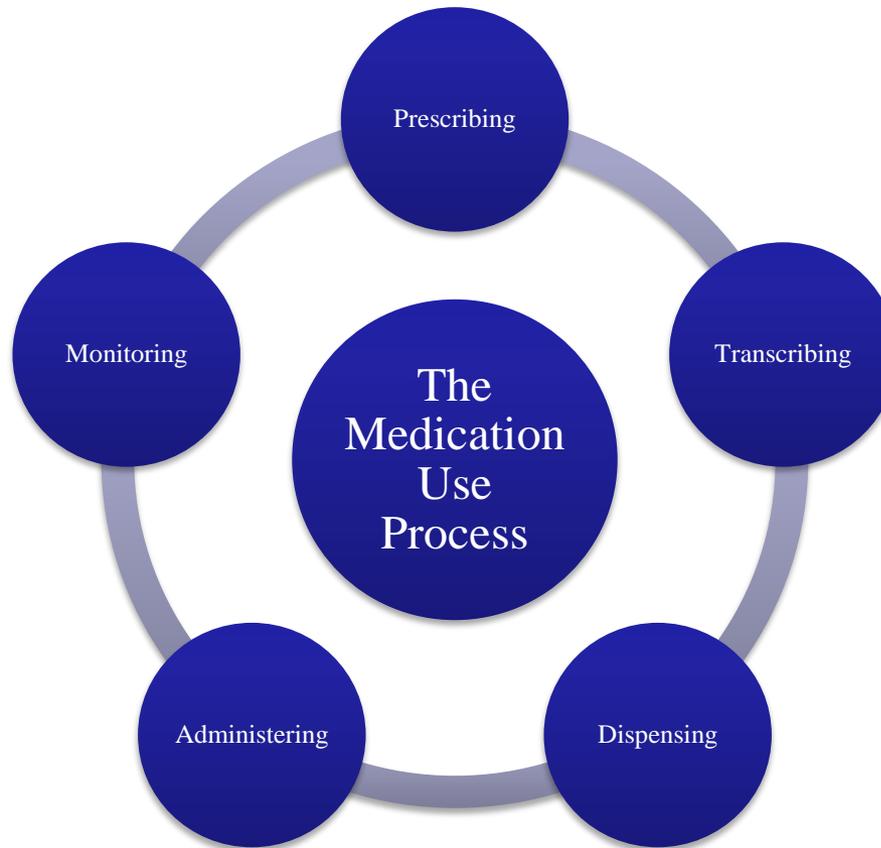
- Flynn et al. *J Am Pharm Assoc.* 2003; 43:191-200.
 - Examined accuracy rates in community pharmacies
 - 50 pharmacies in 6 cities
 - Error rates discovered to be ~4/day when filling 250 Rx/day
 - Total of 51.5 million errors (3.3 million of clinical significance)
 - 1 in 5 doses are not administered as prescribed

But that was 13 years ago...

- 2010 Landrigan et al study in NEJM
 - Randomized sample of 10 NC hospitals
 - 100 admissions per quarter reviewed for medical errors from Jan 2002 through Dec 2007
 - Results
 - 25.1 harms per 100 admissions
 - No statistical significant drop in rate of harms over 6 years

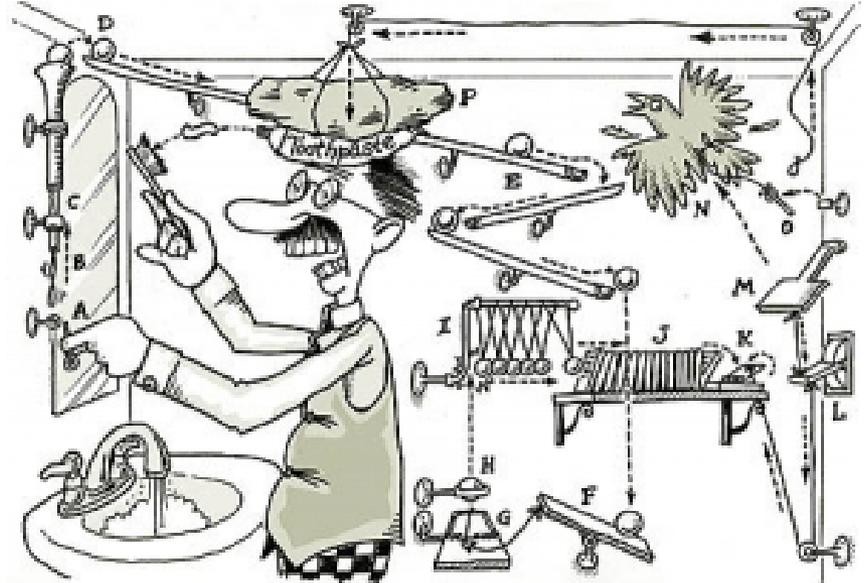
Landrigan, C et al. Temporal Trends in Rates of Patient Harm Resulting from Medical Care. *New England Journal of Medicine*. Nov. 25, 2010; vol 363: pp 2124-2134

What is the Medication Use Process?



Assuring the 5 components of the medication use process provide the most benefit to the patient with the least risk of harm.

Bad practitioner or bad system?



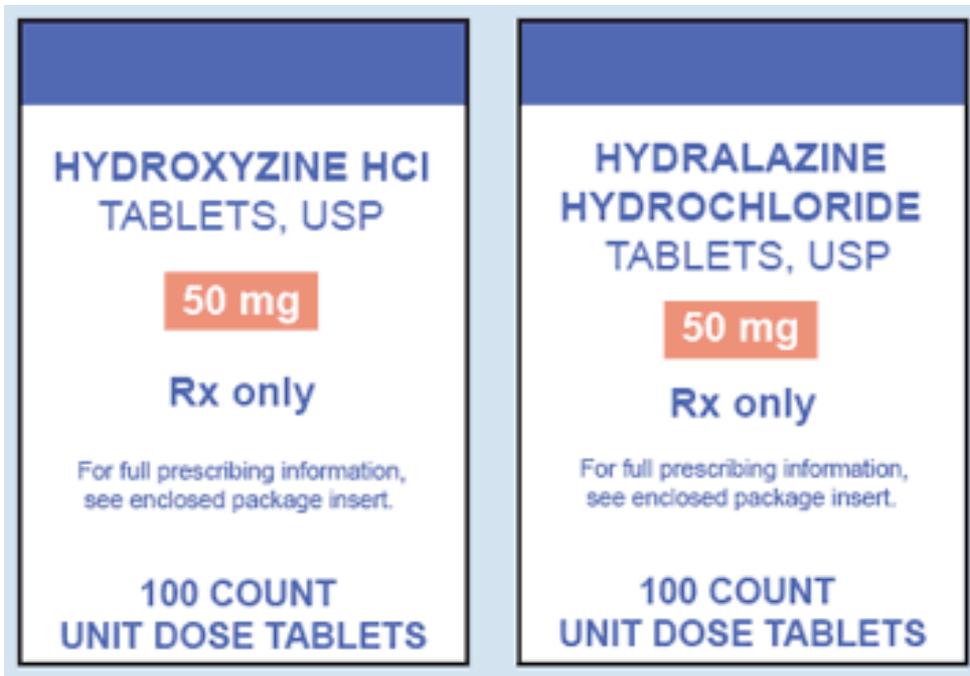
Black holes stand at the very edge of scientific theory. Most scientists believe they exist, although many of their theories break down under the extreme conditions within. But Professor Cornelius Van Bockstein of the University of Ushuaia says he knows what you would find inside, and challenges the traditional idea that gravity would cause you death by "spaghettification".

Count the F's in the text above
(Count them only ONCE!)



Aoccdrnig to a rscheearch at Cmabrigde Uinervtisy, it deosn't mttær in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer be at the rghit pclae. The rset can be a toatl mse and you can sitll raed it wouthit porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe.

Drugs with similar names

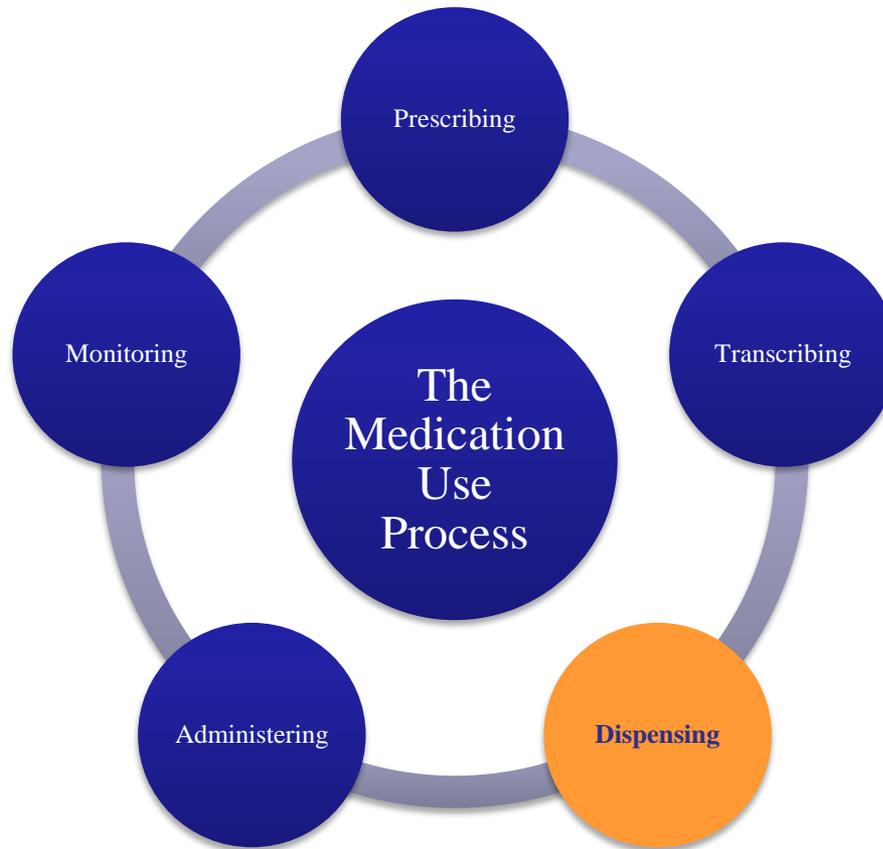




Drugs with similar names

- Lamisil – Lamictal
- Aricept – Aciphex
- Zyrtec – Zyprexa
- Hydromorphone - Hydrocodone

Medication Use Process





History – The technology solution

- 2007 study showing national penetration of health information technology
 - 83% have automated dispensing cabinets (ADC)
 - 44% have smart pumps
 - 43% have electronic medical records (EMR)
 - 24% utilize BCMA technology
 - 18% use computerized provider order entry (CPOE)

Source: The Joint Commission. Sentinel Event Alert: Issue 42, December 11, 2008.



Implementation Results

Error Type	1993 (%)	2001 (%)	Improvement (%)
Wrong Medication	.00371	.00091	75.5
Wrong Dose	.00334	.00127	62
Wrong Patient	.00138	.00009	93.5
Wrong Time	.00143	.00018	87.5
Omission	.00917	.00272	70

Source: Johnson CL, et al. Journal of Healthcare Information Management. Vol.16, No. 1; 2002.



Implementation Results

- Overall, met goal of reducing medication errors – process was becoming safer
 - 1993: 21.7 incidents per 100,000 doses
 - 2001: 3 incidents per 100,000 doses
- Varying degrees of acceptance for new technology
- Multiple unforeseen difficulties
 - Workarounds evolve with the technology

Source: Johnson CL, et al. Journal of Healthcare Information Management. Vol.16, No. 1; 2002.

The Scrubs Method



The Favorite Meds Method



The Warehouse Method



Dashboard



Safety Simulation Research

- PI: Kimberly S. Plake, PhD, RPh
- Collaborating with CMSA to development and launch an interactive educational simulation tool
- Received seed grant from Lilly Endowment and Purdue University College of Pharmacy for design, development, and pilot of the program

Safety Simulation Research

- Aims
 - Develop and validate a dashboard of generally regarded as safe practices
 - Develop and pilot a tablet-based interactive computer software simulation to educate and enhance safe practice metrics

Developing and Implementing a Pharmacy Dashboard



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Safety Dashboard

- Identify generally regarded as safe practices



Safety Dashboard

- Bar Code Medication Administration Scan Rates

of medications scanned prior to administration

Total # of medications charted as administered

==

% scan rate

Safety Dashboard Validation

- Survey of >15 proposed safety measurements sent to groups of identified medication and healthcare safety leaders
- Asked to identify which items they would use if they had the capability (actual use not required, more of a desired future state)
- Status update (as of mid-July)
 - Awaiting validation and selection of final measures

Safety Simulation – High Fidelity



Often large, expensive, but very intensive training facilities meant to mimic as near a lifelike situation as possible with immediate feedback on the same systems providing feedback in the native environment.



Safety Simulation – Low Fidelity

Often smaller, inexpensive tabletop situations that require minimal equipment that is most often representative in nature rather than a lifelike imitation of a natural environment.



Our Proposal – Mid Fidelity

- Take strengths from both high and low fidelity systems
 - Comparatively inexpensive vs. high fidelity
 - Mobile
 - Accurately mimics a native environment

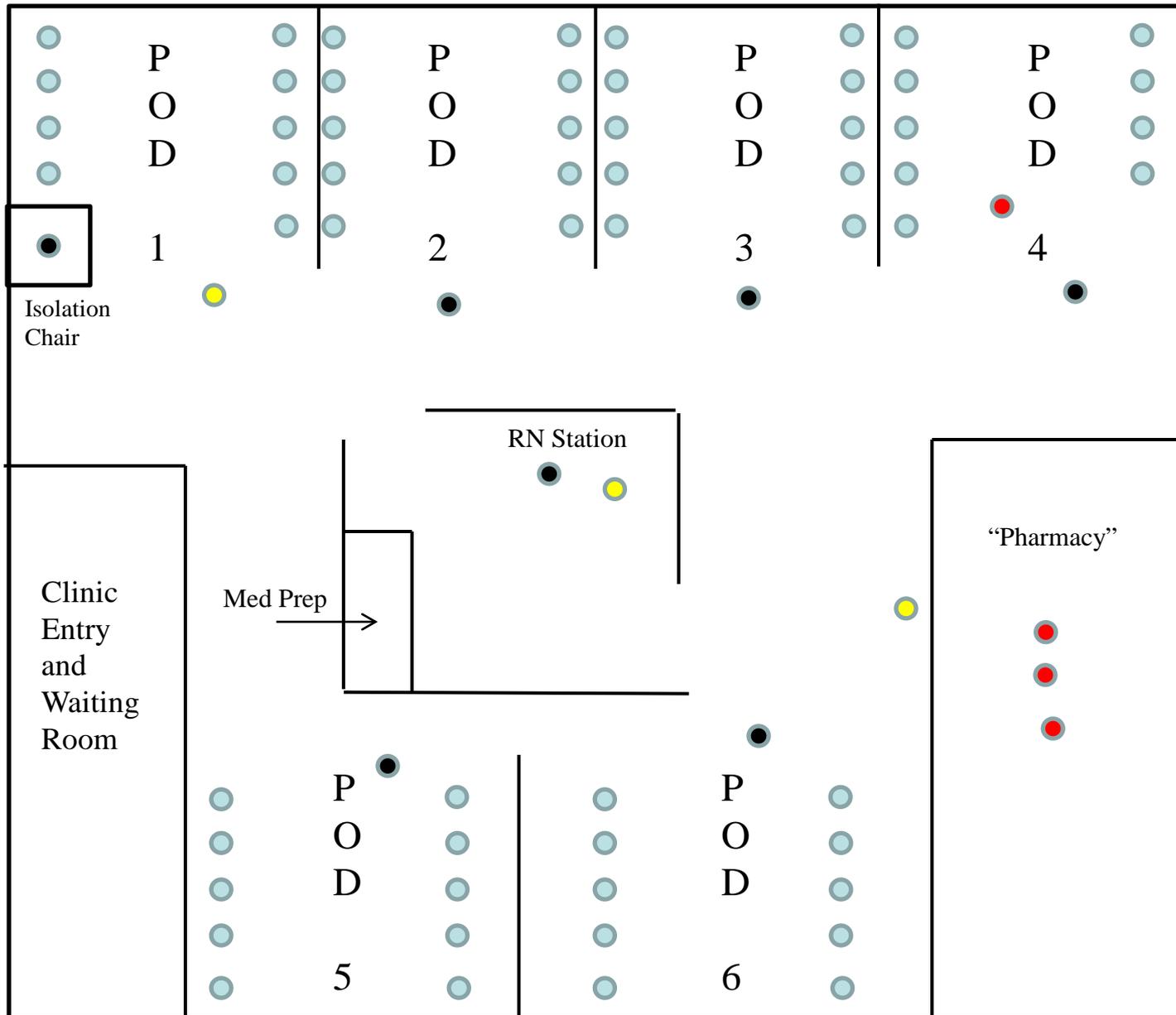


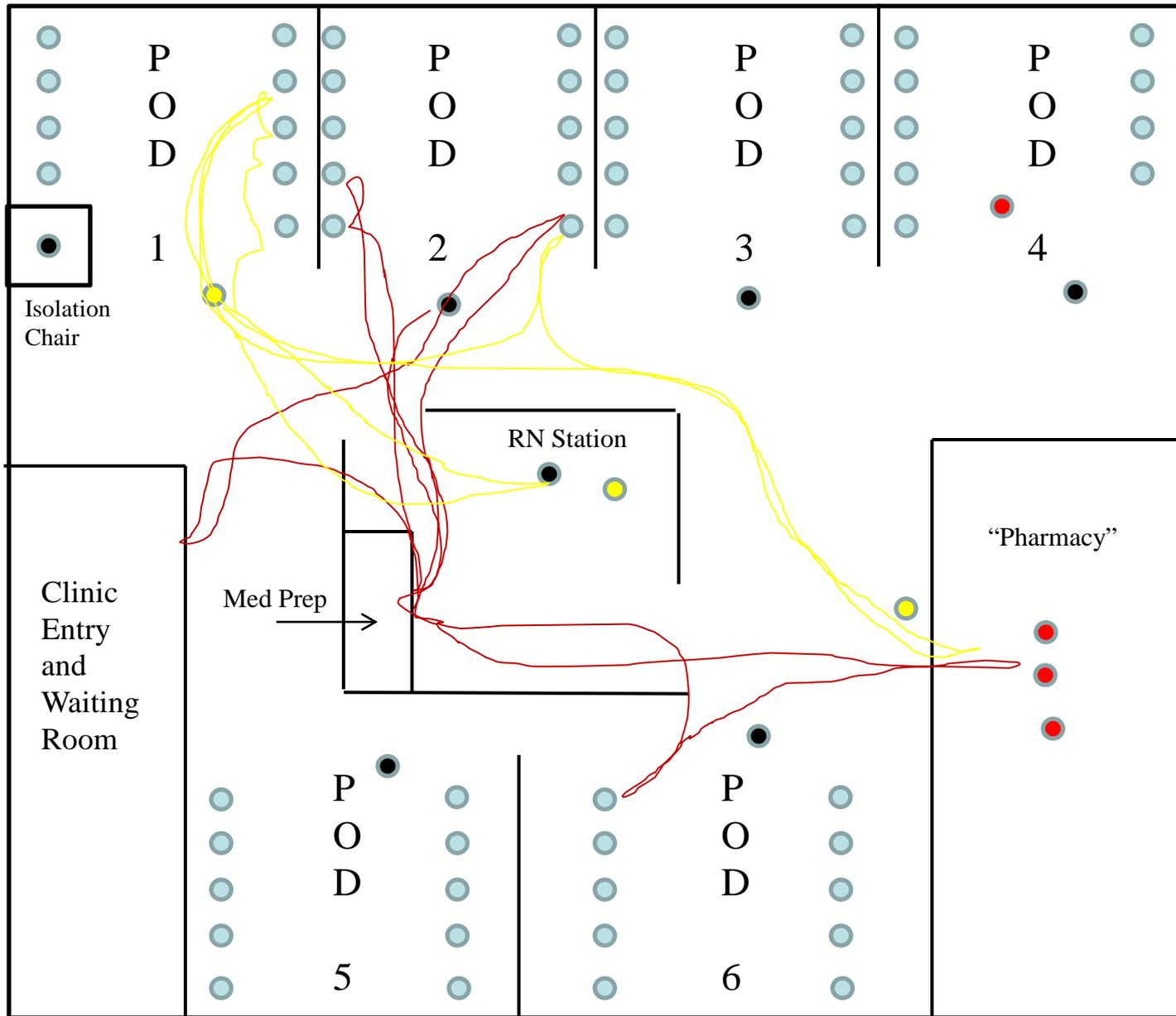
The “Game”

- Simulated Electronic Health Record (EHR)
- Three key roles
 - Nurse (RN)
 - Physician (MD)
 - Pharmacist (PharmD)
- Each participant has a tablet and access to same data, just displayed in different menus designed for their viewing

The “Game”

- Over 200 patient cases and variables loaded into database for simulation
- Compressed time scale
- Each action is measurable
 - Scan rates using tablet cameras and generating medication use barcodes
- Each action is logged in a database and measured or “scored” for outcomes





Measurement

- 6 months of real data from participants is acquired prior to starting simulation
- All data from day of simulation is returned to participant in new dashboard format
- Post-simulation participant is provided an identical dashboard in their work environment to check in daily how they are tracking

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Questions

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