The Prevention of Medication Errors in Surgery

by Joseph Wetterling

Tales from the Field, a new monthly column, consists of reports of evidence-based performance improvement practice and advice, presented by graduate students, alumni, and faculty of Boise State University's Instructional and Performance Technology (IPT) department.

An Unfortunate Accident Happened in the Field

A 7-year old was in a routine surgery to remove scar tissue and a benign tumor. He was to receive an injection of anesthetic, which includes 1:100,000 epinephrine to control bleeding. Ten minutes after the injection, the child experienced cardiac arrest, then eventually went comatose and died. After investigation, it was found that a medication error was responsible for the death - the child actually received a dose of 1:1000 epinephrine, a 100 times stronger dose that should be used topically rather than injected. The 1:1000 epinephrine was poured into an incorrectly labeled cup, while the correct cup for the solution stood empty and unquestioned nearby (Institute for Safe Medication Practices, 1996).

The Performance Issue – Life and Death

This error is one of the National Quality Forum (NQF)'s "Never Events" – one of a list of 28 events that are serious, preventable, and connected to the issue of public accountability. These events are named because they should *never* occur. The NQF noted that this kind of error is both "clearly identifiable and measurable" as well as one for which the risk is "significantly influenced by the policies and procedures of the healthcare organization" (The National Quality Forum, 2006). Simply, the desired performance is for no deaths to be caused by such a medication error. Additionally, there are related financial performance issues – an accidental death is very costly to a hospital – as well as social/emotional issues, as one accidental death is far too many.

Proactive Risk Assessment

The Joint Commission International Center for Patient Safety (2001) recommended that healthcare professionals conduct a proactive and thorough root cause analysis to reduce medication errors. Healthcare facilities around the country responded by proactively evaluating their medication preparation practices. For example, Temple University Health System (TUHS) has a Patient Safety Committee, comprised of a cross-section of the medical staff, administration, and public, which oversees ongoing performance improvement in patient safety aspects of hospital operations. Although the episode described above did not happen at TUHS, it emphasizes that proactive assessments and interventions have in allowing staff to address issues *before* they lead to similar accidents.

Healthcare professionals can use the six categories of Behavior Engineering Model (BEM) (Gilbert, 2007) during such a proactive, risk assessment. This topic was explored as a class project in Professor Chyung's IPT 536 Foundations of Instructional and Performance Technology class at Boise State University. See Table 1.

1. Data • Do staff have all necessary information? • Is correct medication information provided on labels? • Would the presence of an empty cup be questioned?	**2. Instruments** • Do staff have necessary and appropriate tools to prevent accidents? • Can sterility be maintained without cups? • Can the prep area be rearranged to prevent confusion? • Could noticeably different containers be used?	**3. Incentives** • Are incentives sufficient to inspire performance? • Is there negative reinforcement for near-misses? • Are there incentives for reporting near-misses? • Are there incentives that directly reward excellent performance in dosing and administration? • Are staff getting disincentives (longer shifts, heavier case loads, etc.)?
4. Knowledge • Do staff have the necessary knowledge?	**5. Capacity** • Do staff have the capacity to give all responses needed? • Can they prepare medication within the given time? • Is each staff member well-rested and focused? • Are there language limitations that could contribute to making errors? • Are there physical (i.e. visual) limitations that could contribute to making errors?	**6. Motives** • Do staff have the necessary motivation to give the desired level of performance?

Table 1. Assessment questions based on Behavioral Engineering Model

Proactive Interventions
Some of the proactive interventions implemented at TUHS include:

- two people independently verify the data listed on “high-alert” medication labels before administration (a data-related intervention)
- prior to surgery, a “time out” is taken to re-verify the patient, the procedure(s) to be done, and the site(s) involved (a data-related intervention)

- an intranet-based “care management system” was set up to allow anonymous submission of risks observed in practice by any staff member (an instrument-related intervention)

Through the diffusion of effects (Gilbert, 2007), other BEM categories are positively affected. For example, having more than one person verify data (medication labeling, patient identity, etc.) helps overcome capacity issues (i.e., an unfocused or tired staff member). Additionally, while entering an observed event in the care management system does not result in a reward to the reporter (monetary or otherwise), the ability to submit anonymously can increase motivation by eliminating fear of reprisal. See Table 2.

	Information	**Instrumentation**	**Motivation**
Environmental Supports	1. DATA	2. INSTRUMENTS	3. INCENTIVES
Person's Repertory of Behavior	4. KNOWLEDGE	5. CAPACITY	6. MOTIVES

Table 2. Diffusion of effects in the Behavioral Engineering Model

After implementation, TUHS is continuously monitoring performances and reevaluating the six factors to make sure that medication errors never occur.

References

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