Applying Engineering Principles to Medication Safety

Making Sense of HFE, FMEA and RCA
Agenda

15:00  Introduction
15:10  Human Factors Engineering (HFE)
15:30  Failure Mode and Effects Analysis (FMEA)
15:55  Root Cause Analysis (RCA)
16:20  Case Study
16:45  Debrief
Media Reporting Affects Public Trust!
Hospital errors hidden for too long, critics say
Uncounted thousands of Canadians die each year because of avoidable medical errors. A program is just beginning to monitor the errors and eliminate the causes.

Mistakes That Kill

By Diana Wiley

On July 30, 1996, Nancy Brown witnessed her son’s death by the same lethal injection that is used for executions in the United States—potassium chloride. The setting, however, was no death row but the supposedly curative premises of Leamington District Memorial Hospital in southwestern Ontario. Jeffrey Brown, 33, undergoing treatment for a kidney infection, was chatting with his mother and a friend when a nurse arrived with a medication cart. Brown was supposed to receive an injection of laxis, a drug used to reduce swelling caused by excess bodily fluids. Instead the nurse somehow took a vial of concentrated potassium chloride from a drawer in the cart, filled a 30 cc syringe and injected him with a lethal dose of the medicine. The Institute for Safe Medication Practices posted this prescription on its Web site as an example of how doctors’ unclear writing can lead to errors in medication.

The Institute for Safe Medication Practices posted this prescription on its Web site as an example of how doctors’ unclear writing can lead to errors in medication. It calls for a patient with renal failure to be given a dose of the antibiotic vancomycin, along with orders to administer another one-gram dose intravenously if his vancomycin level the next morning is “<10,” meaning less than 10 milligrams per litre. But the “less-than” symbol is written in a way that makes the number 10 look like 40. The posting does not say whether the patient actually received the wrong dosage. A single dose that size is unlikely to cause harm, but prolonged excessive dosing could lead to kidney damage, ear damage or blood problems.

Clearly, there aren’t.

In hospital settings, where the guiding principle is the Hippocratic injunction “First, do no harm,” thousands of Canadians—credible estimates range as high as 10,000 per year—are dying as a result of medical error. A further 10,000 deaths may result from infections acquired in hospitals and unanticipated complications from medications. Add to this an estimated 20,000 medication-related
MAJOR CAUSES OF DEATH IN THE UNITED STATES:

1. Breast Cancer
2. Vehicular Accidents
3. AIDS

1. Make sure you and every member of your health care team knows about every prescription, over-the-counter medication, herbal product or supplement you may be taking. Be sure your doctor knows about any allergies or adverse reactions you have to any medicine.

2. When your doctor writes a prescription, make sure you can read it and that you fully understand what it's for. Be sure you know exactly when and how to take it and that you are aware of any potential side effects your medication may cause.

3. When you pick up your medicine from the pharmacy, ask the pharmacist to confirm that it is the medicine and the dosage your doctor prescribed.

4. If you have a test, be sure to call and get the results. No news is not necessarily good news.

5. If you need to stay at a hospital and you have a choice, choose one where many patients have had the procedure or surgery you need.

6. If you're having surgery, be sure that your health care team agrees on exactly what will be done to exactly which part of your body. Having the surgeon make the site to be operated on is a good idea.

7. When being discharged from a hospital, ask your doctor or health professional to thoroughly explain the treatment plan you will use at home. Review your medications and coordinate your follow-up visit.

8. Speak up if you have questions or concerns and don't be shy about asking your doctor or nurse for more information from reliable sources. Good health professionals value the relationships they have with their patients.

We believe that the more you know about your health, the healthier you'll be. Keep this information and share it with your family and your health care team. For more information on preventing medical errors and other health care-related topics, visit us at www.unitedhealthfoundation.org.
Everyone knows we are talking about…

- Systems
- No blame
After World War II engineers started to develop mechanisms to introduce safety.
Engineers taught to perform accurately to be perfect.

Healthcare workers socialized to be perfect!
Engineering Principles are now being used in healthcare.
General knowledge in proactive design of healthcare processes are very limited.
“The rate of failure in healthcare is unknown and may be unknowable.”

Reference: Root Cause Analysis in Healthcare: Tools and Techniques
As healthcare assessments become more complex, surgeries and processes increasingly inter-dependent, there is an...

- Opportunity for failure
- Difficulty of recovering from failure
Today's Topics

• **Human Factors Engineering (HFE)**
  – The study of how people interact with equipment and their environment.

• **Failure Mode Effects Analysis (FMEA)**
  – Process performed to prevent process and product problems ‘before’ they occur.

• **Root Cause Analysis (RCA)**
  – Process used after ‘something bad’ has occurred to identify underlying causes.