Medication System
Safety

Christine Koczmara, RN BScPsy
ISMP Canada
Outline

• The environment
• Medication systems
  - Why errors occur
  - High-alert medications
  - Experience in Ontario acute care projects
• Error prevention strategies
Observations

• Issues are similar across the spectrum of care and from country to country
• We are beginning to learn what and how to improve systems
• We are starting to change –
  ■ It is difficult
  ■ It is worth it!
The OPRAH Magazine - May 2005

- Special Report “When Bad Medicine Happens to Good People”
- Prescription for disaster – “You say Celexa I say Celebrex”
- “Don’t let it happen to you”
One specialist says: ‘The pen and prescription pad are killing people’

THE BOTTOM LINE

Besides their harmful effects on patient health, medical errors are expensive. While Canadian data are hard to come by, U.S. studies from the late 1990s calculate costs (in Canadian dollars) to that health system:

$ Patients suffering adverse reactions to drugs stayed an additional 2.2 days in hospital with an increased cost of $4,866 per patient

$ Total annual health-care costs for preventable adverse effects: $31 billion

Mistakes with potassium chloride like the kind that killed Jeffrey Brown have happened elsewhere and could happen again, unless steps are taken to reduce the risk. In six of eight cases reviewed from 1996 to 1998 by the U.S. Joint Commission on Accreditation of Healthcare Organizations, concentrated potassium chloride was mistaken for some other medication, primarily due to similarities in packaging and labelling. The most effective way to prevent errors, the commission found, is simply to remove concentrated potassium chloride from patient-care areas.

Like many other institutions, Toronto Western Hospital has done just that. Nursing units now stock only diluted solutions, which are used to treat potassium deficiency. Physicians wanting to have potassium chloride administered to a patient have to write their orders on standardized forms specifying the pre-mixed solutions. Meanwhile, the hospital’s frontline medical, nursing and pharmacy staff have been re-educated about the causes of medication mistakes. The hospital made the changes not only to protect patients from risk of error, but to help staff avoid circumstances in which they could commit an error. “Good people can make mistakes,” says Sylvia Hyland, the hospital’s manager of pharmacy operations. “Words cannot express the devastation they can feel.”
No one wants to hear that their appendix operation was a success when it was their gallbladder that needed to be removed. The fact is, errors in the health care system are a growing concern. Fortunately, most errors are preventable, especially when people become active and informed participants in their own health. This is why UnitedHealth Foundation is providing information from medical and patient safety experts that can help keep you and your family safe. By following the tips below, you can limit the chance of getting a medicine that will clear up your sore when you need one to relax your muscles.

**How to Prevent Medical Errors**

**Major Causes of Death in the United States:**

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 that 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 mark 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.
Hospital medical errors kill 44,000-98,000 people per year:

“More people die from medical errors each year than from suicides, highway accidents, breast cancer, or AIDS.”

“These stunningly high rates of medical errors - resulting in deaths, permanent disability, and unnecessary suffering - are simply unacceptable in a system that promises to first ‘do no harm’.”

William Richardson
Adverse Event

“an unintended injury or complication that results in disability at the time of discharge, death or prolonged hospital stay and that is caused by health care management rather than by the patient’s underlying disease process.” (p.1679).
Canadian Results

- 7.5% (or 187,500) patients in Canadian hospitals were seriously harmed by their care.
- As many as 9,250 to 23,750 people died in a Canadian hospital as a result of medical errors.
- 37% of adverse events were determined to be preventable.
Related Adverse Events

#1 Surgical = 34.2%

#2 Medication and fluid-related = 23.6%
Other Canadian Studies

- Forster AJ et al. Ottawa Hospital Patient Safety Study: incidence and timing of adverse events in patients admitted to a Canadian teaching hospital. CMAJ 2004; 170(8): 1235

- Forster AJ et al. Adverse events among medical patients after discharge from hospital. CMAJ 2004; 170(3): 345

- Gurwitz JH et al. The incidence of adverse drug events in two large academic long-term care facilities. AMJ 2005; 118: 251-258
Wrong injection causes death

BY GRAEME SMITH

A drug used to execute death-row prisoners was mistakenly injected into an elderly woman, whose death in a Peterborough, Ont., hospital will be examined in a coroner’s inquest.

Bonita Porter, Ontario’s deputy chief coroner of inquests, announced yesterday that a jury will look at why Frances Marie Tanner, 84, died at the Peterborough Regional Health Centre on Jan. 21.

The cause of Ms. Tanner’s death is already known: Somebody injected a dose of potassium chloride into her vein. Small quantities of the drug can cure potassium deficiencies, but larger amounts are poisonous.

At least three other Canadians have died after receiving the same drug, sometimes from nurses who thought it was a different medicine.

Some doctors blame these accidents on manufacturers who sell potassium chloride in plastic ampoules and vials that closely resemble containers of sterile water, saline solution, and other harmless solutions.

Others say hospitals need stricter controls over potentially deadly substances. Ontario’s chief coroner sent a memo to hospitals last year specifically warning them that potassium chloride has been wrongly administered in the past.

After the latest death, however, the coroner’s office decided it was time to emphasize the danger.

“It was felt that an inquest might be the best way to get the information out,” Dr. Porter said.

The medical community knows surprisingly little about its own errors. A newsletter published last month by the Institute for Safe Medication Practices Canada recorded five cases in which patients were accidentally given potassium chloride; three died, and two were considered “near misses.”

More cases could exist, said the institute’s president, physician David U. While many hospitals have removed potassium chloride from nursing stations, he said, some doctors still demand to have it on hand, particularly in intensive-care units. And the drug manufacturers have a financial interest in maintaining their products’ uniform packaging.

“The companies have just one assembly line, so they all look the same,” he said. “It’s an accident waiting to happen.”

Researchers have suggested that perhaps 5,000 to 10,000 Canadians die because of medical error in hospitals every year.

The estimate is extrapolated from just one American study, however. A Canadian study was launched last month.

Litany of errors

Incidents involving potassium chloride in Canada:

1. Potassium chloride (KCl) was administered via direct IV when the intended action was to flush an intravenous line with diluted sodium chloride. Result: Patient died.

2. KCl concentrate was used to reconstitute a drug for parenteral administration when the intended diluent was sterile water. Result: Error was noted before administration.

3. KCl concentrate was administered as a bolus injection – an injection given in high quantity, all at once – by a health-care professional who was unaware that KCl concentrate cannot be given as a bolus but must be diluted in a minibag and given as an infusion. Result: Patient died.

4. A one-litre IV solution was prepared with potassium chloride and although it was administered at a very low rate, the incident was felt to be a near miss because of the potential for accidental overdose. Result: Error was noted during administration.

5. IV solutions containing KCl were administered as a fluid replacement in a patient requiring several litres of fluid in a short time frame. Result: Hyperkalemia, patient died.

Injection death second in 3 years

Ontario hospital’s treatment with drug used for executions killed patient in 1999

BY GRAEME SMITH, BRIGHTON, ONT.

Relatives of a hospital patient injected with a drug commonly used to execute death-row prisoners are demanding to know why nothing changed at the Ontario hospital before another woman suffered the same fatal mistake.

They didn’t want to publicize the tragic story of why Ruby McConnell’s heart stopped.

It has been a family secret since the evening of June 29, 1999, when the 94-year-old woman felt weak, fell hard onto her sofa and was taken to the Peterborough Regional Health Centre with a fractured hip.

But they broke their silence, in an exclusive interview with The Globe and Mail, after hearing a news report last week that sounded tragically familiar to them.

An elderly woman, Frances Marie Tanner, had died at the Peterborough hospital after someone shot potassium chloride into a vein.

A coroner’s inquest will investigate.

Few people knew the rest of the story: Ms. Tanner was the second person to die of potassium chloride poisoning at Peterborough’s hospital in less than three years.

Only four such cases have been recorded in Canadian hospitals.

“I was just horrified,” said Mary Gardner, who had been watching the newscast at home in Brighton, Ontario.

“Was I, chopped liver? I’m her nephew.”

Still, the relatives didn’t make a fuss.

“You have a busy nurse,” said Mr. Gardner.

“Her mistake was the mistake of the medical profession,” he added.

The newsmaker was a nurse in Buddies. The Mount Albert, Ont., facility provides long-term care and supports for people with disabilities.

A nurse said that the injection was made by a pharmacist, who was not licensed to work there.

Mr. Gardner said that he had filed a complaint with the College of Nurses of Ontario, which is investigating.

Dr. U., who was consulted by The Globe and Mail, said that anecdotal evidence suggests that only 10 to 20 cases a year are reported.

Mr. Gardner said that he knew of a family who had lost a loved one at the hospital who was given a wrong medication.

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Patient dies after

Man, 69, went to ER following accident
Injected drug normally used in palliative care

BOB WEBER
CANADIAN PRESS

RED DEER, ALTA. — Health officials in central Alberta have launched an investigation after a 69-year-old patient received the wrong pain-killing medication and died.

“All of the staff feels it,” said Denise McBain, a vice-president with the David Thompson Health Region.

“There isn’t a professional out there who doesn’t think of her own practice when something like this happens.”

It is the third Alberta fatality linked to hospital drug mix-ups this year.

Two Calgary patients died in March after being given the wrong medication during dialysis treatments.

The Red Deer case involved a man who came to the hospital emergency room about 3:30 p.m. Sunday with a chest injury received while horseback riding, said Dr. Dave Dawson, vice-president of medicine for the region.

“It was determined that his chest injury, while it was very painful, was not felt to be terribly serious,” Dawson said.

The man’s condition remained stable. Three hours later, he was discharged, but not before receiving a 10-milligram injection of what was thought to be morphine for the pain.

“Due to the nature of the patient, the hospital staff was not sure if it was a narcotic,” Dawson said.

The drug, hydromorphone, is more potent than morphine and is normally used in palliative care. Outside of palliative care, it is usually given in doses one-quarter to one-fifth the size the man received.

The mistake was discovered during a medication check at shift change.

Hospital staff immediately called the man’s home. They also called the hospital in Innisfail, Alta., a town just south of Red Deer on the patient’s way home, warning them he might be brought in.

However, the man’s condition deteriorated rapidly. Although his family took him to Innisfail hospital, where he was given an anti-narcotic, he died shortly after, said Dawson.

“He was very ill,” said Dawson. “(Hydromorphone) is capable of depressing that part of the brain that drives the breathing apparatus.”

The health region has removed all hydromorphone from the emergency ward. Only low-dose stocks will be kept outside the palliative care unit.

Dawson noted both drugs had been stored near each other in similar 10-milligram ampoules.

There will also be an external review.
Media Reporting Affects Public Trust!
Comparisons to Other Industries:

What if we had 99.9% Accuracy?

- 2 unsafe landings at O’Hare Airport/ day
- 16,000 pieces of mail lost/ day
- 32,000 bank cheques deducted from the wrong account each HOUR!
- 50 babies dropped at birth everyday in the U.S.

(Deming, 1987)
Sharp End vs. Blunt End

- Error investigations have always concentrated on *sharp end* (front line staff) where patient/caregiver interaction occurs.

- Contributing factors and latent errors often originate at the *blunt end* where organizational policies, procedures and resource allocation decisions are made.
Swiss Cheese Model

Patient receives wrong drug

Barriers & Safeguards against Errors

- Poorly Designed Order Forms
- Poorly Designed Drug Packaging
- Inadequate Training and Skills Mix
- Multiple Demands on Attention
- Poor Lighting
- Poorly Designed Storage facility

Latent Failures

(modified from James Reason, 1991)
Beyond Acute Care

- National-
  - CCHSA patient safety goals – support change across system
  - Safer Healthcare Now! – medication reconciliation
- Ontario MOHLTC – several projects
  - Patients (OHA)
  - ISMP Canada: EMS / LTC / Community Pharmacy
Making Health Care Safer

Key steps:

A. **Recognize** that improving safety is a **priority**

B. Improve the **reporting** of errors and near misses

C. Increase focus on **system changes**

D. Gain greater **knowledge** about safer systems – much already exists

E. **Leadership** is needed on all levels

G R Baker & P G Norton
A. Recognize that Improving Safety is a Priority

- **Ontario Medication Safety Support Service (MSSS)**
  - Funded by Ontario MOHLTC
  - To provide assistance with implementation of preferred/ better practices for patient safety

- To provide general support for safe medication practices – high-alert medications
  - Concentrated potassium chloride
  - Narcotics
B. Improve Reporting of Errors and Near Misses
Lack of Reporting due to:

Many reasons including:

- Failure to recognize error
- Lack of certainty if it “really is an error”
  - definition (?) Related to harm
- Punitive culture
  - Fear of reporting: self and others
Increased Reporting

ISMP Canada research project:

• 14 hospitals increased error reporting

• Over 5,000 errors received in 12 months
ISMP Canada Safety Bulletin

Volume 2, Issue 4

April, 2002

SENTINEL EVENT WITH STERILE WATER – LESSONS SHARED

Hospitals are urged to review their storage conditions and supply processes for selected sterile water preparations.

ISMP Canada has recently received an error report describing accidental intravenous infusion of sterile water, instead of the intended normal saline solution. Unfortunately, close to 600 mL

3. The one-litre Sterile Water for Injection product had been used as an alternate to other sterile water products (inhaled and irrigation solutions) as a result of previous back-orders with the sterile water products. This resulted in increased availability of the product in the hospital.
Canada: 3 reports
2 hospital
1 ambulance

US: several reports
1 death
Sterile WATER for Injection USP
NOT FOR DIRECT INFUSION
PHARMACY BULK PACKAGE

0.9% Sodium Chloride Injection USP
STERILE NONPYOGENIC SINGLE DOSE
PEER 100 mL
SODIUM CHLORIDE 0.9% CLORURE DE
SODIUM USP - 900 mg
IV FLUID AND ELECTROLYTE REPLASHER
ORDER AS PRESCRIBED DIRECTION SHEET
AVAILABLE UPON REQUEST
SQUEEZE AND INSPECT BAG. DISCARD IF
LEAKING MUST NOT BE USED IN SERIES
CONNECTIONS STORE AT 15° - 30°C

APPROX mmol/L Na+ 154 Cl- 154
mMol/L 308 pH 5.5

Injection de Chlorure de Sodium 0.9% USP
STERILE APYROGENE DOSAGE UNIQUE.

SOLUTION IV AVEC ELECTROLYTES
ADMINISTRER SELON LE PRESCRIPTION DU
MEDECIN FEUILLE DE MODE D'EMPLOI
DISponible SUR DEMANDE
PRESSER ET INSPECTER LE SAC. JETER EN
CAS DE FUITES. NE DOIT PAS ETRE MONTÉ
EN SERIE. ENTREPOSER ENTRE 15° ET 30°C

NO NATURAL RUBBER DTEX LATEX SANS LATEX NATUREL

Valtrax® PVC CONTAINER/CONTENANT DE PVC

Baxter Corporation
Etobicoke Ontario Canada

EAU Stérile pour Injection USP
NE PAS UTILISER POUR PERFUSION DIRECTE
CONDITIONNEMENT EN VRAC POUR L'INJECTION

STERL ANTIBIOTICAL agent or OTHER substance not
RESISTED APPROVED OR 0.9% APPROVED OR 0.9% LITER
DOSE AS DIRECTED BY A PHYSICIAN. DIRECT USES
MADE CONTENTS OF A STERILE SOLUTION.
THE BAG OR A SUITABLE SOLUTION.
CAUTIONS SQUEEZE AND INSPECT BAG. DISCARD IF LEAKING
MADE CONNECTIONS STORE AT 15°-30°C

LESS CONNEXIONS STORE AT 15°-30°C
How Error Reports Are Received

i) website: www.ismp-canada.org

ii) e-mail: info@ismp-canada.org

iii) phone: 1-866-54-ISMPC [47672]
        or 416-480-4099

- ISMP Canada guarantees confidentiality and security of information received.
  ISMP Canada respects the wishes of the reporter as to the level of detail to be included in publications.
C. Increase the Focus on System Changes
CCHSA Patient Safety Goals

**Culture**

**Goal 1:** Create a culture of safety within the organization

**Communication**

**Goal 2:** Improve the effectiveness and coordination among care/service providers and with the recipients of care/service across the continuum

**Medication Use**

**Goal 3:** Ensure the safe use of high risk medications

**Goal 4:** Ensure the safe administration of parenteral medications
“High-alert medications are drugs that bear a heightened risk of causing significant harm when they are used in error.”

From the ISMP Medication Safety Alert!, October 16, 2003, Survey on high-alert medications - Differences between nursing and pharmacy perspectives revealed
Examples of High-Alert (Risk) Medications

- all chemotherapeutic agents
- all narcotic medications
- heparin & oral warfarin
- insulin & oral hypoglycemics
- inotropic medication (e.g. digoxin)

www.ismp.org/msaarticles/highalert
Why Focus on the Medication System

- Almost every patient receives medications
- Sophistication and complexity of medication therapy has increased
- Patient complexity has increased
Reality of Health Care Environments

- Cognitive overload
- Workloads
- Multitasking
- Interruptions
- Miscommunication
- Difficult technology
Figure 2. Cognitive pathway for RN #1

*8:10  *8:41

*Omission
Figure 1. Link analysis for RN #1
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<th>Time</th>
<th>Description of interruption</th>
<th>Location</th>
<th>Type</th>
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Confirmation Bias

It leads one to “see” information that confirms our expectation rather than to see information that contradict our expectation.
The power of the human mind

According to a research at Cambridge University, it doesn't matter in what order the letters in a word are. The only important thing is that the first and last letter be at the right place. The rest can be a total mess and you can still read it without problem. This is because the human mind does not read every letter by itself, but the word as a whole.

Amazing huh?
60 Regular Insulin NOW

Lantus 0.1 mg P.O.

Dy 0.125 mg P.O. q.d.

Minni pen 5 mg P.O. q.i.d.

Fully catheter.

It's done.
Mini test & each meal & NOE
Meds: 4-25mg @4s.
Hydrocortisone 25mg oral tablet
Nurseig liquid + capsule
PK6
W/valyne
NS 75 c.c. 1 h r, add 25000 UI
after patient voids.
Bicillin 600,000 i.u. 1 m x 1 dose
D. Gain Greater Knowledge About Safer Systems
Principles

• Reduce or eliminate the possibility of errors
  o E.g. Remove from clinical area (concentrated KCl)

• Make errors visible
  o E.g. Automation, Independent double check selected drugs

• Minimize the consequences of errors
  o E.g., Make less potent product available,
What We Have Been Learning in Acute Care

- High-Alert Drug Focus
- Human Factors Engineering Principles
- Collaboration and support
Human Factors Engineering

- Research and practical applications designed to improve the interface of humans with systems
- Develops practical design principles that account for the psychological and physical characteristics of people
Rank Order of Error Reduction Strategies

1. Forcing functions and constraints
2. Automation and computerization
3. Simplify, standardize and differentiate
4. Reminders, check lists and double check systems
5. Rules and policies
6. Education
7. Information
8. Punishment (no value)
CULTURE AND COMMUNICATION
1. Educate staff regarding the system-based causes of medication error.
2. Educate staff about the hierarchy of effectiveness of error reduction strategies.
3. Include the patient/family in the narcotic medication-use process.

STORAGE AND STANDARDIZATION
1. Remove the following stock items from patient care areas:
   - Hydromorphone ampoules or vials with concentration greater than 2 mg/mL (exceptions may include palliative care).
   - Morphine ampoules or vials with concentration greater than 15 mg/mL.
   - Morphine ampoules or vials greater than 2 mg/mL in paediatric patient care areas.
   - Sufentanil (exceptions may include Operating Room and Labour and Delivery).
2. Assess risk associated with narcotic stock in patient care areas.
3. Restrict as much as possible the admixing of narcotic solutions outside of pharmacy.
4. Standardize infusion concentrations of parenteral narcotic medications and selection of medications for pain management.

INDEPENDENT DOUBLE CHECK
1. Implement a policy of Independent Double Checks for PCA infusions.
   The policy should include a clear process for an independent double check and documentation when the following occur:
   - Initial pump programming
   - Changes in pump programming
   - Solution changes
   - Patient transfers
2. Consider a policy of Independent Double Checks for:
   a. All opioid infusions (continuous or intermittent)
   b. Epidural infusions

PCA AND EPIDURAL
1. For PCA, develop and follow patient selection criteria (inclusion and exclusion).
2. For epidural, identify and implement multiple error prevention strategies to enhance differentiation of epidural infusions from other infusions.
Applying Error Reduction Strategies

1. Forcing functions and constraints
Man's death after drug error to be probed

Red Deer man dies of wrong narcotic horse-riding accident

from a drug mix-up in Alberta this year.

The man, who was brought in by ambulance but was in stable condition, was X-rayed and observed in the hospital's emergency room for a few hours. Before being discharged, he was prescribed 10 milligrams of morphine for pain.

However, a nurse instead injected him with 10 milligrams of hydromorphone — an amount considered an overdose. The medication is a highly concentrated narcotic that can slow breathing and is normally used in palliative care.

"The two drugs have a similar name, they look very similar. There are a number of factors that could have led to the error," said Denise McBain, the health region's senior vice-president and chief operating officer.

The mistake was discovered about an hour after the injection, and about 30 minutes after the man left with his family, when the ER shift changed and staff did a routine narcotic count.

A phone message was quickly left instructing the patient to go to hospital immediately.

However, as the man and his family drove home, his condition "deteriorated very quickly," Dr. Dawson said.

He died after arriving at a hospital in Innisfail, south of the central city of Red Deer, despite the use of a drug to combat the effects of hydromorphone.

The "very experienced" nurse who made the mistake was put on indefinite paid leave and feels terrible, Ms. McBain said.

Officials stressed that they will not know whether the mistake resulted in the man's death until the medical examiner’s final report is available in about 10 days.

"The evidence is not all in and therefore I think it would be unfair to conclude what the cause of death is," Dr. Dawson said.

Alberta Health Minister Gary Mar told reporters he will work with the health region to ensure such an error does not happen again.

Ms. McBain said an independent team of experts from outside Alberta will be asked to conduct an investigation and issue public recommendations.
Applying Error Reduction Strategies

2. Automation and Computerization:

- CPOE
- Bar Code technology
- Automated bedside verification
Applying Error Reduction Strategies

3. Simplify, standardize and differentiate

- Bedrock Human Factors Principles
  - reduce steps and interfaces
  - Call 911

- Standardize processes and procedures
  - Airline industry
Standardization
Standardization and Simplification

- Identical drug drawers
- Drug protocols/standard concentrations
- Standard order forms
Standardize Order Communication

- Use leading zero (0.1 mg not .1 mg)
- No trailing zeros (1 mg not 1.0 mg)
- Avoid nonstandard abbreviations ("U" for unit, q.d., drug name abbreviations such as "MS")
Differentiate – Use Tall Man Lettering:

vincristine
vinblastine

vinCRIStine
vinBLASTine
4. Independent double checks & other redundancies
### Human Error Rates With Selected Activities

<table>
<thead>
<tr>
<th>Activity*</th>
<th>Rate of Human Error**</th>
</tr>
</thead>
<tbody>
<tr>
<td>General error of commission for example, misreading a label</td>
<td>3/1000</td>
</tr>
<tr>
<td>General error of omission in the absence of reminders</td>
<td>1/100</td>
</tr>
<tr>
<td>General error of omission when items are embedded in a procedure for example, cash card is returned from cash machine before money is dispensed</td>
<td>3/1000</td>
</tr>
<tr>
<td>Simple arithmetic errors with self checking but without repeating the calculation on another sheet of paper</td>
<td>3/100</td>
</tr>
<tr>
<td>Monitor or inspector fails to recognize an error</td>
<td>1/10</td>
</tr>
<tr>
<td>Staff on different shifts fail to check hardware condition unless required by checklist or written directive</td>
<td>1/10</td>
</tr>
<tr>
<td>General error rate given very high stress levels where dangerous activities are occurring rapidly</td>
<td>1/4</td>
</tr>
</tbody>
</table>

* Unless otherwise indicated, assumes the activities are performed under no undue time pressures or stress.

** (# of errors / # of opportunities for the error)

Adapted from Nolan TW. System changes to improve patient safety. BMJ 2000;320(7237):771-773 Nolan
Where Medication Errors Occur…

PRESCRIBING
39% of errors

TRANSCRIPTION
12% of errors

DISPENSING
11% of errors

ADMINISTERING
38% of errors
Independent Double Checks: Working Definition

An Independent Double Check is a process in which a second practitioner conducts an individual verification.
Research show that people find 95% of mistakes when double checking the work of others.

Independent Double Checks

- Common in other industries

- Acknowledges complex and high risk systems and that practitioners are human, and therefore fallible
It Reduces the Probability of Error

\[
\frac{1}{100} \times \frac{1}{100} = \frac{1}{10,000}
\]
Expectations of the Five Rights

- Does not take into account human factors
  - E.g. human bias, interruptions, stress, noise, light
- ISMP Newsletter
Patient Safety

**MEASURING PATIENT SAFETY**

- **Interventions to PREVENT errors**
  - Medical Product Design
    (IV tubing, pumps, monitors, drug packaging & labels, medical records)
  - Work Environment Design (Architecture, Work Station Design)
  - Task or Process Design

- **Interventions to CATCH errors**
  - Close Call Reporting
  - Checks (auto or manual)
Patient Safety

Interventions to PREVENT errors

Interventions to CATCH errors

Analyze & understand errors to develop Interventions
Why do we need independent double checks?

- Front line staff work with:
  - High Stress Environment
  - High Risk Drugs
  - Poorly designed Order Forms
  - Poorly designed Packages & Labels!
  - Poorly designed Pumps

Human Factors
The Physical & Cognitive World
Narcotics Project: PCA Checklist Tool

5. Rules and Policies

• bring to point of care
Independent Double Check

CHECKLIST

☐ Patient Name?
☒ Syringe Drug?
☐ Syringe Conc?
☐ Programmed Conc?
☐ Micro or Milligram?
☐ Dose?
☐ Lockout?
☐ Four hour limit?

×

_____________________
signature
“Thank you for a wonderful and thought-provoking seminar. It is nice to look at things from a different perspective. When I spoke to the nurses on my units about this they were interested and I think that they felt that the “blame” for not always being “perfect” was being taken away”
Applying Error Reduction Strategies
Culture and Communication

6. Education and Information

• Educating staff:
  - System-based causes of medication errors
  - Hierarchy of effectiveness of error prevention strategies
  - Bring patients and family into the medication-use process (pamphlets)
E. Leadership Needed

- Making safety a priority
- Promoting a Culture shift
- Eliminate use of “error rates” as a measurement tool
- Proactive approach
  - Failure Mode and Effects Analysis (FMEA)
  - High reliability organizations
  - Learning from each other (internal, external, outside healthcare)
“Technically the biggest ‘safety system’ in healthcare is the minds and hearts of the workers who keep intercepting the flaws in the system and prevent patients from being hurt. They are the safety net, not the cause of injury”.

Don Berwick