Prevention of Medical Errors

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Author(s)

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Disclosures

None.

Audience

All Health Care Workers

Accreditation

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Course Objectives

Upon completion of this course, participants will be able:

1. To know what is medical error
2. To learn what are the various types of medical errors
3. To know the sources of medical errors
4. To recognize the error prone-situations
5. To know the differences between preventable and non-preventable adverse events
6. To know how to reduce medical errors
7. To know the prevention of adverse events
8. To understand the importance of public health education about medical errors
9. To identify the hazards of medical errors
10. To know the impact medical errors on public health
11. To know the impact of medical errors on health care provider
Course Description

No doubt medical care and medicines relieve pain of the patients, but at times, medical errors committed by medical professionals may result in disastrous events. These medical errors can be prevented by the proper training of professionals, improving knowledge of both the medical professional and the patients.

This course is especially designed to make your knowledge stronger about medical errors. It will explain the various types of medical errors (both preventable and non preventable), error prone situations and sources of such medical errors. The subject will also enlighten and discuss the impact of these medical errors on health and methods of prevention of these medical adverse events. In other words, this course is an approach to understand the methods which can reduce the occurrence of medical errors thus protecting the public from ill-health.

Source: www.ahrq.gov
Introduction

Medical errors are committed by health care providers that result in harm to the patients. These errors can occur while:

- Diagnosing a patient
- Administrating various medications or transfusions
- Carrying out laboratory tests
- Interpreting the laboratory tests
- Performing some surgical procedures

Source: www.ahrq.gov
Medical errors are different from malpractice i.e. medical errors are honest mistakes or accidents while malpractice is the result of negligence or criminal intent. Medical errors are still an important cause of morbidity and mortality worldwide. A comprehensive knowledge about the secrets of medical errors can help the health care provider in preventing the occurrence of these errors. In this regard, proper guidelines issued by the leading institutes of the country and mass education can help the medical professionals to avoid committing medical errors.

The Institution of Medicine (IOM) has published two reports regarding the medical errors and their prevention. These reports are actually a part of the “Quality of Health Care in American” project (a project to access the US health care system). The first report (IOM-1) was published in 1999 and it says that errors by health care providers can be prevented and safety is an important first step in improving the quality of care. The second report was released in 2001 that gave an idea about redesigning of health care system to improve the quality of care. The precious knowledge of these reports will be discussed in this course under different headings in a comprehensive way (1-2).

Source: www.cartoonstock.com
What is a Medical Error?

A medical error is defined as a preventable adverse effect of care. It may or may not be evident to the patient, and it may be in the form an inaccurate or incomplete diagnosis/treatment of a disease, injury, behavior, infection or other ailment. There are some terms which will be used in the topic, so remember these terms. These include:

- **Safety** - means free of accidental injury
- **Adverse event** - it is an injury that results from a medical intervention (not due to the underlying disease)
- **Preventable adverse event** - an adverse event due to medical error
- **System** - a set of interdependent elements working to achieve a common aim
- **Human factor** - the study of relationship between humans, instruments and environment (1-2).

Source: [www.pointoflaw.com](http://www.pointoflaw.com)
What is Impact of Medical Errors on People’s Life and Finance?

According to first report published by The Institution of Medicine (IOM-1), medical errors are responsible for almost 44,000 to 98,000 deaths per year in the hospitals. Medical errors are responsible for harm to one in 10 patients worldwide. Iatrogenic injuries (injuries caused by instruments used or treatment given) are responsible for 180,000 deaths each year. One in five Americans (22%) experienced that they or a family member have suffered a medical error of some type. Medication errors alone are responsible for almost 7,000 deaths per year, about 16% more deaths attributable to work related injuries. Medical errors stand at number 8 among the leading causes of death i.e. even higher than that of motor vehicle accidents or breast cancer. This data was derived from predominately from two studies, one conducted in New York and the other in Colorado and Utah. However, there is controversy regarding the exact magnitude of the adverse outcomes due to medical errors. A 2006, follow up to the IOM study explored that medication errors are among the most common medical errors, affecting at least 1.5 million people every year. This study shows that almost 400,000 preventable drug related harms occur each year in hospital, 800,000 in long term care settings and almost 530,000 among Medicare recipients in outpatient’s clinics.

![Leading Causes of Death Table]

**Diseases of the Heart**
- Cancer (malignant neoplasms)
- Cerebrovascular Disease
- Chronic Obstructive Pulmonary Disease

**Medical Errors**
- Accidents and Adverse Effects
  - (motor vehicle accidents = 43,458; all others = 52,186)
- Pneumonia and Influenza
- Diabetes
- Suicide
- Kidney Disease
- Liver Disease

**Sources:**
Deaths due to medical errors in hospitals are higher than certain other causes of death in the U.S.

Source: www.gao.gov.com

Any Error: Medical Mistake, Medication Error, or Test Error in Past Two Years, 2007

Source: www.pointoflaw.com
According to an estimate, these preventable adverse events cost between $17 billion and $20 billion per year. 50% of these costs refer to the direct health care costs like longer stay or treatment. The medication related adverse events in hospitalized patients cost about $2 billion per year.

IOM-1 also brings to light costs that cannot be directly measured, such as:

- Loss of trust in the system
- Physical and psychological discomforts for patients
- Lost work productivity among patients who need extra care
- Loss of morale and frustrations among health care workers
- Lower levels of health of the population served

Source: www.runningahospital.blogspot.com
This report also indicates that most of the medical errors do not result from individual recklessness but it is due the basic flaws in the way health systems are organized. Examples of such flaws include:

- Availability of certain full strengths drugs on patient care units has lead to severe mistakes
- Illegible writing of prescription resulted in administration of drugs to patients who have known allergies
- When there is no coordination of care (2-4).
Causes of Medical Errors/Situations prone to Medical Errors

There are many causes of medical errors. These include:

**Complexity of health care** - toxic drugs, intensive care, complex techniques and prolonged hospital stay all are contributing factors for medical errors

**Faulty system and process design** - remember that medical errors are not due to bad people in health care settings, it is the bad system of health care that contributes to medical errors. Other contributing factors are:

- Poor communication of authority of doctors and nurses
- Unclear lines of authority of doctors and nurses
- Disconnected reporting system within a hospital
- Thinking that action is being taken by other groups within the institution
- Disconnected reporting system
- Dependence up on automated systems to prevent error
- Improper systems to share information about errors
- Infrastructure failure
- Lack of skilled operators
Human factors and ergonomics

These include:

- Sleep deprivation of health care providers
- Risks factors regarding practitioner include fatigue, depression and burn out
- Factors regarding healthcare settings include variety of patients, unfamiliar settings, tight situations, and burden of patients
- Similar drugs sound similar

Faults in Competency, education, and training

These include:

- Diversity in health care provider training and experience
- Failure to know the severity and prevalence of medical errors
- Arriving of new residents and nurses at teaching hospitals (2,4,7).
The table below shows some medical errors along with their frequency:

<table>
<thead>
<tr>
<th>Clinical Activity</th>
<th>Preventable Adverse Events</th>
<th>Intercepted and Noninterrupted Serious Errors</th>
<th>All Serious Medical Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 54</td>
<td>n = 223</td>
<td>n = 277</td>
</tr>
<tr>
<td>Prevention and diagnostic errors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure to take precautions or follow protocol to prevent accidental injury&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8 (14.8)</td>
<td>22 (9.9)</td>
<td>39 (10.8)</td>
</tr>
<tr>
<td>Medication-related</td>
<td>4</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Premature self-extravasation</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Avoidable delays in diagnosis</td>
<td>3 (5.6)</td>
<td>16 (4.5)</td>
<td>13 (4.7)</td>
</tr>
<tr>
<td>Failure to use indicated tests or act on test results</td>
<td>0 (0)</td>
<td>16 (4.5)</td>
<td>10 (3.6)</td>
</tr>
<tr>
<td>Inadequate patient assessment</td>
<td>1 (1.9)</td>
<td>7 (3.1)</td>
<td>8 (2.9)</td>
</tr>
<tr>
<td>Other prevention or diagnostic error</td>
<td>1 (1.9)</td>
<td>5 (2.2)</td>
<td>6 (2.2)</td>
</tr>
<tr>
<td>Total</td>
<td>13 (24.1)</td>
<td>54 (24.2)</td>
<td>67 (24.2)</td>
</tr>
<tr>
<td>Treatment and procedure errors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication error in ordering or execution of treatment&lt;sup&gt;b&lt;/sup&gt;</td>
<td>13 (24.1)</td>
<td>157 (70.4)</td>
<td>170 (61.4)</td>
</tr>
<tr>
<td>Wrong dosage</td>
<td>7</td>
<td>55</td>
<td>62</td>
</tr>
<tr>
<td>Duplicate medication orders</td>
<td>0</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Wrong medication</td>
<td>0</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Failure to discontinue a medication order</td>
<td>1</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Wrong rate or frequency</td>
<td>0</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Wrong route</td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Omitted medication</td>
<td>1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Wrong patient</td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Other medication error during ordering or execution of treatment</td>
<td>4</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>Failure to take precautions or follow protocol to prevent accidental injury</td>
<td>17 (31.5)</td>
<td>5 (2.2)</td>
<td>22 (7.9)</td>
</tr>
<tr>
<td>Preventable nosocomial infection</td>
<td>14</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Inadequate training or supervision</td>
<td>3 (5.6)</td>
<td>2 (0.9)</td>
<td>5 (1.8)</td>
</tr>
<tr>
<td>Inadequate reporting or communication</td>
<td>2 (3.7)</td>
<td>3 (1.3)</td>
<td>5 (1.8)</td>
</tr>
<tr>
<td>Avoidable treatment delay</td>
<td>1 (1.9)</td>
<td>2 (0.9)</td>
<td>3 (1.1)</td>
</tr>
<tr>
<td>Failure to check equipment or defective equipment</td>
<td>1 (1.9)</td>
<td>0 (0)</td>
<td>1 (0.4)</td>
</tr>
<tr>
<td>Other treatment or procedure error</td>
<td>1 (1.9)</td>
<td>0 (0)</td>
<td>1 (0.4)</td>
</tr>
<tr>
<td>Total</td>
<td>38 (70.4)</td>
<td>169 (75.8)</td>
<td>207 (74.8)</td>
</tr>
<tr>
<td>Monitoring and reporting errors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate monitoring system&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3 (5.6)</td>
<td>14 (6.3)</td>
<td>17 (6.1)</td>
</tr>
<tr>
<td>Medication-related</td>
<td>2</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Inadequate reporting/communication&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5 (9.3)</td>
<td>33 (14.8)</td>
<td>38 (13.7)</td>
</tr>
<tr>
<td>Wrong patient</td>
<td>1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Do-not-resuscitate order did not match true code status</td>
<td>1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Test result</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>8 (14.8)</td>
<td>47 (21.1)</td>
<td>55 (19.9)</td>
</tr>
</tbody>
</table>

<sup>a</sup>More than one factor may be associated with a serious medical error, with the total exceeding 100%; <sup>b</sup>specific subcategories provided for more frequent systems-related errors.

Types of Medical Errors

Remember there are many ways to classify medical errors. Here we have included the classification of medical errors based on IOM-1 report.

Errors regarding diagnosis:

- Delay in diagnosis
- Wrong diagnosis
- Use of outmoded tests
- Failure to apply the required tests
- Uses of outmoded therapy
- Failure to response on results of testing
- Errors regarding treatment

Errors regarding treatment:

- Error in performing a procedure, test or surgery
- Error in administration of drugs
- Non-significant delay in treatment
- Inappropriate care which is actually not indicated

Errors regarding prevention:

- Failure to provide a preventive treatment
- Improper monitoring of treatment
- Inadequate follow up
Medication errors

These errors can occur at any stage of drug administration such as during:

- **Ordering the drug**: wrong dose or wrong selection of drug
- **Transcribing drug**: wrong frequency of drug administration
- **Dispensing**: drug not provided in time to be administered at the time ordered
- **Administration of the drug**: wrong doses, wrong technique of administration
- **Monitoring**: no monitoring the drug effects

Adverse drug event

It is any harm or injury that results from a medical intervention related to a drug. Examples are:

- Cardiac arrhythmias
- Diarrhea, nausea, vomiting
- Fever
- Mental confusion
- Rash
- Low blood pressure
- Liver and renal failure

Other medical errors

These may include:

- Poor or lack of communication
- Instrumental failure
- Other system failure (1, 6, 7)
Source: www.psnet.ahrq.gov
Types of Medical Errors (Source: www.archsurg.jamanetwork.com)

- **Errors**
  - When actions are intended but not performed

- **Mistakes**
  - Errors in planning actions
- **Skill-based errors (slips and lapses)**
  - Errors in executing correctly-planned actions

  1. Knowledge-based errors
  2. Rule-based errors
  3. Action-based errors (slips)
  4. Memory-based errors (lapses)

    - 2a. Good rules not applied or misapplied
    - 2b. Bad rules
    - 3a. Technical errors

The classification of medication errors based on a psychological approach (Source: www.onlineceucredit.com)
Examples of Common Medical Errors committed by Health Care Providers

Common Physician’s Errors:

These are given in the following table:

```
Physician’s Errors
• Failure to detect cancer recurrence
• Inappropriate examination
• Inexperience
• Removal of scar tissue instead of the tumor
• Forgetting to write down orders
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Source: www.peggyrcc.wordpress.com
Common Nurses’ Errors

These are given in following two tables:

**Nurses’ Errors (1)**

- Not responding to calls
- Forgetting to connect the call button.
- Not washing hands or using gloves
- Not placing the oral thermometer in a plastic cover
- Using an inappropriately sized blood pressure cuff *
- Administer an incorrect dose of a medication*

**Nurses Errors (2)**

- Administer medications orally instead of an NG tube
- Administer medications through the NG tube dissolved in hot water (causing esophageal burn)
- Connecting suction machine to wall without a bottle of water
- Not rinsing the hydrogen peroxide after cleaning the tracheostomy tube (causing severe irritation)

Source: www.peggyrcc.wordpress.com
What to do after a Medical Error has occurred

1. Knowing that errors are not isolated events:

There is a strong negative emotional effect of mistakes on the health care providers who commit them. Swiss cheese Model says that adverse events from errors usually do not occur because of an isolated error and these actually reflect system problems. According to this concept, there are layers of protection for health care providers and patients to prevent errors from occurring. If a health care provider makes a small mistake (such as incorrect dose of a drug written on the drug chart by a doctor), this can be picked up (by a pharmacist) before it harms the patient. Such mechanisms are:

- **Practical alterations** such as medications which are not given by IV route, must be fitted with tubing.
- **Systemic safety processes** - Water low score assessment and falls assessment of all the patients must be completed on admission
- **Training programs** (5,7,8).

2. Keeping the practice of medicine in perspective:

The potential to make errors is part of what makes a physician rewarding and without this potential the rewards of medical care would be less.

3. Mistakes Disclosure

1. **Disclosure to oneself**- if you have no ability to forgive one self, it may create a cycle of restlessness and thus increases the chances of a future error.

2. **Disclosure to patients**- it is very important to disclose to patients whenever a medical error has occurred. The American Medical Association's Council on Ethical and Judicial Affairs says in its ethics code:
"Situations occasionally occur in which a patient suffers significant medical complications that may have resulted from the physician's mistake or judgment. In these situations, the physician is ethically required to inform the patient of all facts necessary to ensure understanding of what has occurred. Concern regarding legal liability which might result following truthful disclosure should not affect the physician's honesty with a patient."

Similarly, “The American College of Physicians Ethics Manual” remarks as:

“In addition, physicians should disclose to patients information about procedural or judgment errors made in the course of care if such information is material to the patient's well-being. Errors do not necessarily constitute improper, negligent, or unethical behavior, but failure to disclose them may.”

3. Disclosure to non-physicians- recent studies show that disclosing to non-physicians sources of support may decrease the pressure more than disclosing to colleagues.

4. Disclosure to other physicians colleagues- telling about your errors to other doctors is beneficial even with a fact that doctors may be less forgiving of each other (5,7,8).

5. Telling to the doctors’ institution

6. Use of rationalization to hide medical errors
How to Reduce/Avoid/Prevent Medical Errors?

Following steps are important in reducing/avoiding/preventing medical errors:

- Make a center for patient safety within the agency for health care research and quality

  This center should perform following functions:

  i. Make national goals for patient safety
  ii. Follow the progress in the meeting for the recognized goals
  iii. Create knowledge and understanding of mistakes in health care by developing a research agenda

- Form mandatory and voluntary reporting systems regarding collection and interpretation of medical mistakes

- Make the standards and expectations for improvement in safety high via the actions and support of oversight organizations

- Make safety systems inside the healthcare organizations via the use of safe practices at the delivery level

- Make an accurate patient’s identification

- Increase the effectiveness of communication among the patients and the providers

- Timely reporting of important tests
• Label all the medications
• Transfer accurately the medication information to nurses
• Fulfill the hand hygiene guidelines and thus decrease the risk of infection
• Make a universal agenda for preventing wrong site, wrong patient and wrong procedure
• Complete the pre-procedure verification
• Ensure the safe place for medication preparation
• Reduce interruptions during drug administration
• Use calculator to calculate the exact dose
• Separate and label of drugs with similar names, colors or sounds
• Check whether medication is given to proper patient
• Nursing education regarding calculation of dose
• Delivery of drugs from pharmacy to ward under supervision of staff nurse
• Double checking of medications via two separate nurses
• Follow the rule of right i.e. right patient, right drug, right dose, right route and right time
• Head nurse must report the medication error when it occurs
• Nurses must have access to patient’s information
• Increase the patient-nurse ratio in each shift
• Attendance of educational programs
• Make medication administration policy (5,9,10).
Summary of preventive measures regarding Medical Errors (tables below)

Preventing medical errors (1)
• Better & uniform training.
• Adhere to established standards
• Regular records review to detect and correct errors.
• Employ only well trained staff.
• Counsel, reprimand, and educate staff. Dismiss repeat error makers.
• Develop & meticulously follow algorithms, set procedures & bedside checklist for all procedures.

Preventing medical errors (2)
• Increase supervision & communication
• Educate patients & caregivers about patient condition & treatment plans
• Encourage patient advocacy (family/friend) to ensure appropriate management
• Respond to complaints. Admit responsibility when appropriate & discuss these with the family and staff
• Investigate errors and take preventive action
Advocacy

- Choosing the appropriate treatment (laser, conventional surgery)
- Get a second opinion
- Look for an expert in your type of surgery
- Do not confuse friendliness with expertise
- Ask for the true prognosis

Be Your Own Advocate

- Decrease chances errors by being informed and not hesitating to challenge & ask for explanations
- Become an “expert”
- Have a family or friends
- Get a second opinion
- Educate your medical caregivers about your condition and needs

What can patients do?

- Tell your story straight
- Observe and question doctor, watch out for being dismissed
- Don't assume doctor is right--especially if things start to go badly

Source: www.peggyrcc.wordpress.com
References


