BUILDING A NEW BREED OF HEALTHCARE PROFESSIONALS

CONTINUING EDUCATION DEPARTMENT

Prevention of Medical Errors for Nurses

2 Contact Hours

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Prevention of Medical Errors

Introduction

Medical errors are reported in the news almost every day. On January 19, 2010 The Wall Street Journal began an article with a statement from the Food and Drug Administration (FDA) that medication errors alone cause approximately 1.3 million injuries to people annually in the United States and at least one death every day (1). In 1999, hospital-based medical errors were identified as the eighth leading cause of death in this country, more than the deaths caused from motor vehicle accidents, breast cancer, or AIDS (2). In 2004, however, the Institute of Medicine listed medical errors as the sixth leading cause of death for Americans (3), while by June 23, 2007, according to the Millennium Research Group (MRG), medical errors were moved up to the fifth leading cause of death, with 98,000 deaths annually (4). In addition to medication errors—which cause more than half of all medical errors, according to the Institute of Medicine—other types of medical errors include surgical errors, equipment malfunctions, problems caused by short staffing, communication difficulties, and documentation pitfalls. It’s no wonder that consumers of health care are uncomfortable! They are in new situations dealing with unknown diagnoses or treatments, anxious from being away from work, concerned about how much the hospitalization or procedures may cost, all the while feeling as if they are at the mercy of the health care system. Along with the fears of patients are the fears of family members who are frightened of mistakes that may be made by health care professionals. Clients of health care want to feel like participants, not victims, yet in the present environment it is not surprising that they enter hospitals and clinics with more than just mild trepidation.

The purpose of this course is to identify various causes of medical errors, examine some of the precipitating events and the role that might have been played by nurses in these events, and determine what can be done not only to protect the patient from harm but also to protect the nurse. The course will address medication errors, close calls, adverse events, errors of omission, errors of commission, sentinel events, and root cause analysis. It will also discuss the cost of medical errors, how to prevent them, and how the nursing profession can work toward positive change. Finally, the course will address what the nurse can do to educate patients to help consumers of health care take a more active role in their own care. Nursing has been described as both an art and a science. It will take both to reverse this hazardous situation facing consumers of health care and the professionals responsible for it.

Statement of the Problem

In 1997, well-known singer and actress Julie Andrews had surgery to remove non-cancerous nodules in her throat. Her singing career was over as the result of that surgery. She claimed that she had not been told there was a risk of permanent hoarseness or an irreversible loss of vocal quality. The doctor was accused of operating on both sides of her vocal cord when only the left side was affected. A lawsuit was filed.
Comedian and actor Dana Carvey received double bypass surgery in 1998 in order to save his life. Two months later, his heart surgeon notified him that the wrong artery had been bypassed. The doctor said the mistake was made because that artery was unusually situated in Mr. Carvey’s heart. Another emergency operation was required. Carvey sued his surgeon for $7.5 million.

In 2003, actor John Ritter died at Providence St. Joseph Medical Center in Burbank, California, from what his family allegedly claimed was a misdiagnosed heart condition. He was treated for having a heart attack when in reality he had a tear in his aorta, which led to his death. His family reached a settlement.

Sportswriter and broadcaster Dick Schaap was admitted to Lenox Hill Hospital in New York in 2001 for a routine hip replacement surgery. He was 67 years old. He died three months later of an infection he contracted in the hospital. His family filed a lawsuit and was awarded $1.9 million after the jury found the doctors negligent in their care for Mr. Schaap.

In 2007, the newborn twin babies of actor Dennis Quaid and his wife, Kimberly, were given the wrong dose of medication at Los Angeles Cedars-Sinai Hospital. The two infants, plus a third infant in the same nursery department, received 1000 times the ordered dose of 10 units of heparin, not once but twice. The hospital staff was found negligent and the family received a $500,000 settlement.

Red alert flags are raised and the staff comes to attention when “Very Important People” (VIPs) are admitted to the hospital or other health care facilities. These VIPs are extended extra care, consideration, and professionalism; staff takes great care to make certain their every need is met and every requirement is fulfilled. If all of the errors mentioned above occurred while the health care staff was especially focused on patient care, what does that portend for less prominent clients?

In 1999, the Institute of Medicine (IOM) released the report called “To Err is Human: Building a Safer Health System” reporting that between 44,000 and 98,000 patients die each year in United States hospitals from preventable medical errors (5). The authors of the report write, “Whether a person is sick or just trying to stay healthy, he or she should not have to worry about being harmed by the system itself.” According to The Joint Commission sentinel event statistics, 68% of errors occurred in hospitals, 20% occurred in psychiatric settings, and 3% occurred in long-term care facilities (6). Other areas of concern are clinics, physician offices, patient homes, pharmacies, and ambulatory care centers.

Five years later, 40% of Americans stated that health care had gotten worse, 17% said it had gotten better, and 38% said it had stayed the same. This was a study conducted by telephone of 2,012 adults as a joint project by the Kaiser Family Foundation along with the Agency for Healthcare Research and Quality and the Harvard School of Public Health (7). The study showed that almost half (48%) of the people surveyed said they were concerned about the medical care they and their families received and more than half (55%) indicated they were dissatisfied with this country’s health care. Of this entire survey group, one in three people pointed out that they or a member of their family had experienced a medical error at some point in their life. People with chronic health conditions were more likely to articulate concerns about quality of care and 50% of them indicated having had personal experiences with medical errors.

Inadequate reporting of medical errors occurs because, even though managers stress that negative assessments and judgments will not be made, employees are concerned that an incident could prevent them from getting a promotion or merit raise. They fear being criticized by their peers and given less
responsibility by their superiors. If a trend was seen in a particular employee, certainly that staff member would be counseled. Although confidentiality is assured by the manager, it is often not the case on a nursing unit when an error, particularly a sentinel event, has occurred. The entire staff is aware of it and whose fault it is.

The United States Department of Health and Human Services (HHS) announced in February 2008 that it would be establishing Patient Safety Organizations (PSOs) to improve the quality and safety of health care for all Americans (8). These PSOs would promote clinicians and health care organizations to voluntarily share data on patient safety events more freely and consistently. Data could be analyzed and feedback would be provided to help improve health care quality. Deliberate reporting of patient safety events would be allowed without fear of new tort liability. Even with these attempts being made to improve quality care, consumer cynicism is not unwarranted or unexpected.

**Terms**

**Adverse Event**

The Joint Commission identifies an adverse event as an untoward, undesirable, and usually unanticipated event, such as death of a patient, an employee, or a visitor in a health care organization. Incidents such as patient falls or improper administration of medications are also considered adverse events even if there is no permanent effect on the patient. These injuries are caused by improper safety precautions or the caregiver not concentrating on the patient. Adverse events are injuries as opposed to errors affected by the primary condition of the patient. An additional description of adverse events includes those that are undesirable and unintentional but not necessarily unexpected results of medical treatment. Examples could include nausea and vomiting after receiving certain chemotherapy medications or a significant rash that develops as the result of a new antibiotic that is a side effect but not considered an allergic reaction.

**Error**

The IOM regards an error as a failure of a planned action to be completed as intended or use of a wrong plan to achieve an aim. Errors can include problems in practice, products, procedures, and systems. These errors are not usually caused by negligent professionals but by the exchanges of various people in different departments and in complicated environments. Adverse reactions that are unexpected and not preventable are not considered errors. Two kinds of errors have been identified:

- An error of planning: The failure to determine the appropriate or necessary course of an action, such as a diagnostic error.
- An error of execution: The failure to carry that appropriate or necessary course of action through to the point of completion.
Error of Omission

An error of omission is one that occurs as a result of an action not taken, for example, when a delay in performing an indicated cesarean section results in a fetal death, when a nurse omits a dose of a medication that should have been administered, or when a patient suicide is associated with a lapse in carrying out frequent patient checks in a psychiatric unit. Errors of omission may or may not lead to adverse outcomes.

Error of Commission

An error of commission is one that occurs as a result of an action taken. Examples include when a drug is administered at the wrong time, in the wrong dosage, or using the wrong route; surgeries performed on the wrong side of the body; and transfusion errors involving blood cross-matched for another patient.

Close Call

A close call or near miss incident is an event or situation that could have resulted in an accident, injury, or illness to a patient, visitor, or staff but did not, either by chance or through timely intervention. An example of a close call is a surgical or other procedure that was almost performed on the wrong patient due to a lapse of verification of patient identification but the error was caught at the last minute by chance. Close calls offer opportunities for learning and provide the chance to develop preventive strategies and actions. Close calls receive the same level of scrutiny as adverse events that result in an actual injury.

Sentinel Event

A sentinel event is defined by The Joint Commission as an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof. Serious injury specifically includes loss of limb or function. The phrase, “or the risk thereof” includes any process variation for which a recurrence would carry a significant chance of a serious adverse outcome. Such events are called “sentinel” because they signal the need for immediate investigation and response. It is important to remember that not all sentinel events occur because of an error and not all errors result in sentinel events.

The goals of the sentinel event policy include:

1. To have positive impact on improving patient care, treatment, and services, and preventing sentinel events
2. To focus the attention of an organization that has experienced a sentinel event on understanding the causes that underlie the event, and on changing the organization’s systems and processes to reduce the probability of such an event in the future
3. To increase the general knowledge about sentinel events, their causes, and strategies for preventions
4. To maintain the confidence of the public and accredited organizations in the accreditation process
Accredited organizations are expected to identify and respond appropriately to all sentinel events occurring in the organization. Appropriate response includes conducting a timely, thorough, and credible root cause analysis; developing an action plan designed to implement improvements to reduce risk; implementing the improvements; and monitoring the effectiveness of those improvements.

If a sentinel event occurs, a root cause analysis is expected; however, the reporting of sentinel events to the Joint Commission is voluntary. Sentinel events reported to the Joint Commission are compiled in a database. Once significant trends are apparent, the Joint Commission issues a Sentinel Event Alert that identifies specific sentinel events, describes their underlying causes, and suggests steps to prevent occurrences in the future.

Each health care organization is encouraged, but not required, to report to the Joint Commission any sentinel event that meets any of the following criteria:

- The event has resulted in an unanticipated death or major permanent loss of function, not related to the natural course of the patient’s illness or underlying condition or
- The event is one of the following (even if the outcome was not death or major permanent loss of function unrelated to the natural course of the patient’s illness or underlying condition):
  - Suicide of any patient receiving care, treatment and services in a staffed around-the-clock care setting or within 72 hours of discharge
  - Unanticipated death of a full-term infant
  - Abduction of any patient receiving care, treatment, and services
  - Discharge of an infant to the wrong family
  - Rape
  - Hemolytic transfusion reaction involving administration of blood or blood products having major blood group incompatibilities
  - Surgery on the wrong patient or wrong body part
  - Unintended retention of a foreign object in a patient after surgery or other procedure
  - Severe neonatal hyperbilirubinemia (bilirubin >30 milligrams/deciliter)
  - Prolonged fluoroscopy with cumulative dose >1500 rads to a single field or any delivery of radiotherapy to the wrong body region or >25% above the planned radiotherapy dose

Examples of sentinel events that are nonreviewable under the Joint Commission’s Sentinel Event Policy:

- Any “near miss.”
- Full or expected return of limb or bodily function to the same level as prior to the adverse event by discharge or within two weeks of the initial loss of said function.
• Any sentinel event that has not affected a recipient of care (patient, client, resident).

• Medication errors that do not result in death or major permanent loss of function.

• Suicide other than in an around-the-clock care setting or following elopement from such a setting.

• A death or loss of function following a discharge “against medical advice (AMA).”

• Unsuccessful suicide attempts unless resulting in major permanent loss of function.

• Minor degrees of hemolysis not caused by a major blood group incompatibility and with no clinical sequelae.

In addition to the self-reporting of a sentinel event by the health care organization in which the event occurred, the Joint Commission may become aware of a sentinel event by communication from a patient, a family member, an employee of the organization, a surveyor, or through the media. Once the Joint Commission becomes aware (either through voluntary self-reporting or otherwise) of a sentinel event meeting the criteria listed above and the event has occurred in an accredited organization, the organization is expected to:

• Prepare a thorough and credible root cause analysis and action plan within 45 calendar days of the event or of becoming aware of the event, and

• Submit to the Joint Commission its root cause analysis and action plan, or otherwise provide for Joint Commission evaluation of its response to the sentinel event under an approved protocol, within 45 calendar days of the known occurrence of the event.

The Joint Commission then determines whether the root cause analysis and action plan are acceptable. If the determination that an event is reviewable under the Sentinel Event Policy occurs more than 45 calendar days following the known occurrence of the event, the organization will be allowed 15 calendar days for its response. If the organization fails to submit an acceptable root cause analysis within the 45 calendar days (or within 15 calendar days, if the 45 calendar days have already elapsed), its accreditation decision may be changed to Provisional Accreditation if The Joint Commission determines the organization has not undertaken serious improvement efforts. The Joint Commission staff will provide additional consultative support to the organization and allow an additional 10 business days to submit an acceptable root cause analysis and action plan. The organization’s accreditation decision reverts to Accredited when the root cause analysis and action plan are determined to be acceptable.

An organization which experiences a sentinel event that does not meet the criteria for the Joint Commission review is expected to complete a root cause analysis. However, the root cause analysis need not be made available to the Joint Commission.
Between January 1995 and June 30, 2010, the Joint Commission reviewed 6,923 sentinel events.

<table>
<thead>
<tr>
<th>Type of Sentinel Event</th>
<th>Number of Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrong-site surgery</td>
<td>921</td>
</tr>
<tr>
<td>Suicide</td>
<td>816</td>
</tr>
<tr>
<td>Op/post-op complication</td>
<td>749</td>
</tr>
<tr>
<td>Delay in treatment</td>
<td>592</td>
</tr>
<tr>
<td>Medication error</td>
<td>554</td>
</tr>
<tr>
<td>Patient fall</td>
<td>450</td>
</tr>
<tr>
<td>Unintended retention of foreign body**</td>
<td>383</td>
</tr>
<tr>
<td>Assault/rape/homicide</td>
<td>263</td>
</tr>
<tr>
<td>Perinatal death/loss of function</td>
<td>217</td>
</tr>
<tr>
<td>Patient death/injury in restraints</td>
<td>202</td>
</tr>
<tr>
<td>Transfusion error</td>
<td>148</td>
</tr>
<tr>
<td>Infection-related event</td>
<td>148</td>
</tr>
<tr>
<td>Medical equipment-related</td>
<td>138</td>
</tr>
<tr>
<td>Fire</td>
<td>105</td>
</tr>
<tr>
<td>Anesthesia-related event</td>
<td>102</td>
</tr>
<tr>
<td>Patient elopement</td>
<td>102</td>
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<tr>
<td>Maternal death</td>
<td>95</td>
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<tr>
<td>Ventilator death/injury</td>
<td>64</td>
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<tr>
<td>Abduction</td>
<td>32</td>
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<tr>
<td>Utility systems-related event</td>
<td>25</td>
</tr>
<tr>
<td>Infant discharge to wrong family</td>
<td>9</td>
</tr>
<tr>
<td>Other less frequent types</td>
<td>808</td>
</tr>
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</table>

The state of Florida is licensed by the Agency for Health Care Administration (AHCA) and is required to report incidents to them, including mandatory reporting of all sentinel events. Once an incident occurs, a factual report must be completed within three days and a decision made as to whether the parties involved did or did not have
control over the situation. Control over the situation means it could have been prevented. Not having control would be a situation in which circumstances were unavoidable or a disease process caused the outcome. Root cause analysis is completed and the information is sent to the executive level of the institution, which reports it to AHCA, which may then share the information with The Joint Commission. The risk management division works with the other departments to determine how the incident could have been prevented, no matter what the cause, and makes recommendations for education and improvement.

**Root Cause and Root Cause Analysis**

The root cause of a medical error is the most fundamental reason for the failure or inefficiency of a process. Root cause analysis is a process for identifying the basic or causal factor(s) that underlie variation in performance, including the occurrence or possible occurrence of a sentinel event. The Joint Commission mandates that all sentinel events have a root cause analysis in order to discover causes and put into practice changes to prevent further errors.
Root cause analysis consists of data collection, causal factor charting, root cause identification, and development of recommendations for preventing reoccurrences. Some of the components of root cause analysis include the focus of the problem to be on the system, not on the individual, including the staff involved in the incident; analysis of the people, processes, and systems that contributed to the event; and development of an action plan that addresses root cause findings. When an inclusive root cause analysis is performed, a more clear-cut corrective action can be implemented. The types of changes that are initiated are directed away from the usual employee counseling to the modification of the processes and procedures of the organization as a whole. Corrective actions linked to root causes are much more effective. The following information regarding root cause analysis is from the United States Department of Veterans Affairs (11):

- The review is interdisciplinary in nature with involvement of those closest to the process.
- The analysis focuses primarily on systems and processes rather than individual performance.
- The analysis digs deeper by asking what and why until all aspects of the process are reviewed and all contributing factors are identified (progressing from looking at special causes to common causes).
- The analysis identifies changes that could be made in systems and processes through either redesign or development of new processes or systems that would improve performance and reduce the risk of event or close call recurrence.

Since 1995, when The Joint Commission began the sentinel event policy, data has been compiled from several thousand incidents. Common root causes include:

- Improper assignment of the patient.
- Infrequent or incomplete observation of the patient.
- Incomplete examination of the patient.
- Inadequate safety or security of the patient.
- Inadequate assessment or incomplete reassessment of the patient.
- Factors related to insufficient training or orientation of personnel, including inadequate staffing or competency reassessments.
- Factors related to the unavailability or miscommunication of information among health care personnel and other caregivers.

**Recognizing Error-prone Situations**

**General Issues**

Patient identification is of utmost importance with patient care yet often disregarded; it is the cause of numerous medical errors. The patient armband is an inexpensive, common way to identify patients and is used from admission to discharge. It is convenient and once removed from a patient cannot be used on another patient. However, one study at the Veterans Affairs Medical Center in West Los Angeles, California, compared wristband identification errors for 712 hospitals. When over two million patient wristbands were checked, phlebotomists found more than 67,000 identification errors (12). Identification is an issue no matter who comes in contact with the patient. It can be the nurse, the laboratory technician, the physician, the radiology technician, the dietary assistant, or even the orderly who takes the patient off the unit for testing. All persons who come in contact with the patient must verify the fact that they are working with the correct person.
Another general issue that is increasing medical errors throughout all systems is that of infection. Hand washing has always been stressed but now is even more so. The use of antibacterial agents in patient rooms, hallways, cafeterias, and in common populated areas of medical facilities is becoming more accepted. Still, infections continue to cause complications and patient deaths.

**Nursing Issues**

Improper staffing ratios from either too many patients or too few nurses and support staff, a more critically ill patient load, and mandatory overtime contribute to decreased patient safety. Dr. Lucian Leape of Harvard noted as long ago as 1994 that a patient in an intensive care unit received an average of 178 different activities in a day that rely on the interaction of monitoring, treatment, and support systems. (13)

A 2009 survey by the American Hospital Association (AHA) of 848 respondents found that the current economy has affected patients and the communities that hospitals serve (14). Half of the respondents stated that the institutions’ censuses have been affected by the economy. There is a decrease in inpatient and outpatient volumes but an increase in patient acuity. Many respondents felt that patients were delaying their medical treatment or surgery and consequently were more critically ill when they did present for treatment. Half of the respondents reported that the economy has decreased or eliminated the role of a medication safety officer (MSO) or a quality or risk management staff member dedicated to medication safety.

An investigation by the *Chicago Tribune* in September 2000 reported that overworked or poorly trained nurses were responsible for the deaths of 1,700 patients and injuries to 9,548 patients in this country since 1995 (15). Hospital staffing cutbacks forced registered nurses to work longer hours and use under-trained nurses more often. “An analysis of three million state and federal computer records showed that hospitals are sacrificing patient safety for a better bottom line,” the newspaper said. Records showed that patients received overdoses of medications, vital care was delayed for hours, and nurses were performing medical procedures they had not been properly trained to complete. Patricia Underwood of the American Nurses Association said that when institutions have difficulty finding staff, they use overtime as a means of staffing rather than trying to create an environment that can attract more nurses so that they can get more staff. Nurses are being overworked rather than being relieved of responsibilities.

In 2006, Theresa Pape reported that nurses get interrupted as often as six times per hour during a shift and many of these interruptions take place during medication administration (16). The need to hurry to complete a task adds to the feeling of pressure and stress on the nursing staff.

The nursing profession is one in crisis. Not only is there a tremendous shortage of nurses in specific areas at the present, but fewer young people are choosing nursing as a career. According to the *Tribune* article, more than half of the nursing work force is over the age of 45 and many are retiring.

The American health care industry is one of decentralization and fragmentation with copious opportunities for errors in any number of departments. The medication process alone requires the successful completion of at least five independent steps: ordering, transcribing, dispensing, delivering, and administering. Errors can occur in any one of these steps.
Communication

Initial and subsequent communication with the patient and his family can be the basis for medical errors. Nurses need to actively listen when they perform their preliminary interview with the patient. Not only must the patient be asked about prescribed medications and over-the-counter medications he takes but also any herbal or homeopathic preparations as these especially can cause problems perioperatively. Preparations such as ginkgo, garlic, ginger, feverfew, and ginseng may cause bleeding (17). Ephedra, goldenseal, valerian, and licorice cause cardiovascular instability and increased sedative effects can be found in patients who use St. John’s wort, valerian, and kava. As many as 70% of patients who use herbal remedies and vitamins do not tell their health care providers about the use of these preparations. Either they forget or feel that because these are not considered to be “drugs” they do not need to be mentioned. Nurses must be diligent in asking about these remedies.

Communication within and between departments can also contribute to medical errors. Primary doctors and medical specialists may not communicate well and the nursing staff is often caught in the middle. It is part of the nurse’s job to be an advocate for the patient and help facilitate communication with all those involved in the patient’s care.

Poor written documentation—including illegible handwriting on the part of the physician, transcription errors of orders, or spelling mistakes in nursing notes—leads to medical errors as well. Patient records are legal documents and must be able to face intense scrutiny. The abbreviation “IN” which stands for intranasal could be misread as “IM” (intramuscular) or “IV” (intravascular). The records are a way of communicating from physician to physician, one nurse to another and one shift to another, and from department to department. Any conflict or confusion can cause complications in the patient’s care and outcome. While many larger institutions have gone to electronic documentation, smaller ones have not. Nursing homes, clinics, private physician offices, and many more still rely on handwritten citations as a way to communicate from one health care worker to another, and from one patient visit to the next.

Inconsistent or conflicting use of zeros and decimal points, confusion of metric and other dosing units, and inappropriate abbreviations can cause numerous communication problems. For example, the abbreviation qld, which means daily, could be mistaken for q.i.d., which stands for four times daily. The abbreviation qn stands for nightly or at bedtime but could be falsely read as qh or every hour. A tragic example of this type of error occurred in 1994 at the Dana-Farber Institute in Boston. Betsey Lehman, a 39-year-old medical reporter for the Boston Globe was being treated for breast cancer, as was another patient, Maureen Bateman. The doctor caring for both patients prescribed the powerful anticancer drug cyclophosphamide to be given one time each day over four consecutive days. The doctor wrote the order so that the entire four-day dose was given to the patients in one single day. Ms. Lehman died as the result of the error and Ms. Bateman suffered permanent heart damage and died from cancer several months later (18).

Drug abbreviations can cause deadly errors. DPT can stand for a mixture of Demerol-Phenergan-Thorazine or diphtheria-pertussis-tetanus (a vaccine). A nitro infusion could be a nitroglycerin infusion or an infusion of sodium nitroprusside.

Verbal communication can complicate matters when similar sounding medications are not spelled out or similar words are used. Wrong tests can be performed or labs ordered. Verifying verbal orders by repeating them on the phone to the physician and in person is not only a way to clarify the order for the nurse but also to let the
physician hear what was ordered so he can confirm the correctness of the order. Repeating the dose of a medication is imperative, as is the route and frequency of administration. Making clear the desired treatment regimen simplifies the tasks of the caregivers, lessens the follow-up questions for the physicians, and makes the experience safer for the patient. These are basic techniques taught in nursing school, yet the errors continue. The techniques are not being used or they are simply not good enough.

Spoken communication is used for more than simply giving and receiving orders from physicians. Vital information is passed from nurse to nurse in shift report and to and from nurses to patient care assistants pertaining to common procedures and test results. If a patient care assistant reports to a nurse that a patient’s blood glucose level is a certain number, the nurse may treat the patient based on that information. Casually passing information can certainly lead to miscommunication when distractions abound. Words are missed and assumptions are made. Someone may have thought she was heard when in fact she was not. An important message may have been missed and as a medical error may be just around the corner.

**Equipment**

Nurses come in contact with a multitude of pieces of medical equipment each day. Newer models replace the old and more in-services are needed to teach each nurse how to use the equipment correctly. Going from one unit to another often means coming in contact with and needing to learn to use another new type of equipment. Although studies have shown that more often than not the error is on the part of the person using the equipment and not caused by faulty apparatus, equipment failure can be a problem. A typical example of equipment failure is that of an intravenous pump with a malfunctioning valve that allows too much fluid or medication to be delivered to the patient over too short a time period. Alarms on machines may not work properly, or worse yet, have been purposefully turned off. Batteries run down. Plugs become unplugged. Filters need to be changed. Routine maintenance is imperative to keep equipment functioning properly.

A report on July 1, 2010 from the *St. Louis Post-Dispatch* at its online website (Stltoday.com) entitled “Medical error, at the VA and elsewhere” (19) reported the following information:

- Nearly 2,000 veterans were notified this week that they may have been exposed to viral infections such as hepatitis or AIDS because of improperly sterilized dental equipment at the St. Louis VA Medical Center.
- Last year, the VA warned thousands of veterans who got care at facilities in Florida, Georgia and Tennessee that they may have been exposed to viruses that cause hepatitis or AIDS. In that case, officials learned that flexible tubing used in colonoscopies had been improperly sterilized.
- The University of Pittsburgh Medical Center was forced to notify patients last year that they may have been exposed to life-threatening illnesses because sterilizing equipment at the facility failed.
- In 2008, North Carolina health officials said 160 patients of a hospital in Cape Fear may have been exposed to staph infections because of the same failure.
Another problem with clinical equipment occurs when the alarms used to safeguard the patient are turned off. Alarms may not be set up correctly, may be ignored, or the work environment may be too busy to allow response (20). There is sensory overload in critical care areas and high false alarm rates. Patient movement or patients taking the leads off can desensitize the staff to meaningful alarms. Caregivers can become complacent when many alarms are going off so frequently and the alerts lose their impact. Sometimes the volume of noise makes it difficult to hear or differentiate between the various sounds.

The dilemma with equipment errors of any source is that they are not reported as they should be. Susan Gardner, PhD, deputy director of the Office of Surveillance and Biometrics in the FDA’s Center for Devices and Radiological Health, states that there is “tremendous underreporting” of faulty medical devices or medical errors that are the result of devices (21). This is one of the biggest problems where medical errors are concerned. Gardner also states that although hospital, nursing homes, medical offices, and other facilities that use medical devices are required to report all deaths caused or possibly caused by devices to the FDA, they do not. She says her office receives about 4,000 reports a year from the 40,000 to 50,000 facilities covered by the reporting requirement. Her suggestion for the reporting problem is to assure the facility confidentiality in order to increase compliance with the reporting requirement.

In 2009, a survey of 917 members of the American Academy of Orthopedic Surgeons revealed that within the previous six months, 617 (53%) of them had observed a medical error. For this group, the most frequent cause was equipment-related (22), including missing and broken instruments.

Specific Populations

Two specific populations are more sensitive to medical errors: pediatrics and geriatrics. Both groups have increased complexity of care due to their specific needs. Often nurses have difficulty providing care to these groups as their cooperation with certain aspects of their care is not always as forthcoming as that of other patient populations. Both groups are more susceptible to dehydration, hypothermia, hypoglycemia, falls, and lack of familiarity with healthcare workers and the environment. In addition, these two groups of patients require more time to be spent with them. They have increased needs that demand and warrant more care and attention.

Types of Medical Errors

Medication Errors

The most common medical errors are those dealing with medications. Perhaps this is because of the five independent steps previously mentioned that are necessary in the process of medication administration from beginning to end. The IOM estimates that there are more than 7,000 preventable deaths that are the result of medication errors in hospitals alone and more than tens of thousands in outpatient facilities. Looking at the five steps, how can these mistakes be occurring? The first step is when the physician orders the medication. The physician may not review the patient’s history thoroughly enough to know what allergies the patient has or what medications the patient has been taking at present or previously. Ordering new medications that may have interactions with what the patient is already taking or has in his system can cause possible significant adverse effects or drug interactions. The physician may not be aware the patient has inadequate renal function when he
orders an antibiotic that can be potentially toxic to a patient with this problem. Laboratory results must be consulted to be certain the patient can adequately tolerate the medication at this time.

The second step is the transcription of the order. If the order is not written clearly, the wrong medication can be given. If the decimal is not in the correct place, the wrong dose can be given. If the route is not made clear, the medication can be given inappropriately. If the abbreviation for time or frequency is not clear, the drug can be given too often or not often enough. All of these mistakes result from only the first two steps in the process. Abbreviations used incorrectly, whether when the drug is prescribed or transcribed, can cause problems.

The third step in the progression is that of dispensing the medicine. The pharmacist is responsible for this; again the accuracy and completion of transcription determines the precision of the final dose that is sent to the nurse. Economic conditions have resulted in using multi-dose vials instead of single-use vials and prefilled syringes. At times a drug will be repackaged into smaller units. This will require relabeling and can add another potential place for an error in the process. If a pharmacist does not have access to or does not read available drug information such as up-to-date warnings, mistakes can occur. Environmental factors in the pharmacy such as lighting, heat, noise, and interruptions can distract health professionals from their medical tasks (23).

In an AHA survey, one-fourth of the pharmacist respondents reported that there was an increase in delays in dispensing pharmacy-prepared parenteral products and solutions and more nurses were required to mix products on the nursing unit. Fewer admixtures were received premixed which also resulted in dispensing delays.

Confusion caused by similar drug names accounts for up to 25 percent of all errors reported to the Medication Error Reporting Program operated cooperatively by U.S. Pharmacopeia (USP) and the Institute for Safe Medication Practices (ISMP). The FDA has identified no fewer than 600 pairs of look-alike or sound-alike drug names since 1992 (24).

Dispensing is done by the pharmacist but delivery is usually done by ancillary personnel and that adds the fourth step in the process that can cause a mistake to be made. The medications can go to the wrong floor or unit or be put in the wrong patient’s medication area.

Once the nurse receives the drug—assuming all is correct and following the doctor’s exact orders with respect to the correct drug, dose, and form to be administered—the nurse then has the responsibility to get the medication to the proper patient at the right time via the right route. This is the fifth step. In this current demanding culture, one can assume the nurse will have more than one patient and often patients will need more than one medication. Rarely will a nurse have only one thing on her mind. The phones are ringing, co-workers are asking questions, patient family members need information, physicians want reports, and people from other departments are looking for charts or patients. In this chaotic milieu the nurse is expected to shut out the pandemonium and focus entirely on the one job at hand: medicating her patient. One distraction can make a big difference. In the April 24, 2010 Health News article titled “Interrupting a Nurse Makes Medication Errors More Likely,” experts were quoted as saying never before has a study been done to show a clear association between interruptions and medication administration errors (25). The research consisted of 98 nurses who were observed preparing and administering 4,271 medications to 720 patients at two Sydney, Australia teaching hospitals from September,
2006 to March, 2008. Using handheld computers, observers recorded nursing procedures during medication administration, details of the medication administered, and the number of interruptions. Two types of errors were described. “Procedural failures” included errors such as failure to read the medication label. “Clinical failures” included errors such as administering the wrong drug or the wrong dose. With increased interruptions came a greater risk of a serious error occurring. With four interruptions, the likelihood a patient would experience a major mishap doubled. The results of the study showed that only one in five (19.8%) of the drug administrations was error-free. Interruptions occurred in 53.1%. Most of the errors (79.3%) were minor. Major errors occurred in 115 medication administrations (2.7%) and they were all clinical failures.

After the administration of the medication as stated above, the patient’s response to the medication must be monitored. Any adverse reaction should be promptly reported and documentation completed. This is vital if it has been noted that a mistake was discovered with the drug, dosage, route, or patient, but even if no mistakes were made yet an adverse reaction still occurred. The patient may have an undiscovered allergy or may have suffered a new drug interaction.

Again, the two populations mentioned above, pediatrics and geriatrics, are of significant concern when medications are being administered. The rate for potential adverse drug events in children is three times higher than that in adults. Dosages are usually titrated by weight to meet the needs of the pediatric patient. Extra calculations cause an extra step to be taken, hence, there is an added potential for error. Drugs should also be based on weight for the atypical geriatric patient. An 80-pound older woman, though by age an adult, receives a certain dose of medication that may well be too much. The same dose for an adult 300-pound man will hardly be effective. Geriatric patients are especially sensitive to adverse reactions from cardiovascular drugs.

**Surgical Errors**

Surgical errors include operations performed on the wrong patient, the correct patient but the wrong surgical site, wrong organ, wrong procedure, an unintentional retained foreign body such as a sponge or surgical instrument, mistaken incision, infection, and any other operative or post-operative complication. In a review by The Joint Commission in 1998, the most common reasons for wrong-site surgeries were more than one procedure on the patient, more than one surgeon for the patient, time constraints, and unusual physical patient characteristics (26).

From January 1995 until June 30, 2010, wrong-site surgery has been the cause of 921 (13.3%) of all sentinel events. The most frequent mistakes made involved paired structures and bilateral symmetry and the specialty with the greatest number of errors was orthopedics. In that same time period, 749 (10.8%) operative/post-operative complications occurred and 383 (5.5%) unintended retention of a foreign body sentinel events were recorded by The Joint Commission. This last category has only been added to the definition of reviewable events since June 2005.

**Falls**

In a 2008 study from the New Jersey Department of Health and Senior Services, patient falls made up 40 percent of the 533 total medical events reported by hospitals to the state (27). Twenty of the 213 reported falls were fatal. Senator Loretta Weinberg, (D-Bergen) stated that, “Hospitals should view this report as a call to eliminate preventable errors. This is a reminder that there is still preventable suffering occurring within the
walls of our hospitals.” Most falls occurred in the patient’s room, usually when he was attempting to go to the bathroom without assistance. The population sustaining the most injuries from falls consisted of white women between the ages of 81 and 90, with fractures of the arms or legs being the most common injury.

**Cost of Medical Errors**

Medical errors have added billions of dollars to the cost of patient care. This increased cost in health care is being felt by individual patients, insurance companies, and the facilities in which the errors occur. Pharmaceutical companies are spending millions of dollars trying to change packaging in order to make their drugs easier to differentiate from each other. The Institute of Medicine’s 2006 report estimated that the 1.5 million preventable injuries from adverse medication errors would add up to about $3.5 billion in additional hospitalization costs in 2010, not including the economic burden of lost wages and productivity (28).

Two million hospital-acquired infections occur each year, costing hospitals more than $30 billion dollars. The average cost to manage one infection is $15,000 (29).

In a 2006 study by Chunliu Zhan of the Agency for Healthcare Research and Quality, it was found that hospitals absorbed about two-thirds of the extra costs associated with adverse events and billed Medicare for the remaining one-third (30). This research focused only on costs associated with a patient’s initial hospitalization in which the error took place; it did not take into consideration subsequent admissions required due to that error. Other studies cited in this same article, including one by Michelle Mello and colleagues, looked at inpatient and outpatient care expenses, lost income and household production, future medical expenses, burial costs for fatal injuries, and non-economic losses such as pain and suffering. In this analysis, discharge records in hospitals in Colorado and Utah were reviewed. The records showed the following statistics:

- A review of 14,732 medical records from 24 hospitals in 1992 uncovered 465 medical injuries, including 127 negligent injuries.

- On average, hospitals absorbed $238 of injury-related costs for every patient admitted that year. They externalized, or passed on, $1,775 in injury-related costs per admission.

- Among the 24 hospitals, malpractice premiums amounted to an average of $123 per patient.

In October 2008, an Injury Board National News Desk report announced that Medicare would no longer pay hospitals for the added cost of treating patients who had been injured in their care (31). Medicare provides coverage for the elderly and disabled. The Deficit Reduction Act of 2005 requires institutions in the Medicare program to report all preventable medical errors caused by institution workers. They put 10 “reasonably preventable” conditions on their list of errors they refused reimbursement. These included patients who:

- Received incompatible blood transfusions
- Developed postoperative infections
- Required a second surgery to retrieve a sponge left in from a first operation
- Acquired serious bed sores
- Have injuries from falls
Developed urinary tract infections from catheters

They believe the regulations could apply to several hundred thousand hospital stays of the 12.5 million people covered annually by Medicare. The policy will also prevent hospitals from billing patients directly for costs generated by medical errors.

While the cost of medical care is rising and will continue to do so, it is important to consider that limiting expenditures for one individual patient will not affect the total cost of medical care. The health care giver cannot withhold supplies, medications, procedures, or use of equipment at the bedside because a patient may be terminal or soon to be discharged in the spirit of cost containment. Nurses need to be concerned about the global picture of expenditures and waste by participating in standardizing cost effectiveness, reducing waste, streamlining delivery services, and improving the system as a whole. “Rationing” at the bedside for an individual patient will not affect our nation’s cost dilemma, but it will affect that patient (32).

**Solving the Problem** Leadership

Nursing leadership is crucial in three major areas: nationally, institutionally, and on the unit level. On the grander scale, nursing leaders must take an active part in helping the nursing profession decrease medical errors. Nurses can participate in organizations that promote nursing and that give the profession a strong voice. Nurses come in contact with patients more than any other patient care provider and many of the stated medical errors fall on this group.

Nurses can encourage institutions to move to electronic records for all documentation and bar coding for medication administration, and to support the need for a medical safety officer or quality assurance manager for each department. Nurses can help the administration promote appropriate staffing ratios to provide quality care for patients with increased acuity despite the financial issues involved. They can persuade the organization to have periodic mandatory refresher courses to review medical errors and their prevention throughout the institution. They can ask hospital pharmacists to speak with the nursing staff to discuss the latest drug warnings and what can be done about them.

On the unit level, undesirable actions take place in even the most ideal places. They are inevitable. How they are handled can have a significant effect on the staff. Nursing leaders have the challenge of making the workplace one of learning and encouragement, not one of blame. All staff must be aware of how to report medical errors and the purpose of those reports. The emotional needs of healthcare professionals need to be addressed in the aftermath of an adverse event. An environment of opportunity needs to be created and maintained in order promote growth and prevent future errors. Nursing leaders must be confident the nurses and support staff on the unit are sufficiently trained to perform all the duties required of them and to anticipate and then respond to any crises which could arise. Nursing leaders have the responsibility to be certain their patient care areas are staffed adequately with enough professional nurses and ancillary staff to meet the needs and acuity of the patients.
Nursing leaders must also be aware of all new mandates from The Joint Commission and pass this information onto the staff. Literature needs to be posted and discussed. Periodic review of incidents should take place to facilitate learning and prevent recurrence. Open discussions of potentially hazardous situations and solutions can help staff members engage in meaningful brainstorming ideas.

Problems involving medical errors are numerous and cannot be resolved quickly; however, many can be solved. Taking extra time when performing tasks and allowing colleagues to do the same is the first step.

**Medication Administration**

Being able to focus on the task at hand without interruption would help the nurse be assured that the procedure she is preparing to begin or the medication she is preparing to administer is the correct one. Keeping the medication preparation area away from the chaos of the busy unit and in a quieter place with less visual and auditory distraction can help. The level of noise in the environment can be reduced by turning down or off background music, setting telephones to a softer ring, and turning off computer speakers. Clutter in the medication area can also lead to distraction. Keeping this area clean of trash and with minimum paper and nonessential equipment will help decrease visual disruption.

Many medication carts are in hallways and moved from room to room to be more convenient. This can lead to many distractions for the nurse when preparing medications. If this is the policy on the unit, the nurse will have to be even more diligent to focus on what she is doing rather than what is going on around her. Other nurses and staff will need to be available to help visitors and patients so he or she can focus on administering medications. The nurse should not hesitate to delegate duties to others when it is time to proceed with the medicines.

The FDA and the Institute for Safe Medication Practices began a nationwide educational campaign to eliminate the use of ambiguous medical abbreviations that are often misinterpreted and can lead to errors that can result in patient harm. The ISMP has lists available of error-prone abbreviations, their intended meanings, misinterpretations, and corrections. Also available are lists of dose designations, drug names and abbreviations, stemmed drug names, and symbols. Keeping these lists posted on nursing units is the best way to be certain they are reviewed often.

Bar coding is now being used to help prevent medication errors. Some medical centers have a double check system in which the nurse, the patient, and the medication all have identification strips that must be scanned to verify that the drug is being given correctly to the appropriate patient and will not cause a drug interaction. If a problem is identified, a warning is flashed; otherwise, the activity is recorded.

**Communication**

Moving to electronic medical records (EMRs) to document and store patients’ health information has many advantages. Notes are legible and time-stamped. Documentation is accessible to all, including other departments which facilitates communication and cannot be changed by another caregiver. Safety features are built-in, sending alerts if a drug is ordered that has been documented as on the patient’s allergy list. EMRs also have disadvantages. The templates provided to describe the patient may not provide an area for the nurse to adequately describe what she sees and hears from the patient. That information will still need to be entered into the computer. The nurse must ask more than what is stated on the template and assess the patient to a higher degree. While the computer will send prompts about medications that are due, the nurse cannot rely...
When the patient care assistant is reporting information to the nurse about a patient’s test result, it is imperative that the verbal report include the patient’s name when stating the test result. Writing the data in an approved form is the best way to document the information in order to prevent any questions later. Hearing and seeing the facts will help the nurse focus on what follow-up is necessary for the patient. If the blood pressure is normally elevated but today is quite low, the nurse will check the patient’s record to see if she should hold the antihypertensive medication that is usually given at that time.

Written orders from a physician are always the safest way to communicate. There is something for the nurse to use as a referral should there be a question later. The risk of taking verbal orders is that they can be misunderstood or misinterpreted. When taking verbal orders from a physician, the National Coordinating Council for Medication Error Reporting and Prevention has an established protocol which includes the following guidelines:

- Name of the patient
- Age and weight of the patient, when appropriate
- Drug name
- Dosage form (e.g., tablets, capsules, inhalants)
- Exact strength or concentration
- Dose, frequency, and route
- Quantity and/or duration
- Purpose or indication (unless disclosure is considered inappropriate by the prescriber)
- Specific instructions for use
- Name of the prescriber, and telephone number when appropriate
- Name of the individual transmitting the order, if different from the prescriber

When nurses give report to each other or “hand-off” patients at shift change, they need to review the plan of care, current physician orders, lab results, and medications together. They need to go to the patient’s bedside and look at what intravenous fluids are infusing, the rate, and any additives, and compare that with existing orders. A structured communication technique should be in place so that information is transferred in a consistent manner from one patient caregiver to the next.

**Patient Identification**

Each patient should have an identification bracelet on at all times with their name, hospital number and either a list of all known allergies or the term “no known allergies” (NKA). This bracelet is used to compare the pertinent information about the patient before giving any medication. It is especially important should the patient not be in his bed if he is an inpatient, or if he requires medication while having a procedure performed in another area and the medication will be administered by someone who is not familiar with him.

When a nurse is meeting the patient for the first time prior to administering a medication, checking this bracelet, in addition to asking the patient’s name, is the best way to make certain this is the correct person to receive the drug. It is important to remember to ask the patient’s name and not simply have the patient confirm his own information. Whenever possible, asking the patient if he has any allergies is a double check in case...
there is something he forgot to say when giving his history on admission. Also making certain the drug has not already been given by someone else and not recorded is an extra step in preventing a potential mistake. Explaining what the medication is and verifying that it has not been given (since the last specified dose, if appropriate) is another safeguard.

The Joint Commission requires healthcare organizations to comply with National Patient Safety Goals (NPSGs) which recommend the use of two methods of identifying patients when administering medications and performing procedures. The most common ways of identifying patients include asking the patient’s name; asking for identifying information, such as the date of birth or social security number, or even the patient’s home phone number; and checking the patient’s identification bracelet as stated above. The patient’s room number should never be one of the identifiers. Incorrect patient identification is responsible for approximately 14% of chemotherapy errors (35).

**Surgery**

Since 2004 The Joint Commission has mandated “universal protocol” in that doctors mark the spot where they are to perform surgery with a large “X” or the physician’s initials while discussing the procedure with the patient (36). A small subtle mark is not what is needed to draw attention to the proper site. Some nurses and physicians even go as far as putting the words “wrong one” or “not here” on the appendage not to receive the surgical procedure.

Also included in the universal protocol is the requirement that nurses take a “time out” before the surgery begins and get the attention of everyone in the operating room to perform final safety verification. Check lists are reviewed. Taking a moment or two of calm to check names, numbers, x-rays, lab reports, and confirm procedures can save both lives and licenses.

Counting sponges one more time and by one more person before and after surgery can help decrease the number of foreign objects left in a patient. Checking prior to surgical closure and confirming the count will help eliminate this type of medical error.
Strict adherence to sterile technique is the responsibility of everyone in the surgical area. Once the system has broken down, it must be brought to the attention of all participants and the situation corrected.

**Falls**

Patient falls can be decreased by having the bed rails up to their full height during transport, when the patient is sleeping, and anytime the patient is in the bed and should not be getting out of it without assistance. This is the standard procedure for any patient of any age. Adequate lighting should be provided to the bathroom. Grab bars should be in the bathroom and strong enough to support the patient’s weight. All patients must be instructed on how to use the call system and when to ask for assistance. Nurses and patient caregivers should be swift to respond to these requests so that the patient does not get frustrated and attempt to get out of bed on his own.

With pediatrics, it is important to remember that a child can stand up in the bed so the rails not only need to be at the full height but the head of the bed needs to be flat. There should not be any large toys in the crib or bed on which the child could stand for additional elevation so he could climb over the bed rails.

**Public Education**

Consumer education has been called the “secret weapon” against medical errors. When consumers are aware of diagnoses, medications, procedures, expected outcomes, and possible side effects, they can better participate in their care. They know what their medications are supposed to look like and can question if something looks different. They know if someone is about to perform a test that they have not been told of and can stop it to get more information before a mistake happens. If side effects of a drug occur and these are not expected, the patient can report those side effects to the doctor in a timely manner with confidence, not panic. When a patient is aware of the times he is to receive his medications, his questioning the nurse of alternate times may save his life and her license.

What the consumer can do:

- Know his medications—names of prescribed drugs, over-the-counter drugs, and herbal remedies; doses; times taken; reasons to take them; side effects; how long he has been taking each one; what he cannot take and what reaction can happen if he does.
- Take a list of questions to the doctor when he goes. Do not rely on his memory. Take notes on what the doctor tells him. Ask questions, clarify information. Do not leave or let the doctor leave if he is unclear about an upcoming test, procedure, or result. Ask for written instructions to take home.
- If he is in the hospital and feels like he needs assistance getting up or going to the bathroom, ask for it and allow time to a response. Remember the floors are slippery.
- He should speak to the surgeon before surgery. Have him put his signature on the area where the incision is to take place, if possible. Know why the surgery is necessary and what the expected recovery period is.
- Be certain he knows what medication the doctor prescribed for him, and how much and when he is supposed to take it before picking it up from the pharmacy. Make certain the pharmacist is aware of all other medications he is taking. When picking up a refill from the pharmacy, open it right then to make sure it looks like the previous drug did if the prescription has not changed.
• He ought to bring family to meet with the physician or health care professional to ask questions or listen. Sometimes family members are not as hesitant to clarity information as the patient is.
• When discharged from the hospital, he should follow the instructions given. He needs to take all medications as instructed, even if symptoms have disappeared. He should know what to look for with signs of infection or complications.
• He should be encouraged not to wait until it is too late to go to an emergency department or physician’s office if he is not feeling well. This can have an opposite effect. He may think he is saving money by delaying being seen but he may be getting worse and causing more health problems.
• Be able to identify the signs of infection such as redness, pain, swelling, and warmth and know that these are indications that seeing a medical professional is urgent.

Conclusion

Human error is a certainty. It rises exponentially with an increase in patient acuity, staffing shortages, stress, workload, and technical advancement. These circumstances are not likely to disappear anytime soon. Nurses must work to improve the system in order to best meet the physical, psychosocial, and safety needs of the patient and to avoid medical errors in the process. The organization needs to include redundancy so that if the system fails in one area there is another spot where the error can be caught before damage is done. It only takes one person to make the difference in a patient’s life—either positively or negatively. Maintaining focus on what can be done to prevent medical errors at all times should be the ultimate goal of every medical professional.
References


