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SPECIAL ARTICLE

Medical Errors: An Overview

Nares Sukcharoen MD.

Department of Obstetrics and Gynecology, Faculty of Medicine, King Chulalongkorn Memorial Hospital, Chulalongkorn University, Bangkok 10330, Thailand

Medical errors are a common cause of morbidity and mortality in a variety of health care settings.[1-3] These errors occur not only in hospitals but in other health care settings, such as physicians' offices, nursing homes, pharmacies, urgent care centers, and care delivered in the home. Unfortunately, very little data exist on the extent of this problem in Thailand. The serious problem of medical errors is not new, but in the past, this problem has not gotten the attention it deserved.

Along with an increase in the number of diagnostic tests and effective treatment options there has been an increase in potential for harm, as many treatments and diagnostic tests carry their own risks. The potential for harm is further increased by the number of health professionals involved in the care of any one patient and the size of healthcare institutions, the consequent need for increased communication and the complexity of systems employed.

Despite the increasing recognition of the importance of this phenomenon, there is limited knowledge of its causes and interventions which may be used to effectively reduce the incidence and impact of errors on medical care. In this review, the causes and prevention of medical errors are reviewed. Furthermore, the ethical aspects of medical errors were also discussed, especially, the disclosure of medical errors.

What are medical errors and adverse events?

Medical error is the failure of a planned action to be completed as intended, or use of the wrong plan to achieve an aim. Not all medical errors result in harm. The errors that do result in injury are sometimes called preventable adverse events. An adverse event is an injury resulting from a medical intervention, or in other words, it is not due to the underlying condition of the patient. While all adverse events result from medical management, not all are preventable (i.e., not all are attributable to errors). For example, if a patient has surgery and dies from pneumonia he or she got postoperatively, it is an adverse event. If analysis of the case reveals that the patient got pneumonia because of poor hand washing or instrument cleaning techniques by staff, the adverse event was preventable (attributable to an error of execution). If it is determined that the patient simply had a difficult surgery and recovery, but no error was committed, then the adverse event was unavoidable and not the result of error. The medical error that causes no harm is sometimes referred to as a "near miss". The terminology used to describe the medical errors is shown in Table 1.

Table 1. Terminology used to describe medical errors [4]

Medical errors	The failure of a planned action to be completed as intended, or use of the wrong plan to achieve an aim.
Adverse event	An injury or death resulting from medical management, not the underlying condition of the patient.
Preventable adverse event	An adverse event attributable to error.
Patient safety	Freedom from accidental injury

Much can be learned from the analysis of errors. All adverse events resulting in serious injury or death should be evaluated to assess whether improvements in the delivery system can be made to reduce the likelihood of similar events occurring in the future. Errors that do not result in harm also represent an important opportunity to identify system improvements having the potential to prevent adverse events. Preventing errors means designing the health care system at all levels to make it safer. Building safety into processes of care is a more effective way to reduce errors than blaming individuals. The focus must shift from blaming individuals for past errors to a focus on preventing future errors by designing safety into the system. This does not mean that individuals can be careless. Physicians must still be alert and held responsible for their actions. But when an error occurs, blaming an individual does little to make the system safer and prevent someone else from committing the same error.

Why do medical errors happen?

Most errors are not the result of bad or negligent providers but instead are the result of complex systems. However, the complexity of the problem cannot be used to excuse or ignore it. The solution of this problem requires building safety into the health care system by focusing on ways to prevent errors rather than blaming individuals for past errors, while simultaneously holding individuals and facilities accountable for their actions.

The patient safety can be improved through internal changes within the healthcare system as well as through external changes, such as regulation and legislative action, and through economic and other incentives or disincentives. Regulation and legislative action can serve as a call to action to health care organizations to improve quality and can provide public information about safety. Purchasers and consumers can use economics and other incentives to direct their business to organizations with the best safety records. Therefore, professional groups and providers should set and follow norms and standards of practice.

Most people believe that medical errors usually involve drugs, such as a patient getting the wrong prescription or dosage, or mishandled surgeries, such as amputation of the wrong limb. However, there are many types of medical errors, including:

Medication errors

There are preventable errors in prescribing and delivering mediation to patients, such as prescribing two or more drugs whose interaction is known to produce side effects or prescribing a drug to which the patient is known to be allergic or teratogenic.

Diagnostic errors

Incorrect diagnoses may lead to incorrect and ineffective treatment, unnecessary testing which is costly and sometimes invasive, failure to use an indicated diagnostic test, misinterpretation of test results, and failure to act on abnormal results. Gynecologists who performed more colposcopies a year had more accurate findings than physicians who performed the procedure less often.

Diagnostic error can be classified into three broad etiologic categories (Table 2)[5], including:

No-fault errors

Cases where the illness is silent, or masked, or presents in such an atypical fashion that divining the correct diagnosis, with the current state of medical knowledge, would not be expected.[6] Other examples would include the rare condition misdiagnosed as something more common, and the diagnosis missed because the patient does not present his or her symptoms clearly. A diagnosis missed or delayed because of patient noncompliance might also be viewed as a no-fault error.

System errors

System errors reflect latent flaws in the health care system. Included in this category are weak policies, poor coordination of care, inadequate training or supervision, defective communication, and the many system factors that detract from optimal working conditions, such as stress, fatigue, distractions, and excessive workload. These problems can affect all the physicians in the involved health care system.

Cognitive errors

Cognitive errors are those in which the problem is inadequate knowledge or faulty data gathering, inaccurate clinical reasoning, or faulty verification.[6] Examples include flawed perception, faulty logic, and settling on a final diagnosis too early. These are all errors on the part of an individual physician.

Table 2. Categories of diagnostic errors

Error type	Example
No-fault errors	
Unusual or silent presentation of disease	Missed diagnosis of unruptured ectopic pregnancy in a pregnant woman with no abdominal pain
Uncertainty regarding the state of the world	Missed diagnosis because the patient is inconsistent or confusing in presenting his symptoms
Lack of patient cooperation	Missed diagnosis ovarian cancer in patient who refused pelvic examination and further investigation
Limitations of medical knowledge	Missed diagnosis of severe acute respiratory syndrome (SARS) in the era before this was recognized as a specific entity
Failure of normative process	Wrong diagnosis of a common cold in a patient ultimately found to have rubella infection
System errors	
Technical failures	
Faulty test or data	Wrong diagnosis of urine infection from urine left too long before culture
Lack of appropriate equipments or tests	Missed endocervical carcinoma because unsatisfactory colposcopy was diagnosed without endocervical curettage
Organizational failures	
Inadequate pursuit of noncompliant patient	Abnormal test results not appreciated because patient missed scheduled appointment
Unavailability of needed expertise	Ruptured ectopic pregnancy was missed by emergency de partment staff (gynecologist not available)

Error type	Example
Inefficient processes	Delay in diagnosis of ovarian cancer due to inefficient coordination of outpatient care
Failure to adequately supervise	Diagnoses missed by trainees (supervising attending physician not available)
Patient neglect	Abnormal test results detected but not followed up
External interference (e.g., from health service system)	Delay or missed diagnosis because testing not approved by patient's plan
Policy failures	Delay in diagnosis of pulmonary embolus - nuclear medicine section not open on weekends
Inadequate training or orientation	Delays in diagnosis related to new trainees' not knowing how to navigate the system efficiently
Culture (e.g., tolerance of error)	Delays in X-ray films reading leading to delayed or wrong diagnoses
Failure to coordinate care	Delay of inpatient diagnosis: ward team not informed patient was admitted
Cognitive errors	
Inadequate knowledge	Wrong diagnosis of fetal brain anomaly on ultrasound with sonographic artifact simulating this anomaly.
Faulty data gathering	Missed diagnosis of breast cancer from failure to perform breast examination
Faulty information processing	Failing to perceive the adnexal mass on a patient's sonogram
Faulty metacognition	Wrong diagnosis of missed abortion (no further tests ordered) in a patient with hydatidiform mole.

Equipment failure

Equipment failure, such as defibrillators with dead batteries or intravenous pumps whose valves are easily dislodged or bumped, causing increased doses of medication over too short a period.

Infections

Infections, such as nosocomial and post-surgical wound infections.

Blood transfusion-related injuries

Blood transfusion-related injuries, such as giving a patient the blood of the incorrect type.

Misinterpretation of other medical orders

Misinterpretation of other medical orders, such as failing to give a preeclamptic pregnant woman a low salt diet, as ordered by a physician.

Can medical errors be prevented?

The majority of medical errors can be prevented. There are many approaches to solve the medical errors problem, including :

Education

Education is necessary, often considered the initial step, but not alone sufficient to eliminate medication error. Education may have impact through several interventions that are inexpensive and able to be rapidly deployed.

Systems approaches

The next step is to move from a philosophy of human error to one of systems error. Humans are prone to error, so safety healthcare service must develop systems to identify and preferably to prevent multiple errors.

Safety systems are particularly applicable in the hospital setting, because when an error occurs in the hospital it is rarely if ever due to a single person's mistake. For an example of medication error, usually a series of unchecked errors would need to occur for a patient to receive an incorrect medication. For a patient to receive a medication to which she is allergic, at least five points in the system of care must fail:

I. The physician ordering the drug should be aware of the patient's drug allergy history.
II. The patient's allergy information should also be available to the pharmacy and should be cross-referenced to intercept the physician's oversight before dispensing the drug to the in-patient department.
III. The nurse administering the drug should, likewise, be aware of all reported allergies.
IV. Passive identifiers such as allergy bracelets should be worn by the patient.
V. Finally, the patient (if awake and alert) should be asked about their allergies prior to drug administration.

Technology

Examples of technology-based attempts to reduce medication error include computerized prescriber order entry systems, bar-code medication identification and computerized infusion devices.

Other potential system improvements include:

Use of information technology, such as hand-held bedside computers, to eliminate reliance on handwriting for ordering medications and other treatment needs.

Avoidance of similar-sounding and look-alike names and packages of medication.

Standardization of treatment policies and protocols to avoid confusion and reliance on memory, which is known to be fallible and responsible for many errors.

In conclusion, education, appropriate use of technology and expertise, and a systems approach provide the best opportunity for improvement.

Is it necessary to disclose medical errors?

Medical errors, particularly when patients have suffered harm as a result, are of ethical concern as breaching a fundamental injunction in medicine : "first do no harm". To minimize the chances of a recurrence, an effective response to harm must take into account both the concerns of patients who have been harmed and the concerns of doctors who may fear extreme outcomes if an error is admitted. There is an apparent conflict between a need to respond to errors non-punitively, on the one hand, and ethical and legal requirements for accountability and compensation for anyone harmed, on the other. There is also confusion between arguments for a "blame-free" culture in the health care system and the need to attribute responsibility in some cases. Important elements in an ethical response to medical errors include disclosure to the patient and family; taking appropriate clinical steps to mitigate any harm that may result from an error; identifying the process leading to harm; and responding in an appropriate and humane manner to minimize the likelihood of any recurrence.[7]

How can medical errors be disclosed?

Disclosing error can be challenging for physicians.[8,9] Medical professionals have high expectations of themselves and, not surprisingly, find it difficult to acknowledge their errors openly before patients and colleagues.[10] Disclosing such events may be less traumatic if physicians follow this practical guideline. (Table 3)

Table 3. Disclosing error to patients[11]

▪ Notify your professional insurer and seek assistance from those who might help you with disclosure (e.g., unit director, risk manager).
▪ Disclose promptly what you know about the event. Concentrate on what happened and the possible consequences.
▪ Take the lead in disclosure; do not wait for the patient to ask.
▪ Outline a plan of care to rectify the harm and prevent recurrence.
▪ Offer to get prompt second opinions where appropriate.
▪ Offer the option of a family meeting and the option of having lawyers present.
▪ Document important discussions.
▪ Offer the option of follow-up meetings.
▪ Be prepared for strong emotions.
▪ Accept responsibility for outcomes, but avoid attributions of blame.
▪ Apologies and expressions of sorrow are appropriate.

Finally, all medical errors are not equal, and their impact may vary tremendously. For example, although medication errors are strongly linked to adverse drug events, most medication or prescription errors will not result in any harm. Many studies on medical errors have given limited information of the seriousness of the captured errors. The key to reducing medical errors is to focus on improving the systems of delivering care and not to blame individuals. Health care professionals are simply human and, like everyone else, they make mistakes.

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