Medical Error in Clinical Practice: “Errare Humanum Est”

VASSILIKA K. KATSIB1, CONSTANTINOS DEAN BOUDOULAS2, IRENE D. LYTRIVI3,
CONSTANTINA MASOURA1, COSTAS TSIOUFIS4, IOANNIS VLASSEROS1, IOANNIS KALLIKAZAROS1,
CHRISTODOULOS STEFANADIS5, HARISIOS BOUDOULAS2,5

*First and second authors contributed equally to the paper and are both equally first authors.

1Cardiology Department, Hippokration Hospital, Athens, Greece; 2Division of Cardiovascular Medicine, The Ohio State University, Columbus, Ohio, USA; 3Mount Sinai, School of Medicine, New York, New York, USA; 4First Department of Cardiology, Medical School University of Athens, 5Biomedical Research Foundation, Academy of Athens, Greece

E rrors by clinicians in medical practice will occur and unfortunately may result in harm to patients; however, what matters is the ability to learn from one’s errors and to recognize or anticipate these errors in order to avoid or prevent their reoccurrence.1 Judah Folkman, during a Harvard Medical School class address, stated, “Once we recognize that all our efforts to relieve suffering may on occasion cause suffering, we are in a position to learn from our mistakes and appreciate the debt we owe to our patients for our education.”1,2 This matter of suffering as a result of clinician error is a serious issue in medical care, with individual and community wide implications including ethical, social and legal consequences. Note the striking differences when an error is made by instructors or trainee pilots in the military, where the error will result in injury or destruction to either the instructor, student or both; in contrast, in the case of the instructor and student physicians the errors will impact others.1 In this review, factors contributing to medical error and basic steps to avoid them will be discussed. The authors, clinical cardiologists and most of them physician-scientists, working for decades in major university hospitals on both sides of the Atlantic, draw on their experience for this review.

Definition
It is well recognized today that medical error is not uncommon in clinical practice; however, a uniform precise definition for medical error does not exist. According to the Institute of Medicine, the failure of a planned action to be completed as intended should be considered a medical error. Elsewhere in the literature, medical error is defined as an unintentional deviation from standard operating procedures or practice guidelines. Another belief, especially among hospital personnel, is that an error that is detected and corrected by the staff is an event that occurs as a natural part of the workflow, and not an error.3,4 This discrepancy highlights the lack of an accurate and strict definition related to medical error. In this review, we consider medical error to be any preventable adverse outcome and/or application of inappropriate therapeutic or diagnostic procedure.
Incidence and contributing factors

The lack of a precise definition and the fact that all medical errors may not be reported makes it difficult to determine their real incidence. Medical error, which may also result in death, may occur in clinical practice. Medical errors are more common in clinical compared to laboratory specialties. For example, the rate of error in emergency medicine has been estimated to be approximately 15%, whereas in radiology and anatomic pathology it ranges from 2% to 5%. Furthermore, it is even more difficult to define the frequency of medical error in individual physicians or small group practice.

Several contributing factors lead to medical error, including a lack of communication between physician and patient or between health-care professionals, inaccurate diagnosis, and/or the inappropriate management of a patient. Specifically, studies have shown that approximately 5% to 10% of medical errors are due to inadequate communication, 40% to 45% to medical diagnosis, and 20% to 25% to management. Errors may be made more often by physicians with less experience, especially when they are extremely busy, and in complicated cases. Over-confidence that leads physicians to overestimate their skills and abilities may also result in medical error. Stress, “burnout”, and depression of healthcare personnel may also compromise the quality of patient care.

As a general rule, physicians feel guilty, depressed, and angry with themselves after making a medical error. With these negative feelings, it is even more difficult to find the moral courage to report the error. The fear of punitive measures, as well as the stigma related to their professional efficiency, may also account for the low frequency of error reporting.

Prevention

“Do no harm” – Hippocrates

Meticulous evaluation and management of the patient will result in less error. During each step of patient diagnosis and management, the patient should be the center of focus for the physician. When a physician is with a patient they are obligated to provide the patient with their full attention and avoid distractions and interruptions (for example pagers, mobile phones, etc.) that may lead to medical error. Careful recording of medical history and physical examination is needed in order to determine the appropriate laboratory tests and to make the correct diagnosis. Medical literature summarizes the diagnosis, clinical manifestations and prognosis of one particular disease; however, patients may not fit the “textbook” definition, or may have concomitant diseases that make patient care more complicated. One of the clinician’s central tasks is to identify and analyze the experience and knowledge reported in the literature, and apply what may be relevant to the individual patient. In biology heterogeneity is the rule and not the exception. In addition, placing the focus on the patient will help place test results into a clinical context, avoiding inappropriate patient care or medical error due to an erroneous or clinically insignificant test result. It should be kept in mind that there is not always an ideal test that will give all the answers. In addition, making the effort to collect data from previous hospitalizations is of paramount significance and can minimize medical error. It should be emphasized that both medical science and disease are evolving. Thus, in cases of uncertainty, reevaluation of the patient may provide more information related to diagnosis. During the diagnostic process the accuracy of the initial diagnosis should be tested at each step for confirmation or reconsideration. In heritable diseases, evaluation of family members may be necessary.

Technology is essential for contemporary practice in medicine. Technical proficiency is extraordinarily important in patient care and is becoming more so every day. Clinicians cannot be experts in all available techniques; thus they are unable to be highly proficient in all procedures related to patient care. Clinicians, however, should understand the usefulness and limitations of the techniques they use, and when and how to apply these techniques to their patients.

Pharmacologic agents have side effects and may have different effects on different patients. Often there are drug–drug interactions, especially in patients who are treated concomitantly with four or more medications. Studies have shown that adverse drug events from commonly used medications are important preventable causes of hospitalizations, especially in elderly patients. The physician should know the basic pharmacokinetics and pharmacodynamics of the drugs they use and should be aware of potential drug–drug interactions. The physician should also review all the medications that the patient receives to be certain that symptoms are not related to medical therapy.
Communication among health-care personnel is critically important. Any referral of patient to another physician or hospital should be accompanied by a brief report including the patient's medical problem, pertinent laboratory findings, and specific questions. Likewise, after the patient is discharged from the hospital, a brief summary should be sent to the patient's physician, including the diagnosis and major findings, therapy, and recommended follow-up. 1,12-14

Finally, physicians should not deviate from their practice and should resist outside pressures when taking care of high-profile patients. A “very important person” should receive the standard of care. Biology does not differ among different people because of their stature in society. 1

Despite the above-mentioned methods to minimize medical error, errors still may occur. The prevention of medical error requires critical investigation by the physician for the potential cause of the error. Following that, the physician must learn from the error in order to prevent a similar error in the future. 1,12,13

There are several procedures and/or protocols that have been put in place by medical institutions to prevent or reduce the incidence of medical error. 19-32 In addition, systems have been set up for reviewing medical errors in order to determine what can be done to prevent future reoccurrences. An example of a systematic approach to prevent medical error can be seen in the catheterization laboratory at The Ohio State University Medical Center, Division of Cardiovascular Medicine, and is briefly described below. In general patients are approached in a standardized fashion in order to decrease variability, with the goal of decreasing medical error; this allows for consistency, and for the ability to review past data when an error occurs and recognize where the problem may exist.

The first step begins even prior to the patient entering the catheterization laboratory. Specialized nurses review all cases prior to patients undergoing their procedure. If an issue for concern is identified, this is immediately brought to the interventional cardiologist who will be performing the procedure. For example, a patient who is not a candidate for long-term dual antiplatelet therapy will be identified and will not receive a drug-eluting coronary artery stent; this information will be relayed to the interventional cardiologist, who in turn is responsible for the final review prior to the patient undergoing the procedure. This is the first step in avoiding a medical error.

When the patient has been cleared for the procedure and enters the catheterization laboratory a “timeout” is performed prior to the start, which involves the entire team that will be involved in the procedure and includes confirming the patient’s identification (name, date of birth, medical record number), procedure to be completed and why, and if there are any issues that the team must be aware of in order to avoid a medical error (i.e. renal dysfunction, contrast-dye allergy, contraindication for dual antiplatelet therapy, bleeding risk, thrombocytopenia, noncompliance, etc.). Every member of the team has an opportunity to speak if they determine there is a safety issue. In addition, during the procedure there are other “timeouts” built in to avoid medical errors, including notification to the entire team every time 100 cc of contrast dye is used, as an effort to minimize the use of nephrotoxic contrast dye. These “timeouts” are additional measures taken to assist in avoiding medical error.

Every complication related to the procedure is reviewed by a committee made up of specialized nurses and interventional cardiologists. Every week there is an interventional cardiology conference that reviews selected complications in order to teach the faculty and fellows in training. In addition, every three months each interventional cardiologist obtains a complete list of their own procedural complications to review in detail in order to determine what happened and how this error can be avoided if possible in the future. In addition, every three months a morbidity and mortality conference is held that is open to the entire Division of Cardiovascular Medicine to review and for their input.

When a problem is detected, then a committee is formed to address the issue. For instance, to reduce bleeding complications a committee was formed, consisting of nurses, pharmacist, compliance officers and interventional cardiologists, to develop protocols to decrease bleeding risks associated with percutaneous coronary interventions (PCI). The committee addressed issues from appropriate dosing of anticoagulation to developing protocols for when vascular sheaths should be removed and when patients should ambulate following sheath removal. In addition, there was a substantial shift in practice among the entire group of interventional cardiologists from femoral to radial artery access in an attempt to decrease bleeding related to the access site.
The goal of the committee, as for all committees, was to determine the problem and develop a standard approach that could be applied to all patients to avoid the reoccurrence of PCI-related bleeding. In these efforts, the hope was to decrease medical error, as was evident by a decrease in PCI-related bleeding after the formation of this task force and the subsequently implemented protocols. A similar approach can be applied to any diagnostic or therapeutic procedure, such as electrophysiological studies, colonoscopy or surgery under local or general anesthesia, to mention but a few.

Each hospital and/or practice group should have certain procedures in place to monitor adverse outcomes or complications, as mentioned above. Weekly or monthly morbidity and mortality conferences with constructive discussion may be useful. Physicians who are practicing in a small group, or have a solo practice, should discuss adverse outcomes that may have been preventable with a trusted physician to assist in defining possible reasons for this outcome.1,12-14,32 Research is currently also focusing on hospital design, since suboptimal air, lighting, noise, and other factors may also be linked to patient safety, and in some circumstances, may predispose to errors.24

Physicians struggle to achieve perfection, often not without great anxiety, thus may agonize when faced with an extremely high-risk patient who requires a very high-risk procedure. In certain instances, the only chance for recovery in such a patient may require performing the procedure. A poor outcome that results from withholding a procedure and/or performing a potentially unnecessary procedure may be considered a medical error. In this situation, a standard approach should be in place that may improve the care of the patient. A small committee of experts must be involved to determine whether the procedure should or should not be performed, transferring the sole responsibility for the decision from one individual to a team of experts. When doing what is best for the patient in this way, the outcome, good or bad, should not be included in the statistics of the physician who performed the procedure. Physicians should be concerned mostly for patient safety and less for their statistics. Public display of the physician’s performance, however, is becoming a common practice in medicine today and this may have significant implications for the physicians’ careers; it may affect their reputation, new appointment, reappointment, or promotion, just to mention a few.

Concluding remarks

Medical error has been known since antiquity. Hippocrates stated that we should honor the physician who makes fewest mistakes. Medical error is not uncommon in current medical practice and physicians must endorse preventive measures to avoid it. There are several steps that can be followed to avoid medical error. If an error occurs, physicians should be encouraged to discuss the error in order to avoid a repetition of the same mistake. Weekly conferences, including a morbidity and mortality conference to discuss adverse events, are important steps in order to learn and prevent similar events in the future. Physicians in training need to be taught the appropriate method for disclosing a medical error when it occurs, as part of their medical education. Importantly, the Teacher of Medicine should be a role model for Students of Medicine and teach them by example how to prevent and deal with medical error.1,14,32,33 The most important step, however, is to develop “good” and caring physicians with high ethical standards who understand the complexity of clinical practice in the era of current technology; there is no substitute for this.1,14

References

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