Health Management and Policy Section

Tragedy of Errors- An Analysis of Human Factor in Medical Errors

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ABSTRACT

William Shakespeare wrote a play "Comedy of error", but this is about medical error which may often result in tragic outcome. We often read about medical errors and sometimes realise in our clinical practice that an error has been committed by us or our team leading to an adverse event. Sometimes, these errors are due to lack of knowledge and sometimes due to improper communication and misinterpretations. The aim of this manuscript is to analyse the causes of medical errors, which may vary from irrational prescription, attitudes of arrogance in seniors and juniors leading to communication gaps, bad hand writings or wrong patient selection for surgical intervention for economic benefits. Use of Artificial intelligence, Data mining and Medical informatics can rectify errors of improper assessment and irrational prescription. Self-introspection and spirituality can prevent errors arising from attitudes of arrogance, fear, greed and pride in medical professional.

Keywords: Artificial intelligence, Data mining, Information technology, Miscommunication, Misinterpretation

INTRODUCTION

Authors are of the opinion that all medical professionals would agree that in our routine clinical practice, all clinicians at times come across complications or adverse outcome in their patients. Most of the time, such cases are due to the underlying disease, which fails to respond to the best of the treatment. However, in few cases, after evaluation of case sheets, discussion and reflection, the clinician realises that an error has been committed by them or their resident doctors. Linnaeus collaboration has defined medical error as "errors are events in your practice that made you conclude-that was a threat to patients wellbeing and should not have happened, I don't want it to happen again" [1]. Medical error can be in diagnosis due to inadequate history taking, improper clinical examination, incomplete investigations or wrong reports. It may be due to wrong treatment planning or even if diagnosis and treatment is correctly planned, errors in prescription and administration of right drugs may occur. Any of the above errors can affect patient's health adversely. Sometimes doctors do not realise what caused the error. This article is written to make clinician realise subtle causes of errors as miscommunication, attitude problem or gross issues as wrong reports, improper patient selection for surgery. The aim of the article is to make clinician reflect on the causes of errors in their own workplace and to bring about changes, in themselves and people around them in an effort to reduce morbidity and mortality in patients caused due to human factor in medical errors.

Causes of Medical Errors

This is an observational analysis of causes of errors in diagnosis, prescription of medication and surgical intervention. A structured study in this subject may be difficult as medical professionals would not like to participate in a study where they have to admit any inadvertent mistake made in their clinical practice or may not provide authentic data in this regard.

The authors classify the following reasons for medical errors:

1. Error in communication (written or verbal)
2. Error in attitude- fear, arrogance and casualness
3. Error in reporting of laboratory investigations and misinterpretation of images
4. Error due to multiple guidelines
5. Error in patient selection for surgical intervention
6. Errors which are unexplained

1. **Errors in Communication**

    a. **Written-** Errors in documentation can lead to wrong prescription or administration of a drug due to improper and incomplete information being documented e.g., whether to give intravenous or intramuscular form of parenteral drug administration is not clearly written. Bad handwriting can lead to error in understanding medicines brand name. Similar sounding or spelling of two different medicines of entirely different composition and indications can lead to wrong administration of medicine.

    b. **Verbal-** Verbal communication to resident doctors or nursing staff may lead to prescription errors due to vague, ambiguous incomplete instruction by seniors in authority e.g., Alteration in dosages of insulin with regard to blood sugar levels, assuming that the junior medical staff knows what changes to make, without assessing their knowledge. At times, junior medical staff do not hear properly or interpret and do not ask to clarify the instruction given.

    Many studies have shown different rates of medication error. Kuo GM et al., found 70% of medication errors were the prescription error, 10% were administration error, 10% documentation errors, 7% dispensing errors and 3% were monitoring errors [2]. They also mentioned that 16% of adverse events were from medication errors. Handler SM et al., found on MEDLINE search an incidence rate of medication related adverse events ranging from 1.19 to 7.26 per 100 residents in nursing home settings [3]. A prospective observational study on medication errors found that the drug related medication errors was 26.8% in case of microbials, 20.8% in cardiovascular agents and 11.9% in case of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) [4]. In a study by Patel N et al., medication errors were 36%. The most common error was prescription error of 65%, out of which 53% prescriptions were semi rational and 30% were irrational [5]. In the USA, medication errors are estimated to harm at least 1.5 million patients per year with about 4 lakhs preventable adverse events [6].

Computerised Physician Order Entry (CPOE) possibly will lessen prescription error by: i) ensuring that sequence is legible and complete and it includes all necessary information, such as dose, route and dosage form; ii) examination for problems such as drug allergies and drug-drug interaction; iii) providing dosage adjustment calculation based on clinical features such as weight or renal function; iv) To check for suitable baseline laboratory results such as platelet count and INR for patients getting anticoagulants etc., [7].

Rational prescription decisions can be taken by use of Data mining. In a study, specific data mining model (decision tree) was developed to predict errors of omission which occurred due to different treatment regimens and analysis of prediction results and specific branch path used by decision tree indicated what pattern of decision making by the physician led to errors [8].

2. **Errors of Attitude**

a. Arrogance of seniors leads to errors as it creates fear in junior staff and they cannot clear their dilemma and doubts. "I am always right" attitude prevents senior doctors from updating their knowledge, which may result in incorrect decision making.

b. Arrogance of juniors may lead to errors as they feel, they know everything and hence do not bother to share information or ask for opinion which leads to irrational and wrong prescription e.g., Higher dosage of an antihypertensive drug, if prescribed irrationally may lead to sudden hypotension. The junior medical staff believes that everything is given in book; hence do not feel the need to discuss with seniors which inhibits critical thinking, analysis and proper decision making.

c. Attitude of fear may lead to errors in right management, especially if surgical management is required in a high risk moribund patient due to fear of mortality. Some clinicians fear they will be considered inferior, if they discuss treatment options with their colleagues, thus depriving themselves from opportunity of better analysis and decision making.

d. Attitude of casualness in history taking, examination and scrutiny of reports may result in vital points being missed leading to misdiagnosis. A meticulous focused doctor can have great impact in reducing errors and carrying out right treatment. Authors have observed that a system of check list can reduce some error, but a casual doctor, can make mistake even in filling the check list eg. Improper history and clinical examination can lead to wrong facts being put down in the check list.

3. **Errors in Reporting of Laboratory Investigations, Misinterpretation of Images**

This may occur due to wrong reporting, interpretation of ultrasonographic (USG) images etc., e.g., Wrong interpretation of placenta accrete, or mono chorionic mono amniotic twins in pregnancy may cause clinicians to decide on doing preterm Low Segment Cesarean Section (LSCS) at 34-36 weeks and they may than find peroperatively that USG findings were erroneous and LSCS could have been deferred to 38-39 weeks. If clinical examinations are not done properly or USG/CT (computerised tomograms) scan findings are not clinically correlated, there may be lot of errors, e.g., in diagnosis of a mass on imaging whether it is benign or malignant, and wrong reporting of blood investigations like routine haemoglobin and blood sugar can lead to errors in treatment. Sometimes errors are only discovered when patient has died, and and an autopsy is carried out. Autopsy studies showed that missed diagnosis was found in >30% of deceased patient and if it could have been detected earlier would have changed the therapy and improved the outcome [9,10]. Sometimes ultrasound may miss perforation of viscus in a trauma patient, who may gradually bleed profusely and lead to adverse outcome in that patient. A study by Brroks A et al., has shown that up to 22% of trauma patients have injuries that are missed at the time of initial evaluation [11]. The errors due to misinterpretation of images in radiology can be reduced by use of artificial intelligence, as shown in a study by not only labeling abnormal examination but also by identifying quick negative exams in CT, X-rays and MRI, especially in high volume settings and in hospitals with less available human resources [12].

4. **Errors due to Multiple Guidelines**

Different academic bodies give different guidelines, leading to confusion sometimes e.g., As per Royal college of Obstetricians and Gynaecologists (RCOG) Green top guidelines No. 7 in regard to who should receive antenatal corticosteroids? It is recommended that antenatal corticosteroid administration to all mothers at risk of iatrogenic or spontaneous preterm birth upto 34th week of gestation and antenatal corticosteroids should be given to all women for whom an elective caesarean section is planned prior to 38th week of gestation [13]. However, this indication for antenatal steroids is not recommended by American College of Obstetricians and Gynaecologists (ACOG) committee on antenatal corticosteroids therapy for fetal maturation to prevent respiratory distress syndrome [14].

5. **Errors in patient selection for surgical intervention may be due** to desire to acquire surgical skills fast, e.g., some patients of nonprogress of labour can be taken up early for LSCS by resident doctors in teaching institution, some of which could have delivered vaginally by augmenting labour with oxytocic drugs along with meticulous monitoring for fetal distress. Sometimes commercial or monetary benefits may lead to more patients being taken up for surgical intervention e.g., A very high risk patient suffering from co morbidities may be selected for surgery in contrast to a safer conservative management which could also have been a rational treatment option.

6. **Errors which are unexplained** reasons in view of the fact that every adverse event or complication is not due to error and every error does not lead to adverse event. However, in case of sudden unexpected outcome in a patient one should try to scrutinise every factor to rule out any error, e.g., Unexpected renal shutdown after a diclofenac injection may be an error, if given in a patient with history of renal dysfunction or may be an idiosyncratic reaction in absence of any evidence of renal dysfunction.

CONCLUSION(S)

Errors occur in all fields of life and the solution to prevent an error is to be aware of the error which has occurred and to learn from it to prevent future errors. Use of Artificial intelligence in interpreting images in radiology, Information technology (CPOE) in prescription writing may help to reduce errors of assessment and prescription. Errors arising due to attitudinal problems as arrogance and casualness can be overcome by self-introspection. Continuous improvement of communication, diagnostic, medical and surgical knowledge and skills should be the aim of every medical and paramedical staff to create a healthy world and to specially minimise errors.

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