Identifying Factors Associated with Medical Errors in the 20th Century

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Abstract. It is inevitable that clinical errors will occur, and these errors can have disastrous effects on the patient, the clinicians, the nurses, and the institution. Care protocols that shield patients from preventable damage must be developed to create a secure healthcare system. Consequently, this article is intended to identify the contributing factors leading to medical malpractice, laying a solid foundation for medical practitioners and related administrators to make appropriate adjustments to the current medical system. Moreover, even though more people have come to be well aware of the seriousness of medical errors, correlative articles dissecting the occurrence of them remain to be published, this paper can thus bridge the gap. To collect more reliable data and up-to-date information, a quantity of the latest English and Chinese papers, publications, and journals published between 2000 and 2023 on patient safety have been collected and then reviewed by searching both medical subject titles like 'medical malpractice' and 'safety management, and keywords found in abstracts or headings like 'safety', 'mistakes', and 'medical'.

Keywords: Medical Errors, Medical Mistakes, Medical Safety.

1   Introduction

'To err is human' [1]. A medical error is defined by IOM as failure to carry out a planned action as anticipated or using the wrong approach to accomplish a purpose [2]. To avoid unnecessary mistakes，the "First, do no harm" principle is the solid foundation of the science of medicine [3]. Over the past ten years, the quality of healthcare services and patient safety have become key areas for development worldwide. The reduction of medical errors is known to be one of the most primary determinants of care quality offered by healthcare organizations. According to widely publicized reports from the United States, medical errors were common and adversely impacted medical outcomes [4-5]. The general population became acutely aware of these inadequacies in the healthcare they might get. Despite greater focus on patient security and the quality of healthcare, mistakes and unfavorable results are nevertheless common in clinical practice, endangering the safety of patients.

Both in diagnostic care and medical treatment have patients perceived mistakes and harm. A cross-sectional survey was conducted in North Carolina. Amidst 1697 par-

ticipants, 265 (15.6%) reported that mistakes have been made by a doctor, 227 (13.4%) said a diagnosis had been chosen incorrectly, 212 (12.5%) said the same about their treatment, and 239 (14.1%) said they had switched doctors as a result [6]. Even though it is challenging to establish totally accurate estimates of errors, broad consensus has been reached currently in the United States that 210,000 to 440,000 deaths occur annually due to avoidable adverse events [7]. In a poll conducted by the European Commission, 78% of individuals identified medical errors as a significant issue, and 23% of Europeans stated that they had experienced firsthand the effects of medical errors [8]. Medical negligence may also pose an unwelcome emotional and financial burden. Notwithstanding the impossibility of obtaining specific data in China, it was projected that at least 420,000 patients could pass away annually owing to preventable medical malpractice, or almost 1150 patients each day [9]. In their argument, Zineldin et al. claim that medical mistakes cause more deaths or injuries than illnesses (e.g., AIDS, cancers, etc.). To make it worse, people don't come to realize some of the tragedies are attributed to medical malpractice which are avoidable until further investigation. For instance, between 8.0 and 22.8% of severe diagnostic mistakes are found during autopsies [10].

Although bereaved families do experience grief when a loved one passes away due to a medical error, some of these errors are unavoidable because of the complicated healthcare systems. Yet, most of them are preventable and occur as a result of healthcare professionals' incompetence. Errors can be attributed to variety of factors, including inadequate knowledge, carelessness, and inattention. Diagnostic errors, therapeutic errors, medication errors, and other errors can all be categorized as contributing factors to medical errors. Adverse occurrences are accidents that happen owing to medical treatment and bring about damage to patients, such as death, complications after the surgery, life-threatening sickness, impairment at discharge, an extended hospital stay, etc. [11]. Mistakes can occur purposefully or unintentionally [12].

Aside from the effects on patients, studies show that mistakes can have a profound emotional impact lasting for decades on doctors after the mistake was made [13–14]. The second victim of medical blunders is sometimes referred to as the doctor [15]. When mistakes do happen, doctors frequently go through a great deal of distress and at the meantime feel abandoned by their healthcare communities and administration as they attempt to deal with their blunders [14]. Clinicians living under guilt and distress are hard to practice medicine as exquisite as they could have been, thus leading to further unnecessary medical malpractice.

Consequently, prompted by these facts, the medical industry has been striving to improve healthcare quality and eliminate as many medical errors as possible. To preclude these tragedies from happening, it is crucial to comprehend the primary causes of medical errors and to pinpoint efficient measures to lessen them. Currently, medical malpractice remains unabated. Studies from the past have demonstrated how treatment discrepancy changes over time, but the precise causes of this situation remain unknown. The goal of this paragraph is to study as many fatal medical disagreement situations in the past as possible to pinpoint contributing reasons for the various types of medical misconduct. This study is the first to offer comprehensive insight into medical conflicts and to foresee probable catastrophes by offering potential indicators. The study's findings made clear some practical applications for hospital administrators.

2   Influential Factors of Medical Errors

Medical errors are unplanned and unintended occurrences that interfere with the behavioral expectations or medical professionals' engagements or devices because the health care system is a complicated network. To minimize clinical malpractice and raise the standard of the treatment procedure, this article will dissect the contributing factors of medical malpractice from multiple perspectives at all stages of the whole treating process.

2.1   Errors in Laboratories

The risks involved in medicine profession can also pose severe consequences to laboratory staff and patients. Many kinds of mechanical, biological, and environmental hazards during when operating the laboratory can generate irreversible damage. Errors are categorized by Karkalousos and Evangeloupos based on the testing stage at which they occur. In other words, mistakes may occur at any point during the analysis procedure, including pre-, during-, and post-analysis. Pre-analytical problems include the wrong anticoagulant, specimen, conservation technique, the inappropriate patient identification and preparation. Expired chemicals, faulty sampling and analysis equipment, malfunctioning analyzers, and timed-out calibration systems are a few examples of analytical errors. Wrong matching, results loss, and incorrect copies of the results are examples of post-analytical errors [16]. Despite the universal or national restrictions that regulate the qualifications for access to the lab, accidents emanating from maloperation and scanty stores of knowledge among the lab personnel are prevalent. Although some hospitals begin to adopt high-tech equipment to reduce errors caused by manual work and to generate credible experiment results, hospitals located in rural area or undeveloped countries are not able to raise enough fund to implement them, which has immensely contributed to the increasing number of clinical accidents in laboratories.

2.2   Excessive Workloads

Medical workers tend to overestimate their capability of coping with long-term pressure, fatigue, and anxiety. Even if these health care providers are professionals who have been trained for years, they are still human beings who are susceptible to errors. According to recent research, action that is well-rehearsed can still be poorly performed if its practi-tioner is stressed out. As a matter of fact, sleep deprivation and high- intensity work is incompatible with flawless, high-quality health care service. Errors are more likely to occur when doctors are working in an extremely busy setting. Figure 1 shows the distribution of mistakes over the hours of the day. There were, on average, more mistakes made per hour during the day than at night. Only 21.3% of the errors made by doctors overall occurred at night, whereas 72.7% happened during the day. 68% of the errors made by nurses overall happened during the day, while 32% happened at night. Mistakes that were attributed to doctors typically had a single peak that fell between 10 and 12 hours after their peak activity (see Figure 1) [17].
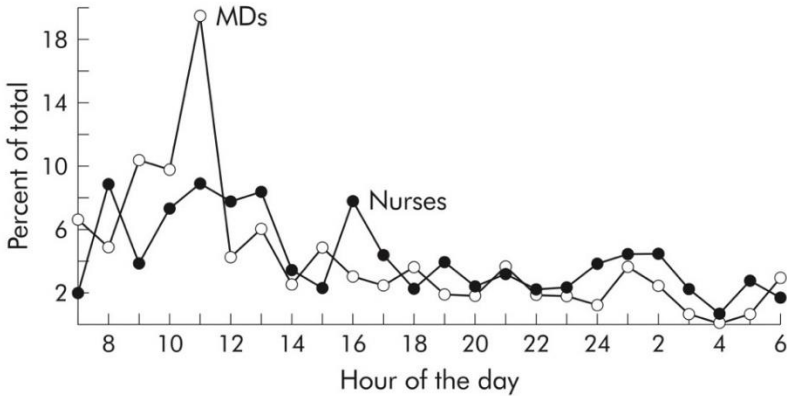
Fig. 1. Distribution of commitment of errors [17]

Medical personnel are known to have abundant workloads. Their schedules are often fully arranged from the beginning to the end of the day. Consequently, they have no alternative but to rush from one site to another in such a short time, contributing to careless medical care. Nevertheless, most medical staff are reluctant to admit the influence of fatigue and stress on their performance, thus increasing the odds of mistreatment and medical accidents. Moreover, since fatigue is more of a subject feeling, it is hard to access whether one is so languorous that he or she should be deprived of the right to practice medicine by compulsory measures. Health care, though a high-risk setting, overlooks the fatigue factor more often than people think, thus holding back the implementing of regulations limiting the working hours of medical staff. With the persisting of negligence, complications such as mortality, infections and various types of disabilities will continue to arise and will impose heavy economic burden on the medical system to compensate for these errors. What's more, if medical practitioners don't come to realize the errors they committed and take enough training, it will result in a vicious loop of the incorrect work method., thus wasting the investment of manpower, money, and efforts.

2.3   Cognitive and Contextual Errors

Preventable adverse events may derive from technical and non-technical factors associated with decision-making. Good outcomes can't live without exquisite technical skills. Non-technical skills, however, also outstandingly influence individuals' per-formance, therefore impacting the outcomes of treatment. Medical personnel including physicians, nurses and administrators belonging to diverse environments and backgrounds receive multiform training. Therefore, it's not likely for them to be educated with formal instruction in perception and mitigation of errors. Their cognition and detection of errors in the context of medical care thus differ as well, creating the risk of late treatment in acute and life-threatening situations.

When doctors fail to consider the patient's context, which is crucial for formulating effective care plans, contextual errors arise. We define patient context as anything that is expressed outside of a patient's skin and is important to care planning. At least ten major categories, such as competing obligations, social support, access to care, financial status, and skills and talents, can be used to arrange the patient context. It should be noted that this includes spiritual ideas and emotional states that, despite having their origins in the brain, materialize as behaviors and acts expressed "outside the skin" and are, therefore, a part of the context of a patient's treatment.

Yet, in contrast to other types of medical errors, it would not have been feasible to identify from a review of the medical record since the details necessary to determine that the care plan was incorrect—information about the patient's context—would not have been recorded if they had been missed. When a clinician treats the disease rather than the patient who has it, a contextual error occurs. Medical services may be abused and overused if context is not considered. For instance, a USP once presented as an old guy who was malnourished and had inexplicable weight loss to several different specialists. Four contextual issues suggested that his ailment had a social root. Social services were recommended to the patient by medical professionals who discovered the underlying issue. Those who failed to notice the signs requested a comprehensive battery of tests to check for malignancy. It is hoped that a growing number of medical educators and researchers will collaborate on projects to characterize and quantify contextual error, develop realistic methods to monitor clinician performance in contextualizing care, and evaluate methods to develop the knowledge and cognitive habits necessary to consistently deliver patient-centered care. It is worth the effort and is achievable, according to a growing body of research.

2.4   Misdiagnosis

In hospital practice, a sizable number of adverse outcomes are caused by diagnostic mistakes. Misdiagnoses (26%)，the primary cause of medicolegal claims in America at present, rival surgical accidents (25%) [18]. Diagnostic errors, which are the most common non-operative events, are more likely to cause irreversible disabilities. There are many factors leading to misdiagnosis. Over-reliance on a straightforward perceptual approach to diagnosis may impinge judgement. When medical equipment or systems are operated by medical practitioners, diagnostic errors may also take place. By ranking clinical issues according to perceived priority and outlining the necessary steps, it is argued that the issue could be handled by encouraging doctors to shift from intuitive to analytical thinking by ranking clinical issues according to perceived priority and outlining the necessary steps.

Presented in Table 1 is a possible model of analysis and action plans which has shown to have reference value in a recent Netherlands study.

Table 1. Analytical process recommended to be applied at the termination of a clinical trial [19]

Clinical problem	Priority	Plan
Sepsis	Urgent	Hunt-clinical exams; scanning; blood cultures

Renal failure	Urgent	Hydrate and follow pro-gress
Digoxin	Urgent	Stop treatment and check level
UTI=Urinary tract infection	24 hours	Check mid-stream specimen of urine past and present
Medications	24 hours	Check appropriateness and rewrite
Cardiac condition	ASAP	Electrocardiogram and cardiac assessment
Date and time:	Signature:	

2.5   Medication Errors

One of the most frequent medical mistakes is medication error, which are underreported worldwide, but especially in developing nations [20-22]. Under-reporting usually take place during most medication stages including prescribing, dispensing, and administration [23]. According to Alsulami et al., in some nations, both doctors and nurses who prescribe and administer medications suffer from a lack of knowledge about medications [24]. He suggested that to prevent medication errors and enhance patient safety, educational programs for prescribers and nurses are required. When choosing a medicine, clinicians may prescribe the inappropriate kind of medicine due to lack of knowledge or poor communication with patients. For instance, he or she gives out penicillin without establishing whether the patient is allergic. These types of errors could have been averted by being aware of the drug being prescribed and the medical history of the patients whom it is being given. Modernized medication prescribing system based on computer programs and bar-coded medication systems can restrain these errors and benefit the current situation. Misapplying rules is another common cause of medication errors. Diclofenac, for example, won't take effect if injected into the lateral thigh rather than the buttock. Last but no least, some mistakes are made for technical errors. Illegible handwriting and confusing brand names are accounted for mistaken prescription of medication. People often neglect the fact that modified release of medication shall be prescribed by brand names as bioavailability varies from brand to brand. When resident doctors first arrive in hospital, there's a particular risk of making mistakes as being deficient of knowledge and experience, and presumably also because their unfamiliarity with local prescription systems. Prescribers should stay abreast of the most recent research to choose the most appropriate drug therapy. This can be done by reading scholarly articles, communicating with pharmacists and other healthcare professionals, attending courses, and so on. When prescribing for ailments that are uncommon in the prescriber's field of practice, it is extremely important to seek out information.

2.6   Complications Due to Misuse of the Devices Required for the Procedure

Neurosurgery, for example, is one of the most high-tech surgical fields, however, it's not reliable enough to be protected against avoidable surgical errors. Neurosurgical operations require devices like operating microscopes, ultrasounds, and C-arms for its

completion. Under the circumstance of malfunction of such devices, the medical procedures are less likely to be carried out as planned.

2.7   Inappropriate Management of Previous Adverse Events

Medical errors are an unfortunate, but unavoidable reality of the healthcare system worldwide, and medical practitioners are almost certain to encounter such incidents during their careers. In the past few decades, hospitals and healthcare professionals have come to realize the seriousness of medical blunders and the damage they may do. A consensus has been reached in healthcare institutions that disclosing medical accidents help to improve current medical service quality and patient's well-being. Consequently, incident investigation is now a standard component of the coping mechanism of the hospital when an adverse event happens. Research and systematic improvement efforts armed with the outcomes of these investigation are supposed to promote physicians' learning from errors and to curb the increase of adverse events. Nevertheless, due to the stigma of errors, many medical institutions lack this process, thus precluding crucial information from being transparent. Physicians, therefore, would miss the wonderful opportunities of learning from their mistakes and then compensating for them in their future practice. Healthcare institutions, similarly, won't be able to improve the system and thus avoid analogous occurrences in the future. What's more, more empirical evidence is available at present to support the conclusion that disclosing errors and opening communication with patients leads to a significant reduction in claims, lawsuits, dispute duration, and costs. Physicians, in this case, can better focus on their work from now on. In fact, psychological pain, fear, diminished confidence, culpability, frustration, exhaustion, and despair are common in medical staff who experience emotional distress on account of unexpected adverse events, medical mistakes, or patient-related injuries. These symptoms are seen as signs of post-traumatic stress disorder. If their experiences are not handled properly, it may be more likely that they may make other mistakes owing to exhaustion, sadness, or diminished empathy.

2.8   Solutions

Under these conditions, it has been demonstrated that a strategic compensation system has impressive impacts on employees' good actions regarding the prevention of medical errors. Since employee engagement is closely tied to the function of organizational culture, changes made to the hospital's regulations to prevent medical errors are crucial. Hence, not only can more accomplished and renowned physicians prevent medical errors, but a compensation incentive scheme can also be used in conjunction with revolutionary technology solutions.

3   Conclusion

Medical discrepancies can be caused by various kinds of things, including people, medical equipment, and administrative processes that take place within a healthcare system

when clinicians are giving diagnoses or treatment. Medical malpractice can also be broken down into the following categories: invalid disease diagnosis or treatment; medical personnel who lack experience; novel procedures or systems; intricate or urgent care scenarios; inadequate patient-care team communication; illegible or erroneous documentation; incorrect information and data; and the prescription or consumption of incorrect medications. Hence, system and process problems as well as human error can lead to medical errors.

Unquestionably, there is an issue with medical errors, and studies are required to identify their origins to improve educational initiatives and actions aimed at lowering medical errors. The goal of this study was to analyze the types of factors that contribute to medical errors. This article identified seven distinct categories of errors that describe the underlying reasons for medical errors. The amount of information about the reasoning process that was available in this study was likely more detailed than in others published before.

Evidently, the overall mechanism where a variety of factors of influence interact is intricate. Nevertheless, the extent to which each of these factors generates superimposed effects, according to the results of our study, remain to be researched into. A window of opportunity remains for health care practitioners to carry out further interventional research targeting how these factors corelate, laying a solid foundation for future improvement concerning healthcare.

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