



A first step toward understanding patient safety

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Patient safety has become an important policy agenda in healthcare systems since publication of the 1999 report entitled “To Err Is Human.” The paradigm has changed from blaming the individual for the error to identifying the weakness in the system that led to the adverse events. Anesthesia is one of the first healthcare specialties to adopt techniques and lessons from the aviation industry. The widespread use of simulation programs and the application of human factors engineering to clinical practice are the influences of the aviation industry. Despite holding relatively advanced medical technology and comparable safety records, the Korean health industry has little understanding of the systems approach to patient safety. Because implementation of the existing system and program requires time, dedication, and financial support, the Korean healthcare industry is in urgent need of developing patient safety policies and putting them into practice to improve patient safety before it is too late.

Key Words: Anesthesiology, Communication, Medical errors, Patient safety, System analysis.

Last year was a disgraceful period in Korean medical history because of the high number of public health disasters. The deadly outbreak of Middle East respiratory syndrome (MERS) was the largest epidemic outside of Saudi Arabia and has made some Koreans cynical enough to claim that MERS should be renamed Korean respiratory syndrome. Subsequently, a massive outbreak of pneumonia was reported at three laboratories in the College of Animal Bioscience and Technology building in Korea [1]. The Korea Centers for Disease Control and Prevention reported that the infected students had been exposed to a bacterium that caused hypersensitivity pneumonitis. Authorities reported that

the building’s ventilation system was not working properly and that the students failed to follow basic safety rules. In the middle of this crisis, the health authority confirmed 78 cases of hepatitis C virus infection caused by reuse of syringes at a local clinic [2]. The unprecedented scale of these incidents deepened public mistrust of the healthcare industry, and the government was criticized for mismanaging the crisis.

The Board of Audit and Inspection demanded that disciplinary action be taken against 16 government officials after investigating the poor preventive measures and response to the 2015 MERS outbreak [3]. Pinning the blame on the individuals involved is the easiest way to calm the public and the victims when an accident occurs. Although we should not place responsibility for a fire on the firefighters who battle it, this deplorable culture of fault-finding and blame has become widespread not only in Korea but in every society worldwide since human civilization began. This fault-finding tradition rarely becomes an effective countermeasure, but rather it likely thwarts development of a safer society. Fortunately, the aviation industry has recognized the reality of systems failure and revolutionized the way in which failure is handled [4]. Rather than criticizing and penalizing individuals for wrongdoing, the aviation industry put more effort into preventing recurrence of similar human errors.

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Human error is inevitable even in highly reliable industries, such as the aviation, nuclear, and health industries [5]. We need to focus on analyzing the various processes in the system that lead to errors rather than consuming valuable resources holding individuals responsible for their actions.

In this paper, two approaches will be introduced to deal with the problem of human error. The general concepts of patient safety in anesthesiology will then be discussed, followed by a discussion of the cultural influence on patient safety and ways to improve the patient safety culture in the Korean healthcare industry.

Human Error Management Model

In 1999, "To Err is Human" reported a high frequency of human errors and adverse events in healthcare institutions [6]. According to several retrospective studies, 1 in 10 hospital inpatients likely suffers the consequence of a human error during their hospital stay [7,8]. As a result, patient safety issues in healthcare have become of interest to researchers. Reason [5], the renowned human error expert who has studied human error for 25 years, presented a theory suggesting that the human error problem can be evaluated using a person approach and a systems approach.

Person approach

The person approach focuses on the errors of individuals. Individuals who commit an error should be held responsible for their delinquency, and the delinquency is normally addressed with disciplinary measures. This paradigm remains the mainstream belief in medicine and elsewhere [5]. However, the person approach has been challenged because people do not choose to make mistakes; bad things happen to good people [9]. People in the healthcare industry have lost jobs, suffered serious stress, or taken their own life after being blamed for errors [10,11]. Indeed, maintaining this tradition is likely to victimize hard-working innocent people and delay the development of a safer healthcare environment [5].

Systems approach

The systems model is based on the idea that humans are prone to err and that human errors are inevitable, even in well-organized institutions. Errors occur when a series of failures in the system occur, which is well illustrated by the Swiss cheese model [5]. This model likens human systems to multiple slices of Swiss cheese with holes, stacked side by side. Although highly technological systems have many defensive layers, such as guidelines and protocols, to prevent errors, each layer also has

its own deficiencies like the holes in Swiss cheese. The presence of holes in any one "slice" does not allow a risk to materialize, as another layer of defense is in place. However, when the holes in many layers momentarily line up, a mistake passes through the holes in all of the slices, resulting in an unwanted incident. The systems approach advocates that a medical error is the result of a system flaw, not a character flaw [5], which makes it easier for an individual to report an error promptly and honestly. This kind of robust reporting helps identify errors and strengthens problematic areas so that the same error does not occur again [9].

Change

The airline pilot Martin Bromiley lost his wife to an anesthesia incident and wanted to change the way in which medical errors were handled in the healthcare industry. After his wife's tragic death, he expected an investigation by an independent body. The Air Accidents Investigation Branch in the airline industry routinely investigates all accidents [12]. He was surprised when he was told that no such investigation would take place unless he sued or filed a formal complaint. An independent investigation was conducted, but Mr. Bromiley did not file charges against individuals and only hoped that some lesson might be taught to others as a result of a fair investigation. As he wished, all professionals involved in the case remained to serve and help the system to avoid similar errors. Implementing the systems approach is vital to improving patient safety because it enables medical professionals to learn lessons from their errors [8,9].

Patient Safety Error Reporting System

A main premise of the systems approach is that a completely error-free system is impossible and emphasizes learning from errors and preventing recurrence [8,9]. One way to learn from errors is to establish a reporting system. The purpose of a reporting system is to analyze the data and provide a remedy and information that leads to a change in the system that affects all healthcare organizations [13,14].

Several studies have reported that healthcare workers often do not report adverse events for fear of punitive action, prosecution, or being ostracized at the workplace [15,16]. Anonymity, confidentiality, or protection from punishment is essential for potential reporters to overcome the barrier of fear [17,18].

The aviation industry recognized the importance of data and introduced an internal confidential error reporting system in 1982 [19]. This confidential reporting system guarantees immunity from prosecution and encourages individuals to report errors without fear of punishment, enabling frank and accurate discussions about errors and system weaknesses. This benefit is equally applicable to the practice of clinical medicine and is

essential for patient safety [19]. Medical error cases are often so complex and debatable that honest and detailed reporting is key to identifying the reasons for the accident.

An error reporting system is currently being used in the USA, UK, Denmark, and several other countries. The Danish Parliament passed the Act on Patient Safety in 2003, following a study reporting that 9% of patients admitted to a Danish hospital were involved in an adverse event [20]. This is the first legislation in the world that has sought to improve patient safety by ensuring that all adverse events are reported and that the National Board of Health will disseminate the results nationally [21]. The US Senate passed the Patient Safety and Quality Improvement Act (PSQIA) in 2005 [22]. The PSQIA introduced a voluntary reporting system to facilitate assessment of data to improve patient safety and healthcare quality. The UK's National Patient Safety Agency created the National Reporting and Learning System in 2003, which is a nationwide voluntary event-reporting system for patient safety [23]. Japanese healthcare workers are also familiar with event-reporting systems because all Japanese hospitals established an in-house, legally bound event-reporting system in 2002 [24]. The Patient Safety Act, which includes a voluntary reporting system, will go into effect in July 2016 in Korea [25].

Patient Safety in Anesthesiology

Recent developments in practice and technology have made anesthesia much safer than before, and anesthesiology is the leading medical specialty addressing the patient safety issue [26]. Clinicians working in anesthesiology became interested in patient safety partly because administering anesthesia can cause adverse events but has no therapeutic benefit of its own. Several technological innovations have contributed substantially to patient safety [26]. One has been to introduce real-time patient monitoring systems, such as electrocardiography, pulse oximetry, and capnography. The laryngeal mask airway and video laryngoscope have had a huge effect on managing patients with a difficult airway. Another strategy adopted by anesthesiologists to improve patient safety has been the establishment of guidelines and standards to provide guidance in specific clinical situations [26]. In particular, guidelines for managing difficult intubation and for regional anesthesia in patients taking antithrombotic agents have important implications for patient safety.

The aviation industry first acknowledged that human factors dominate the risks in aviation safety and that errors are inevitable as a result of human physiological and cognitive limitations [4,19]. Consequently, the aviation industry introduced a team training model called Crew Resource Management (CRM) more than two decades ago to improve individual nontechnical skills [27]. CRM is a set of training procedures used in environments

where human errors can have devastating effects. CRM consists of four categories: teaching situational awareness, improved communication, appropriate task distribution, and optimal teamwork.

Anesthesia is one of the first healthcare specialties that have adopted techniques and lessons from the aviation industry. The widespread use of simulation programs and applying human factor engineering to clinical practice are influences of the aviation industry. The Anesthesia Crisis Resource Management training modules [28] and the Anesthetists' Non-Technical Skills System (ANTS) for assessing behavioral markers [29] were developed while adopting the human factors engineering model. The ANTS skills framework includes four skill categories of situational awareness, decision-making, task management, and team working, each with example behaviors. The ANTS system has satisfactory levels of validity, reliability, and usability, provided raters receive adequate training [30].

In addition to these academic successes, anesthesiology contributed to the institutionalization of patient safety as a subject of professional interest. The Anesthesia Patient Safety Foundation (APSF) is a pioneer organization dedicated to patient safety that was launched in late 1985 as an independent nonprofit organization with the vision that "no patient shall be harmed by anesthesia" [31]. The APSF publishes a quarterly newsletter on anesthesia and patient safety and has funded many important projects that would probably never have been financed by a "traditional" organization. The most outstanding achievement of the APSF program has been helping to create a cadre of experts who devote their careers to patient safety by financially supporting them [26]. The American Medical Association, influenced by the huge success of the APSF, created the National Patient Safety Foundation decades later [32].

Current Understanding of Patient Safety in Korea

Despite relatively advanced medical technology and comparable safety records, the Korean healthcare industry has little understanding of human factors engineering or the systems approach to patient safety, and anesthesia is not the exception. The quality of equipment, procedural techniques, and anesthetic medicine is quite standardized among developed countries, partly due to the tremendous marketing effort of multinational pharmaceutical and device companies. Technologic developments for patient safety can be adopted quickly because no time or sophisticated knowledge is required. Furthermore, outcomes are easily recognizable. However, creating the system and applying a training program, such as ANTS, are taxing and require time and commitment. Considerable interest in the use of ANTS has been generated worldwide, and ANTS is currently

used in anesthetic simulation training in many countries, such as Canada, Spain, Sweden, and the Netherlands [30]. Unfortunately, no attempt has been made by Korean anesthesia societies to introduce a CRM-style training course or establish a simulation center. In addition, no patient safety committee has been created by The Korean Society of Anesthesiologists.

Cultural Traditions and Patient Safety

Cultural traditions may be influencing patient safety in Korea. In a study investigating the characteristics of the patient safety culture in Japan, Taiwan, and the US, the authors emphasized the need for open communication in Taiwan [33]. A lack of open communication is not unique to Taiwan but is deeply seated in the Confucian culture, including Korea. Koreans are more reluctant to mention another individual's behavior for fear of offending them; if the individual is senior, such action is often regarded as challenging authority. Feedback and communication about errors are not prevalent in the Korean healthcare industry because people believe that this kind of discussion may humiliate coworkers, and they are more concerned with punitive measures [34,35].

This Confucian culture also plays an important role in communication among healthcare providers [36]. Even in Western culture, it is difficult for junior staff to question seniors about their actions. This is even more difficult in East Asian cultures, including Korea, where younger people are expected to show their respect to their elders and superiors due to the long influence of Confucianism. For example, Korean Air had more plane crashes than almost any other airline in the world by the end of the 1990s. Gladwell blamed those crashes on crew members whose cultural legacy made them too deferential to communicate clearly about a problem that could cause the plane to crash [37]. This hierarchical communication also exists in the Korean medical profession and is one of the main causes of adverse events. Because medical service is delivered by a team, communication with other team members is important during patient care. Strong verbal communication skills in the context of a complex medical system is at the core of patient safety and effective teamwork. Following is a typical case that shows how important communication is to patient safety.

A 4-year-old child (height, 106 cm and weight, 16.7 kg) was admitted to the hospital for excision of a preauricular cyst. A physician-in-training (resident) in the ear-nose-throat (ENT) department telephoned an anesthesia resident about a sedative dose of ketamine. The anesthesia resident said, "10 milli would be enough." The anesthesia resident interpreted the word "milli" as short for milligram. However, the ENT resident considered that "milli" was short for milliliter and wrote the order as follows: inject 500 mg/10 cc of ketamine over 1 min. This was 50

times the therapeutic dose. A nurse was concerned about the dose and asked the resident "Is this right?" to verify the order. The resident approved the medication by answering the nurse, "Yes, give it." The nurse executed the order. This accident was discovered when the parent reported that the child had not woken up from sedation for several hours after finishing the computed tomography scan. Fortunately, the child recovered fully without complications.

The quality improvement committee reviewed the case and a remedy was implemented. The computerized order system was supplemented with dose-adjustment calculations based on weight and prohibited anesthetic prescriptions to be written by a non-anesthesiologist so that such an error would never happen again. The committee also recommended that nurses should confer with the attending physician through a senior nurse if they have an issue with a resident regarding an inappropriate subscription order. The committee made an effort to improve the system, but it did not address the communication problem properly and failed to suggest a remedy.

Communication

The above-described tragedy began when two residents failed to communicate properly. The anesthesia resident assumed that the ENT resident understood that "milli" meant "milligram." This so-called "receiver-orientated" style is more prevalent in oriental culture, as the Korean saying goes, *gaetteoggat-i malhaedo chaltteoggat-i al-adeul-eola* (i.e., "You must get it down to perfection, even though I speak gibberish") [38]. This type of interaction reflects the typical authoritarian culture in Korea. Higher-ranking individuals generally speak and then expect subordinates, who are usually listeners, to understand. If they fail, then it is the listener's fault. In contrast, Western languages are typically "sender orientated," meaning it is the speaker who has the responsibility to communicate clearly and unambiguously [38]. This style emphasizes the speaker's role in transmitting the information correctly from the beginning, which is obviously more reasonable [36]. In this way, we can reduce the possibility of miscommunication.

There has been growing concern for improving verbal communication in clinical practice. Therefore, many practical strategies to enhance medical communication already exist. One suggested method, which may have been helpful in this case, is the repeat-back method [39]. This means repeating what was said back to the speaker to confirm mutual understanding (e.g., the listener repeats an order from a speaker: "...okay, so that is 10 milliliters of ketamine").

Communication failure can arise for a number of reasons, but above all, a dysfunctional hierarchical system exists in healthcare professions. Although authoritarian culture permeates all of

healthcare, physicians dominate the culture and influence others [40]. Nurses traditionally provide care within the ordering scope of physicians. This traditional role plus a sense of privilege and status has led some physicians to believe that they are superior to nurses. This dysfunctional culture has created a barrier to the open communication and feedback that are essential for patient care. Even an experienced nurse in the previous ENT case would not challenge the novice resident.

Teamwork is another casualty of authoritarian behavior [40]. Expecting deferential treatment from a subordinate or lacking respect for colleagues are detrimental to teamwork, which is the cornerstone of safe practice. As a team, physicians should treat other healthcare workers as their colleagues and not as subor-

dinates. Building healthy relationships with mutual respect is essential to the well-being of patients and healthcare workers.

Conclusion

Patient safety has become an important policy agenda in the healthcare industries of developed countries for the past decade, and numerous changes have been made to improve patient safety. However, the Korean healthcare industry is well behind in patient safety for many reasons, including culture and policy. The Korean healthcare industry and healthcare authorities should work together to develop and put policies into practice to improve patient safety.

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