ORIGINAL ARTICLE

Medical errors and patient safety in the operating room

Esra Ugur,[1] Sevim Kara,[2] Songul Yildirim,[3] Elif Akbal[4]

Abstract

Objective: To investigate medical errors in the operating room, attitudes of healthcare professionals in case of errors and educational needs of professionals.

Methods: The descriptive study was conducted at a university hospital in Turkey from January 25 to February 14, 2011, and comprised operating room staff, including physicians, nurses, anaesthesia technicians and perfusion technicians. Data was obtained using a questionnaire.

Results: Of the 69 respondents, 45(65.2%) had experienced medical errors and 29(42%) had verbally warned the person who caused the error. The main cause of the medical errors was a lack of healthcare professionals and their inadequate qualifications, 51(73.9%); and insufficient communication, 41(59.4%). Coping with stress and communication 45(65.2%) and radiation safety 28(40.6%) were the most common educational needs.

Conclusion: Patient safety applications in the operating room can be improved by offering educational programmes, designing an easy reporting system, encouraging reporting of medical errors and active participation of healthcare professionals in decisions that might affect patient safety.

Keywords: Medical error, Operating room, Patient safety. (JPMA 66: 593; 2016)

Introduction

The science of medicine is built on "First, do no harm" principle. However, despite technological developments in the health system, medical errors (MEs) still continue to threaten patient safety (PS) in healthcare practices.[1] In the United States, 210,000 to 440,000 deaths occur each year due to preventable MEs.[2] Errors may happen deliberately or as a result of negligence. Causes such as having insufficient information, not taking enough care and precautions, and inattention may lead to errors.[3] MEs can be analysed in four groups including diagnostic errors, treatment errors, preventive treatment errors and other errors.[1]

A health organisation is responsible for ensuring the safety of patients to whom treatment and care service is provided. Ensuring PS in an organisation depends on the composition of a PS culture, which is described by England Health and Safety Committee (HSE) as the product of values, attitudes, perceptions, competencies and patterns of behaviour which belongs to an individual or a group that defines the style and competence of an organisation's health and safety management and commitment in this area.[4] The first step in creating such a culture is to accept PS as a primary issue and common value of the organisation. Suggestions to create a PS culture include announcing that PS is an issue which needs commitment of all; providing and supporting open communication between leaders, employees and patients on the subject of PS; transferring responsibility to employees for identification and control of procedures that threaten PS; allocating resources to PS; and supporting all employees for continuous education on PS.[5]

Where advanced technology is used, there is a direct intervention in human life and in one of the areas with the greatest patient concentration. Operating rooms (ORs) are high-risk healthcare areas for MEs. Prevention of MEs such as wrong-site surgery, medication errors, and patient falls are important issues for PS practices in the OR. Determining the values, opinions and attitudes of staff on safety will be of benefit in reducing MEs. The current study was planned to investigate MEs in the OR, attitudes of the healthcare professionals in case of errors, and the educational needs they reported.

Subjects and Methods

The descriptive study was carried out between January 25 and February 14, 2011 at a university hospital in Turkey, and comprised OR staff, including physicians, nurses, anaesthesia technicians and perfusion technicians.

After approval from the institutional management, data-collection form was prepared by researchers, and

[1]Acibadem University School of Health Sciences, Istanbul, [2,3]Yeditepe University Hospital, Nursing Services Directorship, Istanbul, [4]Anadolu Medical Center Patient Care and Nursing Services Directorship, Kocaeli, Turkey.

Correspondence: Esra Ugur. Email: eugur1@gmail.com

it consisted of two parts. In the first part, 13 questions collected descriptive information about the OR employees. In the second part, five questions assessed approaches towards MEs, PS issues and educational needs about PS. Additionally, there were nine questions scored using a three-point Likert scale. In this section, the subjects were asked about the reasons for errors that occur most frequently and threaten PS in the OR. Mean, standard deviation (SD) as well as frequencies and percentages were calculated for data analysis.

Results

Of the 88 staff members approached, 69(78.4%) agreed to participate. Of them, 30(43.5%) were physicians, 17(24.6%) nurses, 10(14.5%) anaesthesia technicians and 12(17.4%) others. The overall mean age was 33.49±6.53 years with 10.86±6.46 years of professional experience. Of the participants, 31(44.9%) were postgraduates (Table-1).

Moreover, 49(71%) members had received training on PS in an in-service education programme. Despite the fact that 45(65.2%) participants had witnessed patient-threatening event, 67(97.1%) had not been in an activity related with PS before. Only 11(15.9%) subjects had participated in committee studies on PS, while 51(58%) took no responsibility in corrective and preventive actions in PS-threatening situations. Most errors, 26(37.7%), were related to communication and flow of information between staff. Besides, 29(42%) subjects said they verbally warned about the error, while 19(27.5%) suggested a resolution of the error without discussing it with patients and their families (Table-2).

While 10(14.5%) of the participants stated that they had no need for training on PS, coping with stress and communication, 45(65.9%) said the three subjects were the most commonly needed training topics (Table-3).

Table-1: Descriptive characteristics of operating room staff.

	N	%	M	SD	Min-Max
Age	-	-	33.49	6.53	19-50
Professional experience	-	-	10.86	6.46	1-30
Working time in the organization	-	-	4.03	1.64	1-7
Occupation					
Physician	30	43.5	-	-	-
Nurse	17	24.6	-	-	-
Anaesthesia technician	10	14.5	-	-	-
Other	12	17.4	-	-	-
Level of education					
High school	22	31.1	-	-	-
Associate degree	11	15.9	-	-	-
Undergraduate	5	7.2	-	-	-
Postgraduate	31	44.9	-	-	-

Table-2: Experiences of operating staff regarding patient safety practices and patient safety threatening medical error.

	N	%
Regarding Patient Safety Practices		
Condition of receiving patient safety related training	49	71.0
Condition of participating decisions related to patient safety		
I participate in committee studies	11	15.9
I take responsibility for corrective-preventive actions	29	42.0
I provide feedback about my field of expertise	30	43.5
Condition of reporting patient safety related incident within 1 year		
None	55	79.7
1-2 events	10	14.5
3-5 events	4	5.8
6-10 events	0	0
Regarding Patient Safety Threatening Medical Error		
Condition of witnessing a patient safety threatening event in the operating room throughout professional life	45	65.2
Type of witnessed medical error*		
Errors related to communication and flow of information	26	37.7
Errors related to sample collection and delivery	22	31.9
Errors related to staff qualification (training and experience)	20	29.0
Patient fall	18	26.1
Sterilization nonconformity	17	27.4
Errors related to equipment / supply safety	16	23.2
Wrong site surgery	12	17.4
Incorrect drug administration	12	17.4
Leaving supplies in the operation site	10	14.5
Errors related to patient identification	9	13.0
Errors related to safety of high risk medication	6	8.7
Blood and blood products' transfusion error	4	5.8
The action taken in case of error*		
I did not do anything	1	1.4
I notified patient's primary physician	14	20.3
I notified my supervisor	25	36.2
I filled out a sentinel event report form	13	18.8
I verbally warned people caused the error	29	42.0
I wrote / verbally warned the head of department that I thought on the cause of error	22	31.9
Opinions about the response to be given to error*		
Precautions should be taken after investigating the causes and results	58	84.1
Patients should be compensated after explanation	37	53.6
Problems should be solved without reflecting to patient and family	19	27.5
Should be apologized to the patient	14	20.3

* More than one choice is selected.

Table-3: Opinions of operating room staff related to frequency of reasons causing patient safety threatening conditions.

	None		Rarely		Frequently	
	N	%	N	%	N	%
Insufficient number and qualification of staff	0	0.0	18	26.1	51	73.9
Fatigue and stress due to long working hours	5	7.2	34	49.3	30	43.5
Communication disorder	1	1.4	27	39.1	41	59.4
Time constraint and fast pace of work	5	7.2	32	46.4	32	46.4
Lack of supply and improper use	18	26.1	41	59.4	10	14.5
Shortcomings in teamwork	10	14.5	43	62.5	16	23.2
Careless or inelaborate work	18	26.1	41	59.4	10	14.5
Complexity of performed work	20	29.4	43	62.3	6	8.7
Not known or inapplicable procedures	12	17.4	45	65.2	12	17.4

Discussion

PS is the first priority issue to be considered by every individual in every stage of healthcare delivery organisations. Despite the effective improvements in PS practices, MEs continue at unacceptable rates.[6] MEs occurred in 4% of hospital admissions in a New York study, of which 14% resulted in death.[7] One in every 50 patients admitted to the hospital die due to an adverse event and two-thirds of these events occur in surgical clinics or OR.[8] In this study 65.2% of health professionals reported condition of witnessing a PS threatening event in the OR throughout their professional life.

ORs are one of the most complex areas in healthcare where adverse events are frequently seen with the rate of 47.7% to50.3%.[7,9] Surely adverse events do not occur only in ORs, but the nature of ORs where staff come from multiple disciplines with different educational aims and now work as teams creates issues. This results in more errors.[9] At least half of these adverse events can be prevented with corrective feedback, reviewing the errors and better teamwork.[9] An error-free environment is not possible and human error is unavoidable but regular staff training, monitorisation and system analysis can minimise the risk.[10]

Standardisation of surgical processes can be another preventive factor. Methods that standardise surgical processes must include the period from admission to discharge.[11] In these processes, surgeons, anaesthesiologists, and nurses have the professional responsibility resulting from their fields of expertise. Because every discipline has different expertise related to the patient, multiple professional ideas for solving problems are available to the patient and care team.[9,12] Characteristic feature of the healthcare professionals, their adaptation to teamwork and efficient communication of people from different disciplines constitute the main source of PS.[9,13] All problems that can result in catastrophic consequences, including wrong-site or wrong-surgical procedure and retained sponges, can easily be avoided with effective communication.[13,14] More than one-third of the errors resulting from communication cause noticeable issues such as ineffectiveness, tension, waste of resources, delay, inconvenience and procedural errors.[15] Development of procedures that improve the teamwork and harmony in the OR, along with effective communication, can minimise the occurrence of adverse events. In this study, 37.7% of the participants had communication difficulties. More than 50% reported communication disorders as a frequent reason of PS threatening conditions.

One solution to reducing errors prior to surgery was holding a team meeting where, through communication, the patient is evaluated in detail.[6,16] This meeting provided a special benefit to teams that do not know each other.[16] From the organisational perspective, preoperative assessment meetings reduce the rate of complication and consequently costs.[6] Detailed discussion of the patient's situation and understanding aspects of the different disciplines may improve patient outcomes and decrease complications.

Other factors negatively affecting PS in the OR include rotation of employees, staff with insufficient training and working with unqualified staff.[9] Similarly, lack of particularly qualified staff was found one of the most common causes of errors. In a regular functioning team, interruption in the continuity of staff or interpersonal conflicts are the most important factors distorting planning.[16] Communication problems occur 30% of the time with team changes and one-third of the time this disrupts regular activities, increases tension and endangers PS.[15] In addition, having a

stable team where individuals know each other well reduces staff changes, increases team satisfaction and also reduces medication errors and subsequently results in increased PS.[16]

It has been reported that marking the site of surgery and other simple precautions such as a time-out ora sign-out procedure may prevent adverse events.[13,14] With time-out procedures, information is shared among surgeon, anaesthesiologist and nurses prior to the incision, thus the responsibility is distributed among all OR staff.[13,17] Time-out procedures, which last 1-4 minutes on average, prevent errors at a rate of 97% and increase PS 93%.[13] In the beginning of the time-out procedure, convincing a surgical team, especially primary surgeon, might be difficult, but emphasising importance of this procedure in hospital education will help to solve this problem as it divides the responsibility among all surgical members.

Errors within medical processes may occur or be realised before an occurrence. However, providing feedback by keeping a report in each case of error is important.[9] In PS, accident reporting is a popular procedure and is traditionally expected from nurses. A survey report found that nurses reported 61% of identified errors, but only 45% of the reports were filled out properly.[18] However, reporting errors in detail may identify causes and possible outcomes of error and prevent re-occurrence. Study results showed that nearly 80% of health professionals did not report any PS related incident within one year. Also, verbal warning was the most preferred way of reporting.

A PS culture requires a process based on questioning and improving the system instead of punishing individuals. Judgmental and punitive attitudes from top management are important causes of not reporting problems related with PS. In this study, 27.5% of the participants thought that in terms of ME, problems should be solved without reflecting to the patients and their relatives. Researchers considered it one of the most important issues, perhaps arising from lack of self-confidence in coping with the problem or avoidance from any punitive results. In our trainings, we emphasised the main objective of PS to increase the rate of detection and reporting of PS issues in the hospital.

Nurses' issues in their work environment have a direct negative effect on PS; however, enhancing the workplace and giving nurses authority over practice improves PS.[19] Nurses who are authorised to play an active role in PS feel valuable, and provide practical, repetitive hands-on trainings thus improving their problem-solving skills and organising their respectability, autonomy and professional position.[19] From the nurses' perspective elimination of uncertainty regarding procedures and improving communication with other perioperative team allows them to work in harmony, increase effective leadership practices and gain job satisfaction.[6]

In 2004, the Joint Commission International (JCI) issued a compulsory universal protocol for JCI-accredited hospitals. Recently, different control forms including Worth Health Organisation (WHO)'s Safe Surgery Saves Lives principles and Surgical Patient Safety System (SURPASS) have also been reported.[6,8,20] Which control form to use is not as important as using the form that is appropriate to hospital culture. Adopting one of these control forms according to the local needs may be helpful to improve PS.[21]

Conclusion

Surgical complications due to MEs can be reduced when OR staff members are trained in PS, clear procedures are followed step by step, control forms are developed and used. Organising teamwork meetings, improving communication between the disciplines and encouraging medical staff to report MEs may improve PS.

References

1. Bulun M. [Patients safety practices 1]. Ankara, Turkey: Sage Press, 2009; pp 1-214.
2. James JT. A New, evidence-based estimate of patient harms associated with hospital care. J Patient Saf 2013; 9: 122-8.
3. Turk Hemsireler Dernegi. [Rights and responsibilities in nursing]. Ankara, Turkey: Odak Ofset Press, 2012; pp 1-60.
4. ACSNI Human Factors Study Group. Third Report: Organising for Safety, Advisory Committee on the Safety of Nuclear Installations, Health and Safety Commission. London, UK: 1993; pp:1-100.
5. Pronovost PJ, Weast B, Paine L, Griffifth L, Rosenstein BJ, Kidwell RP, et al. Senior executive adopt-a-work unit: A model for safety improvement. Jt Comm J Qual Saf 2004; 30: 59-68
6. Penprase B, Elstun L, Ferguson C, Schaper M, Tiller C. Preoperative communication to improve safety: a literature review. Nurs Manage 2010; 41: 18-24.
7. Brennan TA, Leape LL. Adverse events, negligence in hospitalized patients: results from the Harvard Medical Practice Study. Perspect Healthc Risk Manage 1991; 11: 2-8.
8. deVries EN, Prins HA, Crolla RM, den Outer AJ, van Andel G, van Helden SH et al. Effect of a comprehensive surgical safety system on patient outcomes. N Engl J Med 2010; 363: 1928-37.
9. D'Addessi A, Bongiovanni L, Volpe A, Pinto F, Bassi P. Human factors in surgery: from Three Mile Island to the operating room. Urol Int 2009; 83: 249-57.
10. Zohar E, Noga Y, Davidson E, Kantor M, Fredman B. Perioperative patient safety: correct patient, correct surgery, correct side--a multifaceted, cross-organizational, interventional study. Anesth Analg 2007; 105: 443-7.

11. de Vries EN, Eikens-Jansen MP, Hamersma AM, Smorenburg SM, Gouma DJ, Boermeester MA. Prevention of surgical malpractice claims by use of a surgical safety checklist. Ann Surg 2011; 253: 624-8.
12. Manser T. Teamwork and patient safety in dynamic domains of healthcare: a review of the literature. Acta Anaesthesiol Scand 2009; 53: 143-51.
13. Nilsson L, Lindberget O, Gupta A, Vegfors M. Implementing a pre-operative checklist to increase patient safety: a 1-year follow-up of personnel attitudes. Acta Anaesthesiol Scand 2010; 54: 176-82.
14. Makary MA, Sexton JB, Freischlag JA, Millman EA, Pryor D, Holzmueller C, et al. Patient safety in surgery. Ann Surg 2006; 243: 628-35.
15. Lingard L, Espin S, Whyte S, Regehr G, Baker GR, Reznick R, et al. Communication failures in the operating room: an observational classification of recurrent types and effects. Qual Saf Health Care 2004; 13: 330-4.
16. ElBardissi AW, Sundt TM. Human factors and operating room safety. Surg Clin North Am 2012; 92: 21-35.
17. Michaels RK, Makary MA, Dahab Y, Frassica FJ, Heitmiller E, Rowen LC, et al. Achieving the National Quality Forum's "Never Events": prevention of wrong site, wrong procedure, and wrong patient operations. Ann Surg 2007; 245: 526-32.
18. Espin S, Lingard L, Baker GR, Regehr G. Persistence of unsafe practice in everyday work: an exploration of organizational and psychological factors constraining safety in the operating room. Qual Saf Health Care 2006; 15: 165-70.
19. Lin L, Liang BA. Addressing the nursing work environment to promote patient safety. Nurs Forum 2007; 42: 20-30.
20. vanKlei WA, Hoff RG, van Aarnhem EE, Simmermacher RK, Regli LP, Kappen TH, et al. Effects of the introduction of the WHO "Surgical Safety Checklist" on in-hospital mortality: a cohort study. Ann Surg 2012; 255: 44-9.
21. Alitoor A, Nigah-e-Mumtaz S, Syed R, Yosouf M, Syeda A. Surgical safety practices in Pakistan. J Pak Med Assoc 2013; 63: 76-80.