

Original Article

The Effects of Using Intraoperative Care Documentation Forms on the Number of Reported Errors

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ABSTRACT

Background: Reporting intraoperative errors can help reduce the incidence of more errors. However, some errors remain unreported. A key strategy to improve error reporting is quality care documentation. **Objectives:** The aim of this study was to determine the effects of using intraoperative care documentation forms on the number of reported errors. **Methods:** This single-group pretest–posttest interventional study was conducted on 65 operating room technicians and nurses recruited from the operating rooms of Alzahra and Kashani Teaching Hospitals, Isfahan, Iran. A researcher-made error-reporting questionnaire was used to assess the rate of reported and unreported errors both 1 week before and 2 months after the study intervention. During the study intervention, participants were asked to perform intraoperative care documentation for 2 successive months using five researcher-made intraoperative care documentation forms. Data were analyzed through the McNemar's and Wilcoxon tests and the Spearman's correlation analysis. **Results:** The mean score of intraoperative care documentation had a direct correlation with the number of written-reported errors ($P = 0.044$) and an inverse correlation with the number of unreported errors ($P = 0.047$). The number of written-reported errors significantly increased ($P = 0.009$), whereas the number of unreported errors significantly decreased after the study intervention ($P = 0.017$). **Conclusion:** Intraoperative care documentation can significantly increase the rate of error reporting. Therefore, the intraoperative care documentation forms developed in this study can be used to improve operating room staff's documentation and error-reporting practice.

KEYWORDS: Documentation, Error, Intraoperative care, Operating room, Reporting, Surgery

INTRODUCTION

Perioperative documentation, including intraoperative documentation, is an essential component of quality patient care.^[1,2] The use of efficient documentation system can enhance the efficiency of intraoperative care up to 53%.^[3] Contrarily, improper intraoperative documentation can endanger patient safety.^[4,5]

Despite the importance of documenting all intraoperative events, evidence shows that the most commonly reported intraoperative events are related to incomplete or incorrect counting, equipment malfunction, wrong labeling of surgical specimens, and patient fall.^[6-12] In other words, some events in the operating room may not be

documented and reported at all. Improper intraoperative documentation and lack of error reporting can significantly increase the risk of errors.^[7] Improper intraoperative documentation by the operating room staff can be due to factors such as their unwillingness to report errors,^[13] their underestimation of the errors in the operating room, lack of quality documentation-related training for them, and lack of appropriate documentation forms.^[14]

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Well-designed intraoperative documentation forms and checklists may be effective in improving the quality of intraoperative documentation. A study reported that the use of an intraoperative surgical safety checklist significantly improved staff's safety-related performance and reduced the number of wound complications and readmissions.^[15] A 6-month interventional study also showed that using a surgical safety checklist significantly reduced surgical complications and improved patient outcomes.^[16] Yet, there are no reliable data concerning errors in operating rooms in Iran. Moreover, no interventional study had yet evaluated the effects of intraoperative documentation on error reporting in operating rooms in Iran. Therefore, the present study was conducted to fill this gap.

Objectives

The aim of this study was to determine the effects of using intraoperative care documentation forms on the number of reported errors.

METHODS

Study design and setting

This single-group pretest–posttest interventional study was carried out from March to June 2018 in the operating rooms of Alzahra and Kashani Teaching Hospitals affiliated to Isfahan University of Medical Sciences, Isfahan, Iran.

Participants

The study population comprised all operating room technicians and nurses who work in Alzahra and Kashani Hospitals, Isfahan, Iran. All 65 eligible participants were recruited through the census method. Eligibility criteria were a work experience of at least 2 months in the study setting, working in the operating room as a circulatory staff, and willingness to participate in the study. Exclusion criteria were unilateral withdrawal from the study and incomplete filling of the study tool.

Measurement tools

One of the data collection tools was a researcher-made error-reporting questionnaire which consisted of 12 items on the frequency and the type of orally- or written-reported errors as well as unreported errors and their causes in the past 2 months. The questionnaire was administered to participants both 1 week before and 2 months after the study intervention. The other study tool consisted of five researcher-made intraoperative care documentation forms. These forms were developed using guidelines and standards for intraoperative documentation adapted from the Association of Operating Room Registered Nurses, the existing literature, and most recent textbooks in the area of operating room.^[2,1-17]

These forms were related to counting surgical items (10 items), surgical specimen handling (17 items), tourniquet use (14 items), electrocautery device use (9 items), and patient transfer (3 items). Most items were of yes/no questions and some were of open-ended questions. All yes/no items were scored either 1 (“Yes” or “Done”) or 0 (“No” or “Undone”). Each participant was asked to fill each form for all surgeries he/she attended as a circulatory staff. Then, the mean score of each of the five forms and the total mean score of all the five forms were calculated for each participant. If a participant left an item blank, it was considered an intraoperative error. The face and the content validity of the study tools were confirmed by ten faculty members of the operating room, Department of Isfahan University of Medical Sciences, Isfahan, Iran. The reliability of the intraoperative care documentation forms was also confirmed through the test–retest method, through which ten operating room staff who were external to the study twice completed the forms, and the test–retest correlation coefficient was calculated to be 0.768.

Intervention

Before the intervention, the first author personally visited participants and asked them to complete the error-reporting questionnaire. Then, a 30-min training session was held for the operating room staff of each hospital to train them how to complete the intraoperative care documentation forms and to highlight the importance of their filling. Participants who were absent from that session were individually trained. During group and individual training sessions, participants' questions were answered, and they were provided with a series of intraoperative care documentation forms and were asked to fill the forms for patients whom they attended their surgeries as circulatory staff. It is noteworthy that intraoperative care documentation is among the responsibilities of circulatory staff.^[1,17] In addition, a group composed of all participants was formed in one of the social media, where they could ask their questions from the first author. During the course of the study, the first author referred to the study setting twice weekly and collected the completed forms. Upon the completion of the 2-month course of the study, the error-reporting questionnaire was re-administered to the participants.

Ethical considerations

This study was approved by the Research Ethics Committee of Isfahan University of Medical Sciences, Isfahan, Iran (code: IR.MUI.REC.1396.3.808). All participants voluntarily participated in the study and provided written informed consent for participation. Confidentiality of the data was maintained.

Data analysis

The data were analyzed through the Version 16; SPSS Inc., Chicago, IL, USA. The McNemar's and the Wilcoxon tests were conducted for comparing the pretest and the posttest number of reported and unreported errors. Moreover, the Spearman's correlation analysis was used to examine the correlations of the scores of intraoperative care documentation with the rates of reported and unreported errors.

RESULTS

This study was conducted on 65 operating room technicians and nurses. Most of them were female (90.8%), held bachelor's degree (80%), and had studied in the field of operating room (89.2%). They ranged in age from 23 to 50, with a mean of 32.28 ± 6.30 years. The mean of their work experience was 9.04 ± 6.72 years.

The pretest and posttest frequency distributions of written- and orally-reported errors as well as unreported errors are shown in Table 1. The Wilcoxon test revealed a significant increase in the rate of written-reported errors ($P = 0.009$) and a significant decrease in the rate of unreported errors ($P = 0.017$) after the study intervention. However, there was no significant difference between the pretest and posttest rates of orally-reported errors ($P = 0.80$).

Table 2 shows the frequency distributions of the types of unreported errors as well as orally- and written-reported errors, whereas Table 3 shows the reasons behind not reporting errors. The results of the McNemar's test illustrated that the rate of unreported errors due to surgeon-instilled fear significantly reduced after the intervention ($P = 0.04$). Table 4 shows the mean scores of total intraoperative care documentation and its domains.

The Spearman's correlation analysis also showed that the total mean score of intraoperative care documentation was directly correlated with the number of written-reported errors ($P = 0.044$) and inversely correlated with the number of unreported errors ($P = 0.047$). However, there was no significant correlation between the total mean score of intraoperative care documentation and the number of orally-reported errors ($P = 0.109$).

DISCUSSION

The aim of this study was to determine the effects of using intraoperative care documentation forms on the number of reported errors. The most common written-reported errors in the present study were errors related to surgical item counting. Similarly, a former

Table 1: Pre- and post-test frequency distributions of written- and orally-reported errors as well as unreported errors

Frequency of errors over the past 2 months	Before, n (%)	After, n (%)	Wilcoxon's test, Z (P)
Written-reported errors			
>1 per month	1 (1.5)	4 (6.2)	2.61 (0.009)
1 per week	4 (6.2)	11 (16.9)	
1 in several months	6 (9.2)	8 (12.3)	
Never	54 (83.1)	42 (64.6)	
Orally-reported errors			
Never	38 (58.4)	40 (61.5)	0.24 (0.80)
1	13 (20)	13 (20)	
2	7 (10.8)	4 (6.2)	
3	0	1 (1.5)	
4	3 (4.6)	2 (3.1)	
5 or more	4 (6.2)	5 (7.7)	
Unreported errors			
Never	32 (49.2)	43 (66.2)	2.38 (0.017)
1	23 (35.4)	17 (26.2)	
2	8 (12.3)	3 (4.6)	
3	0	1 (1.5)	
4	1 (1.5)	0	
5 or more	1 (1.5)	1 (1.5)	

Table 2: The frequency distributions of the types of unreported errors as well as orally- and written-reported errors

Type of error	Before, n (%)	After, n (%)	McNemar's test, P
Written-reported errors			
Patient fall	1 (1.5)	6 (9.2)	0.04
Counting	1 (1.5)	6 (9.2)	0.04
Electrocautery device use	1 (1.5)	0	0.96
Tourniquet use	0	0	-
Surgical specimen handling	3 (4.6)	1 (1.5)	0.62
Other	4 (6.2)	5 (7.7)	0.93
Orally-reported errors			
Patient fall	3 (4.6)	8 (12.3)	0.04
Counting	12 (18.5)	11 (16.9)	0.96
Electrocautery device use	5 (7.7)	2 (3.1)	0.25
Tourniquet use	2 (3.1)	0	0.50
Surgical specimen handling	7 (10.8)	4 (6.2)	0.55
Other	5 (7.7)	6 (9.2)	0.96
Unreported errors			
Patient fall	4 (6.2)	5 (7.7)	0.92
Counting	13 (20)	7 (10.8)	0.03
Electrocautery device use	6 (9.2)	7 (10.8)	0.96
Tourniquet use	5 (7.7)	1 (1.5)	0.04
Surgical specimen handling	11 (16.9)	5 (7.7)	0.04
Other	7 (10.8)	9 (13.8)	0.73

study on perioperative nurses reported that incomplete, incorrect, and no surgical item counting constituted the most common intraoperative errors. That study suggested

Table 3: The reasons behind not reporting errors

Reason	Before, n (%)	After, n (%)	McNemar's test, P
Personal fear	3 (4.6)	1 (1.5)	0.50
Fear instilled by colleague	2 (3.1)	0	0.50
Fear instilled by operating room authorities	1 (1.5)	4 (6.2)	0.37
Fear instilled by surgeon	4 (6.2)	0	0.04
Ignorance	5 (7.7)	5 (7.7)	0.99
Time limitation	10 (15.4)	8 (12.3)	0.80
Previous punishment	2 (3.1)	0	0.50

Table 4: The mean scores of intraoperative care documentation and its different domains (out of 100)

Domains	Mean±SD	Minimum	Maximum
Total	93.19 ± 5.18	76	100
Counting surgical items	97.53 ± 8.09	67	100
Surgical specimen handling	96.89 ± 5.78	76	100
Tourniquet use	89.58 ± 9.22	62	100
Electrocautery device use	85.10 ± 10.04	67	100
Patient transfer	99.48 ± 4.17	67	100

SD: Standard deviation

that performance improvement, closer attention to quality care delivery, and more accurate documentation of care can help manage and reduce errors.^[7] The high prevalence of counting-related errors in the operating room may be related to the facts that surgical item counting is essential in almost all surgical procedures, and it is the most commonly documented care measure in surgeries.

The second most common written-reported intraoperative error was related to patient fall. A former study reported that the documentation of procedures such as fastening safety straps, ensuring patient safety, and avoiding unnecessary patient transfers was a key component of fall-related error reporting system.^[18] Given the high risk of patient fall in each step of patient transfer in the operating room, closer attention to fall-preventive measures and accurate fall documentation can increase the rate of fall reporting and reduce the prevalence of intraoperative patient fall.

Findings also indicated significant increase in the rate of written-reported errors after the study intervention. This finding denotes the positive effects of the study intervention on participants' reporting of written errors. However, our findings indicated that the rate of orally-reported errors did not significantly change after the study intervention. This finding is attributable to the fact that all participants were informed in the orientation session that only written error reporting is in concordance with legal and professional standards of practice. Yet, the frequency of orally-reported errors

related to patient fall significantly increased after our intervention. An earlier study into patient fall prevention concluded that all operating room staff need to assess risk factors for patient fall and write them on a board in the operating room in order to inform other health-care providers of these risk factors and thereby, reduce the risk of patient fall.^[11] Considering the high risk of fall throughout patient stay in the operating room, documentation of care measures such as using safety bed straps, patient transfer by at least four health-care providers, and ensuring the safety of operating room beds can make operating room staff to pay greater attention to these fall-preventive measures and thereby, encourage them for accurate reporting of any fall-related errors.

The study findings also showed that the rate of unreported errors significantly decreased after the intervention. In line with this finding, the results of a study into the effects of using the revised pediatric surgical safety checklist illustrated that appropriate interpersonal relationships and effective error reporting can reduce the risk of intraoperative errors.^[19]

We also found that the rate of unreported errors related to surgical specimen handling significantly decreased after the intervention. The surgical specimen handling form in the present study contained items on different aspects of surgical specimen and hence, its use can draw operating room staff's attention toward all aspects of surgical specimen handling, require them to consider all of them in documentation, and, thereby, reduce the rate of errors in this area. Similarly, a study reported that step-by-step documentation of surgical specimen handling can enhance patient safety and care quality.^[20]

Another finding of the study was the significant decreases in the rates of unreported errors related to tourniquet use and surgical item counting. Similarly, a former study reported the effectiveness of using a tourniquet checklist in minimizing the risks associated with tourniquet use.^[10] The Association of Operating Room Registered Nurses also emphasizes the importance of documenting all counting-related activities to prevent leaving surgical items inside patient's body and encourages staff to report counting-related errors.^[21]

The causes of not reporting errors in the present study were classified into seven categories, four of which were related to fear over reporting errors. Findings showed that fear instilled by the operating room authorities significantly increased after the intervention. Authorities may think that complete error reporting can present their unit as a unit with high error rate.

Therefore, complete documentation, which can provide more accurate data about the rate of errors, can increase staff's authority-instilled fear. However, our findings revealed that the fear instilled by surgeon significantly decreases after the intervention. One of the main goals of documentation is to produce legal documents to protect staff against legal problems.^[1] Intraoperative care documentation forms in the present study included items which had to be signed and approved by the attending surgeons. Therefore, the decrease in the fear instilled by surgeon is attributable to staff's confidence in the accurate documentation of all intraoperative care measures and low risk of errors. A former study concluded that complete documentation of all intraoperative events through the "surgical black box technology" can reduce both errors and fear over their report.^[22]

The study findings also revealed that the total mean score of intraoperative care documentation was at satisfactory level. This finding is due to the use of comprehensive documentation forms in the present study. However, a former study in hospitals affiliated to Isfahan University of Medical Sciences, Isfahan, Iran, reported that documentation rate by operating room technicians was as low as 42%, denoting nonoptimal care documentation. Underestimation of documentation importance by operating room technicians, lack of proper training for them, and their heavy workload were among the most significant factors behind such poor documentation.^[14]

The highest and the lowest rates of completing intraoperative care documentation forms were related to patient transfer and electrocautery device use forms, respectively. The highest completion rate of the patient transfer form may be due to its limited number of items (only three items). On the other hand, the lowest completion rate of the electrocautery device form was due to participants' time limitation and heavy workload. During the study, we noticed that participants did not complete this form and hence, we repeatedly referred to the study setting and emphasized the importance of electrocauterization documentation. Afterward, they started to complete this form.

The other findings of the present study were that the total score of intraoperative care documentation was directly correlated with the number of written-reported errors, inversely correlated with the number of unreported errors, and insignificantly correlated with the number of orally-reported errors. These findings denote that the study intervention was effective in improving participants' intraoperative documentation and error-reporting practice.

The main limitations of this study were the short course of its intervention, recall bias among the study participants, and lack of a control group. Studies with longer interventions and a control group can provide more reliable data about the effects of using intraoperative care documentation forms on error reporting.

CONCLUSION

The use of well-designed intraoperative care documentation forms significantly improves operating room staff's documentation and error-reporting practice. Therefore, the integration of these forms into patients' medical records is recommended. Using intraoperative care documentation forms to encourage operating room staff for reporting their errors can help significantly reduce the rate of errors in the operating room. Studies are needed to assess the effects of using electronic intraoperative care documentation forms on operating room staff's documentation and error-reporting practice.

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Conflicts of interest

There are no conflicts of interest.

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