

Factors Influencing the Interruption of Nursing Document Writing in the Intensive Care Unit: A Cross-Sectional Survey

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Objective: To explore the current status of interruption events in nursing document writing in the intensive care unit (ICU) using a cross-sectional survey.

Methods: Between May and October 2021, the convenience sampling method was used to observe the interruption events in nursing document writing in the ICU. A total of 54 nurses and 7 indicators were observed: the start time, end time, interruption period, source, type, duration and outcome of interruption events.

Results: A total of 438 interruption events in nursing document writing occurred in 85.955 hours, with a frequency of 5.093 times/hour and a duration of 4787.00 (1152.00, 13,109.00) seconds. The frequency of interruption events in nursing document writing was the highest (11 times/hour) and the duration was the longest (9581.50 seconds) from 08:00 to 12:00. The main sources of interruptions for nurses with 10 or more years of service or with the professional title of nurse are nurses themselves and their colleagues. The main sources of interruptions for nurses who have been in charge for 10 years or over are the working environment and doctors. This intervention in work continuity occurs unexpectedly; however, if adjustments are made to nursing procedures, the interruption can be terminated rapidly or adverse consequences can be avoided. Years of working experience, seniority level, interruption time periods and professional titles were independent factors influencing the number of interruption events, and they were all positively correlated. The results of this study show that there were statistically significant differences in the incidence of negative outcomes among ICU nurses with varying years of working experience and professional titles.

Conclusion: Interruptions in nursing document writing have high frequency, complex sources and multiple types. For senior nurses, the outcome was predominantly positive, while for junior nurses, it was predominantly negative.

Keywords: ICU, nurses, nursing documents, interruption events

Introduction

Nursing interruptions (NI) refer to the external actions that interrupt or delay the current transaction and distract the attention of the recipient in the process of providing ethical nursing services to patients in a specified temporal role and environment.¹

Writing nursing records is the most common task for intensive care unit (ICU) nurses.²⁻⁴ Studies have found that interruptions occur most commonly when nurses are writing nursing records (31.6%), and ICU nurses have the most interruptions when writing nursing records. A nursing record is a legal document that provides strong evidence to protect clinical nursing practice behaviour. Nursing practice behaviour is mainly manifested in professional autonomy and the ability to establish and maintain a therapeutic relationship with patients, to understand the working environment and to cooperate with doctors. The interruption of nursing record writing may make nurses forget to record crucial nursing information. At present, the irregular writing of nursing documents is relatively common, which is likely to cause a series of medical disputes and legal problems, and even threaten clinical medical safety. This is a potential nursing safety

hazard.⁵ Previously, foreign experts have observed nurses in the trauma ICU and critical care unit (CCU), but there is a lack of studies that investigate nursing document writing. In China, Xie Jianfei et al.² Based on this need to construct and apply a management model of nursing documentation interruption events. Observational studies of interruptions in care should also not focus primarily on general wards and operating theatres. The current related research mainly focuses on the status of shift interruption events during ICU nursing medication, but there is no correlation study on ICU nursing document writing interruption events. Therefore, this study investigates the interruption events of nursing document writing in the ICU, aiming to identify management countermeasures, reduce the occurrence of the interruption of nursing document writing and ensure patient safety.

Objects and Methods

Objects

The convenience sampling method, which followed the voluntary principle, was used to select all the interruption events observed in nursing document writing in the ICU of our hospital between May and October 2021. Informed consent was obtained before the investigation was conducted.

Methods

Methodology

Before the survey was conducted, the domestic and foreign literature was reviewed and the ICU nursing document writing interruption event registration form was designed. The ICU nurses were observed, and data were collected. The event registration form included general information, such as the name of nurses on duty in the observed department, years of working experience, seniority level, age and professional title, and indicators, such as interruption start time, interruption end time, interruption period (08:00–12:00; 12:01–14:00; 14:01–17:00; 17:01–20:00), source type, length of time and the outcomes of the seven indicators. The source of nursing interruption events was divided into management (system process, etc.), equipment (instrument operating system, etc.), environment (doorbell, office telephone, etc.), emergency (rescue, etc.), nurses themselves (private telephone, physical discomfort, drinking water and toilet anxiety, etc.), colleagues (other nurses, doctors, health care personnel, clinical support personnel, etc.), and patients (themselves and family members). According to sociologist Jett,⁶ research on interruption events is divided into four types: invade and harass – an act that occurs unexpectedly or interferes with the continuity of work; distraction – the state of mind in which one's mental activity is partially or completely removed from the main work for the necessary time and transferred to something unrelated; contradiction – behaviour that is contrary to actual work friction, personal theory and expectation; and corruption – a planned or spontaneous action at work that interrupts the continuity or main flow of work. According to a study conducted by Linda et al,⁷ the outcomes of interruption were divided into positive and negative results. Positive outcome judgment: suspend the nursing staff's current business; temporary loss of memory; increase nursing staff workload; and a security risk interruption event is generated.

Data Collection Method

The researchers directly observed and recorded the nursing document writing of the subjects via one-to-one supervision on weekdays/holidays. Due to the relatively small number of patients receiving treatment at night, less external interference and the low frequency of nursing interruption events, the observation time selected in this study was from 8:00 to 20:00. The researchers selected nurses who met the inclusion criteria for observation for a period of 2–3 hours. During the observation period, the researcher was only responsible for recording the work situation when the document writing of nurses was interrupted and did not participate in any clinical nursing operation. However, to ensure the safety of patients, the researcher was obliged to give corresponding reminders if hidden risks to nursing safety were observed during the observation process. In addition, a timer (stopwatch) was used to monitor and record the duration of interruptions.

Quality Control

In the preparation stage, the project leader unified training for investigators, clarified the meaning and source types of nursing document writing interruption events, correctly interpreted the content of each observation index, unified survey time limit standards and methods and ensured consistency among investigators. In the data collection stage, the subjects

were observed and recorded using scientific and feasible methods. To reduce the bias due to the presence of the investigators and to ensure that nursing interruption events occurred in natural conditions, the research subjects were informed that the purpose of this study was to understand how the ICU staff generally work together and solve the problem, only used for scientific research, avoid the psychological burden of nurses were observed and tension Did not say we care is the focus of the interruption events. In the data analysis stage, the two-person input method was used to ensure that data were input accurately. In case of difficulties in statistics, you can directly consult statistics professionals.

Statistical Analysis Method

In this study, the collected data were input into SPSS 26.0 software (IBM, Armonk, NY, USA) using the two-person input method. After the input was completed and checked, statistical analysis was performed. The Shapiro–Wilk test was used to test the normality of measurement data, and the median (upper quartile, lower quartile) was employed for description. The Kruskal–Wallis rank sum test was used for comparison between groups. One-way analysis of variance was employed to analyse the influencing factors. The enumeration data were described in the form of frequency (%) and compared between groups using Chi-square analysis. A value of $P < 0.05$ was considered statistically significant, and all the tests were two-sided.

Results

General Data

A total of 54 duty nurses were included in this study. The general information was as follows. The age was (33.00 [25.00, 45.00]), and there were 3 males and 51 females. The years of working experience was (8.00 [3.00, 27.00]). In terms of rank, there were 12 (22.2%) N0 nurses, 20 N1 nurses (37%), 11 N2 nurses (20.4%) and 11 N3 nurses (20.4%). Regarding professional title, there were 3 nurses (5.6%), 31 nurse practitioners (57.4%), 18 nurses in charge (33.3%) and 2 deputy directors of junior and senior (3.7%). There were 50 undergraduates (92.6%) and 4 juniors (7.4%). The interruption duration was (4787.00 [1152.00, 13,109.00]) seconds, the number of interruption events was (8.00 [2.00, 30.00]) times, and the frequency of interruption events was (2.50 [0.50, 14.00]) times/h. The ICU nursing document writing was observed for 85.955 h, during which 438 interruption events occurred, with an average of 5.093 times/h (see [Table 1](#) and [Table 2](#)).

ICU Nursing Document Writing Interruption Events

ICU Nursing Document Writing Interruption Events in Different Periods

The results of this study showed that there were statistically significant differences in the frequency and duration of nursing document writing interruption events in different periods ($P < 0.05$). The number of nursing document writing interruption events (11 times/h) in the time period from 08:00 to 12:00 had the longest duration (9581.50 s), and the frequency of interruption was the highest (4.25 times/h) in the time period from 12:01 to 14:00 (see [Table 3](#)).

Table 1 Descriptive Analysis of the General Data of the Study Population

	Variant	Frequency	Percentage (%)
Gender	Male	3	5.6
	Female	51	94.
Education	Bachelor Degree	50	92.6
	Junior college	4	7.4
Hierarchical	N0	12	22.2
	N1	20	37
	N2	11	20.4
	N3	11	20.4
Service Year	≤10 years	35	64.8
	>10 years	19	35.2
Professional title	Associate professor of nursing	2	3.7
	Nurse-in-charge	18	33.3
	Senior nurse	31	57.4
	Nurse	3	5.6

Table 2 Descriptive Analysis of Interruption Events in the Study Population

Variant		Frequency	Percentage (%)
Interruption period	08:00–12:00	14	25.9
	12:01–14:00	14	25.9
	14:01–17:00	13	24.1
	17:01–20:00	13	24.1
Source of Interruption Event	Surroundings	9	16.7
	Family members	9	16.7
	Doctor	11	20.4
	The nurse colleagues	13	24.1
	The nurse itself	12	22.2
Interrupt Event type	Invadeandharass	13	24.1
	Distraction	12	22.2
	Contradiction	17	31.5
	Corruption	12	22.2
Outcome	Active	13	24.1
	Negative	41	75.9

Table 3 Difference Analysis of the Frequency of Interruption Events in Different Time Periods [Median (Interquartile Range)]

Variant	08:00–12:00	12:01–14:00	14:01–17:00	17:01–20:00	H	P
Time of interrupt events	9581.50(3043.50, 12,023.50)	5794.00(4127.75, 6688.75)	4736.00(2914.50, 7300.00)	4058.00(2070.50, 5240.50)	8.037	0.045
Number of interrupt events	11.00(4.75, 18.25)	7.50(5.00, 10.50)	8.00(5.00, 8.50)	4.00(3.00, 8.00)	8.193	0.042
Frequency of interruption events	2.00(0.94, 4.56)	4.25(2.50, 6.13)	2.67(1.50, 3.83)	1.33(0.83, 2.67)	9.695	0.021

Source of ICU Nursing Document Writing Interruption Events

The results of this study revealed that there were statistically significant differences in the source distribution of interruption events in document writing among ICU nurses with varying years of working experience and professional titles ($P < 0.05$). The main sources for nurses with 10 years or less of working experience were nurse colleagues (10, 28.60%) and themselves (11, 31.40%), while the main sources of nurses with more than 10 years of working experience were environment (6, 31.60%) and doctors (5, 26.30%). The main sources for nurses with titles above nurse in charge were environment (7, 35.00%) and doctors (7, 35.00%) and the main sources for nurses with titles below senior nurse were nurse colleagues (12, 35.30%) and themselves (12, 35.30%) (see [Table 4](#)).

Types of ICU Nursing Document Writing Interruption Events

The results of this study indicated that there were statistically significant differences in the distribution of interruption events in nursing document writing among ICU nurses with varying years of working experience and professional titles ($P < 0.05$). The main type of nursing document writing interruption event for nurses with 10 years or less of working experience was distraction (12, 34.30%), the main type for nurses with over 10 years of working experience was interference (8, 42.10%), the main type for nurses with titles above nurse in charge was interference (9, 45.00%) and the main type for nurses with professional titles below senior nurse was contradiction (11, 32.40%) (see [Table 5](#)).

Outcome of ICU Nursing Document Writing Interruption Events

The results of this study showed that there were statistically significant differences in the incidence of negative outcomes for ICU nurses with varying years of working experience and professional titles ($P < 0.05$). The incidence of negative outcomes was higher among nurses with 10 years or less of working experience (18, 51.4%) and nurses with professional titles (18, 52.9%) (see [Table 6](#)).

Table 4 Analysis of the Source Difference of Interruption Events in Different Working Years [n (%)]

Variant		Source of Interruption Event					χ^2	P
		Surroundings	Family Members	Doctor	The Nurse Colleagues	The Nurse Itself		
Service Year	≤10 years	3(8.6)	5(14.3)	6(17.1)	10(28.6)	11(31.4)	9.309	0.048
	>10 years	6(31.6)	4(21.1)	5(26.3)	3(15.8)	1(5.3)		
Professional title	Associate professor of nursing, Nurse-in-charge	7(35.0)	5(25.0)	7(35.0)	1(5.0)	0(-)	23.858	0.001
	Senior nurse, Nurse	2(5.9)	4(11.8)	4(11.8)	12(35.3)	12(35.3)		

Table 5 Analysis on the Difference of Interruption Event Types in Different Working Years [n (%)]

Variant		Interrupt Event Type				χ^2	P
		Invadeandharass	Distraction	Contradiction	Corruption		
Service Year	≤10 years	5(14.3)	12(34.3)	11(31.4)	7(20.0)	11.714	0.006
	>10 years	8(42.1)	0(-)	6(31.6)	5(26.3)		
Professional title	Associate professor of nursing, Nurse-in-charge	9(45.0)	3(15.0)	6(30.0)	2(10.0)	8.124	0.037
	Senior nurse, Nurse	4(11.8)	9(26.5)	11(32.4)	10(29.4)		

Table 6 The Difference Analysis of Outage Event Outcome in Different Working Years, Professional Title [n (%)]

Variant		Outcome		χ^2	P
		Active	Negative		
Service Year	≤10 years	2(5.7)	33(94.3)	15.601	0.001
	>10 years	11(57.9)	8(42.1)		
Professional title	Associate professor of nursing, Nurse-in-charge	11(55.0)	9(45.0)	14.042	0.001
	Senior nurse, Nurse	2(5.9)	32(94.1)		

Discussion

The Interruption of ICU Nursing Document Writing Occurs Frequently

The results of this study revealed that the frequency of interruption events in ICU nursing document writing was 5.093 times/h on average, which was higher than the incidence of 4.95 times/h reported by foreign observational studies in the ICU.⁸ Sasangohar et al⁹ observed the nursing interruption events in the CCU, and the interruption occurred every 3 min on average. This is due to the fast pace of ICU work and the complex condition of patients, which requires multidisciplinary collaboration, leading to more frequent interruption events for ICU nurses.^{10,11} Due to the complexity of patients' conditions, intensive use of high-risk drugs with various instruments and equipment, frequent treatment of patients and close working units, nursing staff in the ICU are particularly vulnerable to interference and interruption.¹¹ Therefore, relatively speaking, ICU nursing document writing interruption events occur more frequently.

The Main Sources of Interruption in ICU Nursing Document Writing are Different

Different from previous studies,^{8,12} in this study, through the detailed grouping of nurses' professional titles and years of working experience, it was found that the sources of interruption events in ICU nursing document writing varied for nurses with different professional titles and years of working experience. The main sources for nurses with 10 years or less of working experience or a professional title of nurse or below were nurses' colleagues and themselves, while the main sources for nurses with more than 10 years of working experience or a professional title of nurse and above were

environmental, family members and doctors. The reason may be that nurses with higher professional titles or longer seniority are easily influenced by family and other reasons. Moreover, they have richer nursing experience, and they will put forward their own suggestions when they have doubts about the doctor's prescription. Therefore, compared with the younger nurses, the source of interruption of nursing events is different. Guo Jia et al¹³ observed the current situation of interruption events in the ICU nursing medication process and found that the most common source of interruption events was doctors (22.8%). This is consistent with the findings of this study. Zhao Peng et al¹⁴ found that ICU nursing interruption events were short and frequent, and the main source was equipment (31%). There are many critically ill patients in the ICU, so there are many instruments and equipment. Because the patient's condition is unstable, it is easy to cause frequent instrument alarms, which will affect the continuity of nurses' work. Huang Xiaomei et al¹⁵ found that the main source of interruption in the medication process in the respiratory department was the environment (26.7%), followed by family members (25.5%). This is consistent with the findings of this study. Reports from the United States⁸ showed that the results of this study were consistent with other ICU studies for common assessments (eg time spent on different primary tasks, frequency of interruptions and frequent sources of interruptions). May participate in rescue medical cooperation with senior nurses, go out to accompany examination, communicate with patients' families, receive outside consultations and other operations; For junior nurses, participation in basic operation is more related to life care.

There are Various Types of Interruptions in ICU Nursing Document Writing

This study found that the types of interruptions in ICU nursing document writing were related to different professional titles and years of working experience. For nurses with 10 years or more of working experience, the interruptions were mainly intrusion (45.00% and 42.10%, respectively), while for nurses with less than 10 years of working experience, the main type of interruptions was distraction (34.30%). The main type of interruption for nurses with lower professional titles was contradiction (32.40%). Guo Jia et al¹³ observed the current situation of interruption events in the ICU nursing medication process, and the most common type of interruption was intrusion (47.5%). ICU nurses play a wide range of roles, and the patient's condition is complex, urgent and rapidly changing, full of various uncertainties, so there are many kinds of treatment drugs and many details of nursing operations. It is easy for nursing interruption events that interfere with or hinder the continuity of nursing work to occur. In the course of this study, it was found that to actively participate in technical operations of personal interest, such as PICC puncture and maintenance of blood filtration extracorporeal membrane oxygenation and learning other new technology, the occurrence of interruption events occasionally would affect the quality of nursing and threaten the safety of patients. This type of interruption must therefore be eliminated. Nursing managers should pay attention to nurses' responsibility education, increase relevant training, and strengthen nurses' awareness of interrupt management.

The Outcomes of ICU Nursing Document Writing Interruption are Different Among Nurses with Different Seniority Levels

This study found that for nurses with more than 10 years of working experience or who were nurses in charge, the outcomes of interruption events were mainly positive, accounting for 57.9% and 55%, respectively. The incidence of negative outcomes was higher for nurses with 10 years or less of working experience and nurses' title, accounting for 94.3% and 94.1%, respectively. Huang Xiaomei et al¹⁵ observed the nursing interruption events in the course of medication in the respiratory department and found that most of these interruption events produced negative results (89.1%). Studies have shown⁸ that when certain interruptions are non-urgent and necessary, they may adversely affect the treatment of patients. Although interruption has both positive and negative effects, most of the research at home and abroad has analysed its negative impact but not its positive influence.¹⁶ This paper explores the main by interfering with personal attention and prospective memory, interrupt ongoing things people, thus increasing the probability of errors and repeated, studies have found that interfering with individual attention and prospective memory increases the chance of errors and repetitions.¹⁷ The occurrence of nursing interruption events is often accompanied by nurses' negative emotions, often manifested as a decline in cognitive function and task performance, and the increase in negative emotions can lead to a decline in professional identity and helplessness.¹³ In clinical work, senior nurses can obtain

the latest information in a timely manner by answering the phone and receiving visitors, and they play a leading role in the overall situation. They will convey and remind doctors and other nurses of the collected information, which explains why senior nurses encounter active nursing interruption events.¹⁸ Nursing managers should focus on strengthening the management training of junior nurses on interrupted incidents, improve risk awareness, and avoid adverse events of nursing interrupted.¹⁹

During the observation, it was found that after the doctors' shift from 8:00 to 12:00, a ward round was carried out, which required timely communication with the nurse in charge, so the probability of nurses being interrupted increased. In addition, the information on various medical orders was constant in the morning. Patients in the ICU with complex and critical diseases progress quickly and may have disease changes at any time, and rescue operations are frequent. After 11:00, family members send meals, ask about the condition and other links frequently. Therefore, during this period, ICU nurses need to perform various nursing operations, record patients' condition changes, adjust various medical equipment to meet the needs of patients and their families and often perform multiple tasks at the same time.²⁰ An observational study showed that 22% of nurses' time is spent on dealing with interruption events,³ which implies that there is a need to strengthen the allocation of human resources during this period, reduce the workload and minimise the occurrence of interruption events in the future. However, senior nurses are more involved in this type of operation, and nursing document writing can easily be affected. Furthermore, junior nurses have less clinical experience and less professional knowledge. Consulting senior nurses in the process of work can also easily lead to the interruption of senior nurses' nursing document writing. Wu Cheng cheng,²¹ such as demand for NI training present situation and the analysis of the operating room nurses according to the survey, as some important jobs are made of high qualification nurses, a higher probability of occurrence. In addition to paying attention to the timely training of young nurses, nursing managers also need to pay attention to the knowledge update of high-quality nurses, so as to improve the safety of writing nursing documents as a whole.²²

This study found that interruption comes not only from external sources but also from nurses themselves, which is consistent with the conclusions of previous research,²³ and self-interruption will lead to 40–50% task conversion and reduce task accuracy as external interruption has been shown in some studies. ICU nurses are sometimes unaware that they are interrupted due to too many frequent interruptions, known as interruption desensitization, and it is not uncommon among ICU nurses.^{24,25}

Our study has two limitations. First, a general limitation of observational studies is the possibility of deviating from natural behaviour due to the presence of an observer. Future work needs to replicate this study using less invasive observational techniques, such as video recording. Second, only day shifts were observed, and disturbances during night shifts may have different characteristics since there is no need for admission or ward rounds and communication is reduced during night shifts. Further research is needed to understand and redesign nursing workflows, to fully explore the factors influencing ICU nursing document writing interruption and to formulate a series of effective intervention measures based on existing management countermeasures to prevent the occurrence of related hazards, reduce unnecessary events and further improve the quality and safety of nursing documents.

Conclusion

The frequency of interruptions in ICU nursing document writing is high, and the sources of interruption are complex. The incidence of negative outcomes of interruption in nursing document writing among ICU nurses with varying years of working experience and professional titles is different. This study found that the main type of interruption for nurses with 10 years or less of working experience was distraction, while the main type for nurses with more than 10 years of working experience was intrusion. The main type of interruptions for nursing staff with the title of nurse in charge and above was intrusion, and the type for nurses with titles below nurse was mainly contradiction. The type for nurses with titles below nurse was mainly contradiction. Therefore, it is necessary to provide hierarchical training for nurses, implement corresponding management measures, improve the safety awareness of ICU nurses to prevent interruption events and ensure the quality and safety of documents.

Data Sharing Statement

All data generated or analyzed during this study are included in this published article.

Ethics Approval and Consent to Participate

This study was conducted in accordance with the declaration of Helsinki. This study was conducted with approval from the Ethics Committee of Heze Municipal Hospital (No.: 2021-KY021). Written informed consent was obtained from all participants.

Consent for Publication

The manuscript is not submitted for publication or consideration elsewhere.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests in this work.

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