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Safety Route in Care: Theoretical Model of Patient Care Process in Operating Room

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Abstract

Background: Care in the operating room is challenging. The dimensions of this type of care are unknown.

Aim: The present study was conducted with aim to explain the process of patient care in Iranian operating rooms in order to deeply understand the concept of care, determine the dimensions of care, facilitators and obstacles based on the obtained data.

Method: This grounded theory study was conducted in 2020-2023. Data gathering was conducted through unstructured interview with 37 participants. Data were analyzed using Corbin and Strauss, 2015 in three levels of concept, context and process.

Results: The safety route in care has three themes titled "Slippery passage of care with 3 categories including: 1- Threatening and risky conditions of care, 2- In the straits of stress and pressure, and 3- Lack of understanding of the sensitive surgical situation" and a total of 7 subcategories. The second theme" Trying to maintain balance and safe care" with 3 categories includes: 1- Relying on values, 2- Deciding to improve performance and 3- Seeking support and 14 subcategories; and finally, the outcome of these efforts was "safe care" and 4 sub-categories of the outcome included: "maintaining vigilance", "assertiveness and authority", “continued patient safety”, and “patient reassurance and peace” with 12 subcategories.

Implications for Practice: The nurses try to maintain the patient's safety in the slippery passage of care with relying on values, deciding to improve performance, reviewing and seeking support.

Keywords: Model Process, Nursing Care, Operating Room, Patient

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Introduction

Care in the operating room is one of the riskiest and challenging care (1-4). About 230 million surgeries are performed in the world every year (5). Given the complex conditions of the operating room, including high stress, speed of work, interactive nature of work, and collaboration, the care process is fraught with numerous challenges (6, 7). Nurses have different roles such as reducing the patient's anxiety, giving morale and protecting the patient's privacy, participating in surgery, and managing challenges (8, 9).

Care is a complex, abstract, incomprehensible and culture-dependent concept (10, 11). Although Caring is a universal phenomenon, but its patterns and expression are done in different ways in various cultures (12). In 1995, Field and Morse introduced care as a special human action, moral, interpersonal relationship, nurse-patient interaction and a therapeutic intervention (13). Relying on culture and cultural care, which requires interaction with the patient and also requires time, does not seem appropriate in the conditions of the operating room.

The humanistic care model presented by Watson (1988) is a very suitable model for creating a meaningful relationship between the patient and the nurse, which requires adequate time. According to this model, the goal of care is to maintain, promote, and provide human dignity, and an appropriate care environment, relying on the patient's independence and decision-making power, achieving patient flourishing (14). In addition to all the advantages of this model, the potential conditions of the operating room in terms of the patient's physical and psychological conditions, time constraints, and even elective or emergency surgery, present challenges in using this model (14). In certain departments, such as the operating room, it is caregivers who support the patient, and in fact, the meanings given to the situations are given by the nurses, not the patients, and they care based on their own meanings (15) because patients in the operating room are not in a position to make decisions for themselves and leave their care completely to the caregiver (3, 4).

In our country, theories are usually imported from the West, mostly the materials are taught which are the result of the experiences and researches of foreigners with their own background, culture and conditions. This is while the solutions should be formed in the real-life environment and be applied in domestic universities (17). A significant issue with nursing theories is that they cannot provide clear guidance for today's nurses, especially in changing health conditions (18). Therefore, a feasible care model in line with the operating room requirements is needed in the country.

Nursing needs to emphasize different descriptions of care and make its meaning clearer. As stated, the process of care depends on the context and depends a lot on the existing conditions and it varies based on the prevailing conditions, so the existing conditions have a great impact on the way of care. (19), Suitable care needs the development of more theories and extensive research, and further research in this field will help to eliminate the gap between theory and practice by reaching practical theories based on the context (20) and the information needed for the effect will provide part of the care. Researchers believe that in order to improve care, it is necessary to identify the perception of patients as recipients of care and nurses and their views on care, and it is necessary to determine what issues nurses face in their daily activities to provide care (21-22).

One of the most practical methods in building practical theories based on data from the field is the grounded theory approach (23). By searching the databases, it was found that there has been no study on nursing care in the operating room in Iran (although these studies are limited abroad) and detailed information on how to care for the patient, forms of care, challenges but it is not available in the operating room, other than what is stated in the title of the courses. While it seems necessary to have a broader vision of nurses' activities considering the sensitivity of the environment and the type of work and team activities in the operating room environment (1). Since care based on essential human needs is the essential element of the nursing profession, a deep understanding of it helps nurses in providing high-quality and comprehensive care services (24). Therefore, deep knowledge based on their experiences is helpful. Therefore, this study was conducted with aim to explain the process of patient care in the operating room.

Methods

A classic grounded theory (GT) approach with a qualitative design was used for this study by focusing on the operating room nurses and their perceived problems or main concern in the care process in operating room. The purpose was to understand the actions and behaviors of those involved

in this process from their perspective. From 3 October to 28 December 2022, operating room nurses at a teaching hospital in Tehran, Iran, were recruited using purposive and theoretical sampling. A few conceptual categories derived from focused coding of the initial interviews were used for theoretical sampling. For example, participants were asked to clarify conceptual category of 'safe care' More conceptual categories emerged in subsequent interviews. Therefore, theoretical sampling continued. Questions in the interview guide were modified and revised in subsequent interviews to clarify the emerging conceptual categories. In this study, seven conceptual categories were clarified through theoretical sampling. After 37 interviews, theoretical saturation was achieved as no new properties of these conceptual categories were emerging.

The participants in the research completed the consent form knowing the goals and working methods, and they were assured that all data will remain confidential and anonymous. In the present study, 37 people formed the research sample. First, using purposive sampling, 32 samples were interviewed. Then, based on the data obtained from the research, the classes, the specific characteristics that emerged in each of the classes, and the need for satisfaction within the classes, a purposive sampling of 5 patients were also conducted. The inclusion criteria for participants in the study included operating room nurses or caregivers with patient care duties, having at least one year of work experience, and experience caring for awake patients. The inclusion criteria for patients were participants who were not undergoing emergency surgery, had undergone surgery more than once, and had rich experience with the research topic. Interviews were carried out in different shifts and in three different hospitals in various areas of Tehran. Sampling was first purposeful and gradually with the emergence of concepts and guidance of data through theoretical sampling, the next sampling paths were determined.

The data were collected by an in-depth semi-structured individual interview. Considering environmental factors, tolerance level, information, and willingness of the participants, all interviews were conducted in one session and in only two cases in two sessions. The interviews were recorded using a tape recorder and immediately after the interview was completed, they were converted into text word for word. The original interview was kept in a secure location, and the analysis and initial coding of the data from each interview was performed before the next interview. In addition to interviews, participant observation was also used to supplement the data and examine different dimensions of the phenomenon under study in natural conditions. Interviews were conducted in order to obtain in-depth data regarding patient care, barriers and facilitators. Observation and note-taking were also done in the field (operating room). The interview was conducted in a quiet and peaceful environment wherever the participants were most comfortable. Using the continuous comparison between data, emerging categories, and assumptions derived from field notes and memos guided the researcher to continue the theoretical sampling process until data saturation was reached in each category.

According to the desire of the participants, most of the interviews was conducted in a private and quiet room in the hospital environment. For the participating nurses, three questions were considered to start, "How is the process of care in the operating room?" "What factors and conditions are involved in patient care?" "Can you talk about your experiences in the patient care process in the operating room?". The answers were the basis of the next questions. Observation and field notes were also done in operating room. Notes in the field done with a long presence in the environment in order to obtain information obtained from observing how to care for the patient from the moment of entry to the exit and finding things that can be achieved through being in the field and observing, as well as re-examining through interviews. Interviews with patients were conducted on the day after the operation or when the patient has reached a state of stability and peace and is able to be interviewed. The duration of the interviews was between 20-60 minutes. The analysis process began after implementing the text of the interviews on the Word software and transferring it to the MAXQDA 10 software.

Data were managed using software and analyzed through an iterative process of constant comparison of data from one participant to another and comparison of incidents in and between accounts. Data analysis was done according to the method of Corbin and Strauss 2015. Although Glaser and Strauss (1966) were the primary founders of the grounded theory method (16), but considering that Corbin and Strauss provide a better and more accurate guide to the process of conducting grounded theory for researchers, therefore, the Strauss method precedes the Glaser method (17). The analysis method was the three-stage open, axial, and selective coding method of Strauss and Corbin as the basic approach

along with the modified operational model, which is a combined model based on the analysis of Strauss and Corbin (2015) that includes five steps: 1. Open coding, 2. Developing concepts according to their characteristics and dimensions, 3. Analyzing data for the context, 4. Bringing the process into the analysis, and 5. Integration. These categories were used according to the topic, the techniques of asking questions, constant comparison, the technique of slanging and raising the red flag. At the end, the analysis of the context and the process started simultaneously, and a great effort was made to explain the micro and macro processes, and in order to combine and the integration of the created categories and the discovery of the central concept of the overall story of the analysis were presented. Initial coding (line-by-line coding) was implemented after each interview. Focused coding, which involved synthesizing initial codes that made the most analytic sense to categorize the data followed thereafter. A few conceptual categories derived from focused coding of the initial interviews were used for theoretical sampling. More conceptual categories emerged in subsequent interviews. Therefore, theoretical sampling continued. Questions in the interview guide were modified and revised in subsequent interviews to clarify the emerging conceptual categories. In this study, nine conceptual categories were clarified through theoretical sampling. After 37 interviews, theoretical saturation was achieved as no new properties of these conceptual categories were emerging. Theoretical coding was conducted thereafter. Moving to theoretical coding was not entirely a linear process: there were simultaneous memo-writing and constant comparisons between categories and memos and field notes. Further analysis through memo-writing and constant comparative methods revealed that the concept of 'safety route in care' was the core category that both unified the other conceptual categories.

Table 1: An example of a data analysis process

Theme	Categories	Subcategories	Codes
Slippery passage of care	Threatening and risky conditions of care	Hazard fence	-Position-related injuries -Possibility of equipment malfunction -Possibility of falling -Possibility of error -High risk of cautery burns
		Life-threatening conditions	-Severe and life-threatening bleeding -Anesthesia complications -Damage (rupture) to blood vessels and nerves
	In the straits of stress and pressure	The stressful nature of the work	-Stress of working with Attend -Requires a lot of knowledge and skill -Need for a lot of coordination -Stress of extensive operations -Stress of unexpected events/incidents
		Carrying out responsibilities in a workplace with disrespectful behavior	-The burden of disrespectful and offensive behavior at work -Undermining and ignoring the knowledge, experience, and assistance of nurses -Deep and long-lasting emotional wounds
	Lack of understanding of the sensitive surgical situation	Ignorance	-Insufficient knowledge -Lack of awareness of the consequences of mistakes
		Irresponsibility	-Negligence -Not trying to improve skills at work -Lack of responsibility -Absence of attendance (repeatedly leaving room)
		Indifference and arrogance	-Insufficient concentration -Carelessness

Table 1 provides the analysis details of one category. To ensure the validity and reliability of the study, data robustness rigor was used, which emphasized writing multiple notes, theoretical sampling,

and accuracy in coding and categorization. Also, emphasis was placed on comparisons between and among data to strengthen the accuracy and diversity levels. In order to make the generalizability of the created theory more appropriate to the context and field under study, theoretical sampling with maximum diversity was also carried out, which is evidenced by the diversity of the study samples. The researcher carefully selected key informants, combined data collection methods such as in-depth interviews, field notes, note-taking, reviewing literature on the situation under study, and integrating time in participatory observations such as conducting hospital observations in the morning and evening shifts to ensure data validity. Continuous review, simultaneous analysis of data, and continuous comparison of data and categories for similarities and differences, allocating sufficient time for interviews, and following up on disagreements regarding code clarification via email or in person and focus on the topic in relevant settings, and observer review were used to obtain real data (17).

Criteria of credibility, originality, resonance and usefulness were used to evaluate the quality of the emerging substantive grounded theory. Credibility was achieved mainly by obtaining rich data through interviews, compiling detailed written transcripts of interviews and making extensive field notes. Extensive and constant comparison procedures between observations and categories were also conducted to establish credibility. Originality was attained through reflexivity process such as writing memos and reflective journals and by referring to the literature to explore whether the analysis provided a new conceptual rendering of the data.

External auditing was also a way to assess consistency; in the sense that we gave the data to a researcher who was not involved in the research to see if he had the same understanding of the data? Would he draw the same conclusions from the data? When the reports, manuscripts, and research notes were given to another researcher, similar findings were extracted and the points of disagreement were reviewed more closely to ensure that the data were objective. To ensure transferability and appropriateness, or generalizability, of the results to other groups and similar settings; The results of the study were shared with a number of operating room nursing staff, patients, and faculty members who did not participate in the present study to assess their transferability and appropriateness. The outcome of this process, while confirming the findings, was to provide a series of complementary experiences and perspectives that were used in the data analysis process. Peer review included the use of complementary perspectives from colleagues, and manuscript review by participants, faculty, and colleagues familiar with qualitative research. By practicing the researcher's sense of responsiveness, creativity, and sensitivity in the research process, an attempt was made to observe the researcher's acceptance criteria as an essential component of qualitative research, and the supervision of associate professors of qualitative research methods also played a fundamental role in this matter.

Ethical Consideration

The study was approved by the Ethics Committee of the Clinical Development Unit of Loghman Hakim Hospital, Tehran, Iran (ethical code: IR.SBMU.RETECH.REC.1402.653). Informed signed consent was collected from all participants. Before the interview, the purpose and the use of the tape recorder were explained to the participants, and the written permission to record their voice was obtained from them. The time and location of the interviews were chosen according to the participants' convenience. Data were managed anonymously, ensuring privacy criteria according to GDPR.A.

Results

The participants in this study were 32 hospital staff and 5 patients who were candidates for non-emergency surgery. Regarding the staff, 65.8% of the participants were female with a mean age of 35.04±6.04 years and 11.5±6.20 years of work experience in the operating room, and 60% of the patients were male with a mean age of 51.11±3.24 years (Table 2).

The results of the analysis showed that the operating room nurses were affected by the “Slippery passage of care” in the context of "Tthreatening and risky conditions of care", " In the straits of stress and pressure" and "Lack of understanding of the sensitive surgical situation", which affected the care of the patient in the operating room. The main concern of these nurses is "To maintain the patient's safety in the slippery passage of care". To achieve this goal, they use the main process of "Trying to maintain balance and safe care". This process included "relying on values", "deciding to

improve performance", "reviewing" and "seeking support". The outcome of these efforts was "safe care" and the sub-categories of the outcome included "maintaining vigilance", "assertiveness and authority", “continued patient safety”, and “patient reassurance and peace” (Figure 1).

Table 2: Characteristics of participants

Variable			N (%)
Operating room staff	**Gender**	Female	24 (65.8)
		Male	14 (36.2)
	Education	High school	2 (24)
		Associated Degree	11 (34.3)
		Bachelor	13 (40.6)
		Master of science	2 (6.25)
		PhD	4 (12.5)
	Age	Mean ± SD	35.04±6.04
	Work experience		11.5±6.2
Patients	**Gender**	Female	2(40)
		Male	3(60)
	Age	Mean ± SD	51.11±3.24

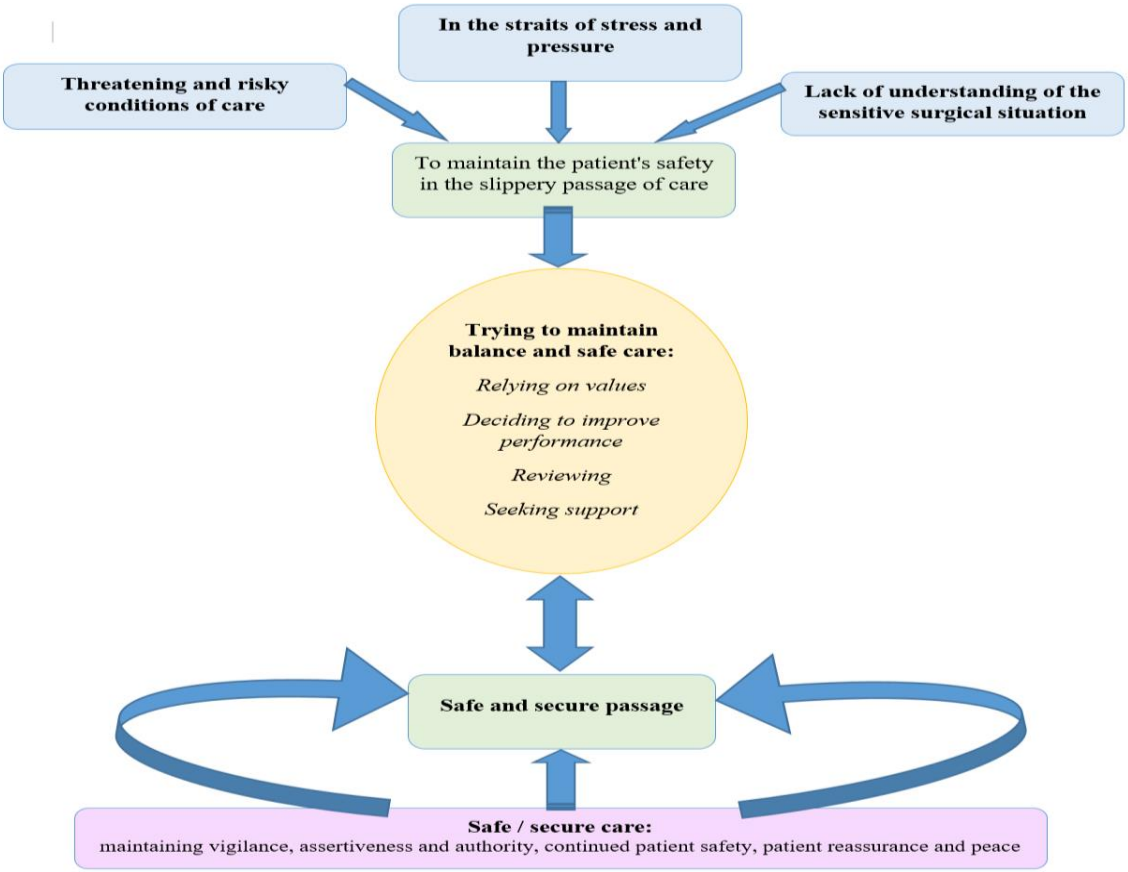

Figure 1: **Patient care process in the operating room**

Table 3 presents the main categories and subcategories of safe/secure care, and the most important quotes from each section are listed. In total, the study included three themes, 10 categories, and 34

subcategories.

Table 3: Main theme, categories, subcategories, and codes emerged from data analysis

Theme	Categories	Subcategories
Slippery passage of care	Threatening and risky conditions of care	-Hazard fence -Life-threatening conditions
	In the straits of stress and pressure	-The stressful nature of the work -Carrying out responsibilities in a workplace with disrespectful behavior
	Lack of understanding of the sensitive surgical situation	-Ignorance -Irresponsibility -Indifference and arrogance
Trying to maintain balance and safe care	Relying on values	-Adherence to ethics -Belief in spirituality -Adherence to professional commitments -Self-surrender
	Deciding to improve performance	-Patience -Strive for team satisfaction -Strive for placement/decision to improve -capabilities -Improvement of communication -Coordination -Trying to be one step ahead
	Seeking support	-Report violence to the head nurse -Heartache with a colleague -Report to the office
Safe care	Maintaining vigilance	-Continuous attention to the patient -Continuity of knowledge and practice -Companionship with the patient
	Assertiveness and authority	-Resistance to unreasonable requests -Insisting on principles of safe care
	Continued patient safety	-Patient Non-Release -Companion -Continuous Assessment
	Patient reassurance and peace	-Attention to multiple caregiving roles -Responding to patient needs -Reducing patient anxiety -Being with family

Slippery passage of care

In this study, operating room nurses have experiences and issues in the treatment care process that are influenced by contextual conditions and make it difficult to provide optimal and safe care. The analysis process found that contextual condition which influences on the actions of the operating room nurses were under the concept of “Slippery passage of care”. In this theme, three categories are included. The categories were “Threatening and risky conditions of care", " In the straits of stress and pressure" and "Lack of understanding of the sensitive surgical situation”. The process is both sequential and circular in nature. These phases unfold sequentially within each clinical experience.

Threatening and risky conditions of care

In this section, participants discussed the potential threat landscape for the operating room manager and explained the risks related to pre-, intra- and post-operative procedures as well as potential complications arising from technical hazards. Participants explained how the patient's health is at a high risk and high threat level in the complex operating room environment, and the general structure of this category was expressed in the following two subcategories:

Hazard fence

The patient in the operating room is surrounded by numerous potential hazards. Operating room nurses, especially with increasing knowledge and experience, are aware of these hazards and focus care on preventing them.

" …Unfortunately, falls are not something that should happen, but they are too common. The patient is waking up and if we do not anticipate the patient's condition well, it can happen at any moment. And if it does happen, all kinds of superficial to serious injuries can occur..." (Participant No. 17).

Life-threatening conditions

The operating room is a very complex and dynamic environment due to the equipment, the type of interventions, and the patients' conditions. It is accompanied by various incidents, sometimes sudden and unpredictable, and sometimes uncontrollable, such as sudden and severe bleeding, the effects of anesthetic drugs, etc., which threaten the patient's life.

" …After surgery, despite everything happening correctly, after extubation, the patient may develop apnea, or their blood pressure may drop sharply and suddenly, sensation and movement may suddenly become impaired, or spinal complications may suddenly cause acute disorders in vital signs in some patients..." (Participant No. 21).

In the straits of stress and pressure

Operating room nurses in the present study were affecting by stressful and high-pressure conditions that made their performance as difficult as crossing a strait. The set of statements in this section discusses the skill required for each surgery, working with diverse and advanced equipment, dangerous and complex incidents and incidents, working with an attendant (a skilled person), fear of being submerged under water, along with the burden and pressure of abusive behavior, humiliation, blame, devaluing, being looked down upon, and being looked down upon. In this section, participants discussed the stress of working with a specialist and sometimes unprofessional work environment. and the general structure of this category was expressed in the following two subcategories:

The stressful nature of the work

The operating room is a high-pressure environment where split-second decisions can mean the difference between life and death. Surgeons, nurses, anesthesiologists, and other staff must work with intense focus and coordination. The emotional toll, physical demands, and constant urgency contribute to a uniquely stressful atmosphere, making resilience and teamwork essential qualities for those who work there.

"...So much scope, so many operations, so many fields... Let's go to this operation, okay.... to that operation... well, you have to know everything... all this equipment.... Something could happen at any moment, we have to be careful not to hit a vein.... At that time, the patient's life is in danger, and even in many cases, in critical situations of the operation, the surgeon's behavior becomes very abrupt and bad, and although there is no mistake on our part, the inappropriate behavior causes us a lot of stress, and it has happened to me many times…."(Participant No.2).

Carrying out responsibilities in a workplace with disrespectful behavior

Working in an operating room demands precision, concentration, and effective teamwork. However, when disrespectful behavior—such as harsh criticism, condescending remarks, or dismissive attitudes—enters the environment, it can disrupt communication and lower morale. Healthcare professionals may struggle to perform their duties effectively when they feel undermined or belittled. This not only affects their mental well-being but can also compromise patient safety. In such a high-stakes setting, mutual respect and professionalism are essential to ensure optimal outcomes and a supportive work culture.

"...I have 12 years of experience, but often times, with unprofessional behavior, lack of shift cooperation, not doing things properly, and not paying attention to our experience, it makes your mind constantly busy and your nerves are not calm enough to attend your shift... "(Participant No.13).

Lack of understanding of the sensitive surgical situation

This category is derived from the three subcategories of “ignorance’, ‘irresponsibility/negligence’, ‘indifference and arrogance’. The participants stated that the lack of knowledge and experience of nurses has an effect on their care process and causes a threat to the health of the patient, especially

in younger nurses. This ignorance causes irresponsible and careless behaviors in the matter of risky care in the operating room. One of the participants says about the inattention and carelessness of some colleagues:

"...If my colleague had been paying attention from the beginning, the bandage roll won't have been lost. I looked to find it everywhere, so when I do not find it, I will not calm down. I'm thinking about it would be stayed in the surgery field!!!" (Participant No.15).

Trying to maintain balance and safe care

Considering that most of the activities of the operating room nurses required relaxation, concentration and attention, the main goal of the operating room nurses was to "trying to balance and sage care" in order to maintain optimal performance and the safe passage of the patient from the operating room. Therefore, all the actions, emotions and interactions were aimed at achieving it by "relying on values", "deciding to improve performance and seeking support.

Relying on values

The most important strategy used by the nurses was to do things accurately and correctly and provide safe care. This sub-category included the concepts of "responding to the call of conscience, fear of punishment, doing work for God's pleasure, empathy with the patient as someone who could be a member of his/her family". One of the participants says about response to the call of conscience:

"...The only thing that makes me take care of the patient well is my conscience. Conscience is very important in this work. I work in such a way that my conscience is calm, in fact, I cannot satisfy myself that I do not consider the patient." (Participant No.1).

Deciding to improve performance

This subcategory included the concepts of tolerance, enhancing abilities/stabilizing the position, getting support, reporting the incident, heartache with colleagues. One of the participants in the expression of tolerance said:

"...We don't care much anymore, we tolerate them, we say that maybe their misbehaviors related to their stress or to their hard work, they are also human beings, we don't care much about their misbehavior... It's as if we don't pay attention to what they say…." (Participant No.16).

Seeking support

When nurses encounter violent behavior for various reasons, they seek help from superiors, supervisors, and others. This method included "reporting incidents and conflicts to the operating room supervisor or the surgical attendant and talking with colleagues." The purpose of this work is to reduce the effects of conflicts on self and performance. One of the participants said:

"...These problems and issues that arise disturb one's mind, I went to talk to my colleague, he told me not to be upset, we have also seen these encounters, he talked to me and I calmed down." (Participant No.3).

Safe care

Effective strategies that the operating room nurses used following their main concern, to maintain patient safety, led to the emergence of safe care outcomes for the patients. Safe care had the sub-categories of the outcome included "maintaining vigilance", "assertiveness and authority", "continued patient safety", and "patient reassurance and peace"

Maintaining vigilance

By trying to maintain balance, the nurses in the operating room tried to prevent the deviation of the mind, thoughts and mental concentration in order to take care of the patient vigilantly. Participant 8 said:

"I pay attention to the surgeon during the operation. I am also aware of the anesthesia. If there is any bleeding, I will call the anesthesia. I am not only in the operation room. I'm taking care of everything; you know… I'm aware of everything. The surgeon may cut the nerve or vein… I should be also aware of these things."

Assertiveness and authority

The nurses were defending the patient's rights with assertive behavior and resistance against the doctors and some colleagues who intentionally or unintentionally were caused discomfort or harm to the patient. Such behaviors were sometimes friendly and sometimes serious. The nurses used authoritative behaviors if they were assured of support and avoided these behaviors in case of punishment or lack of support.

Participant 3 says about her assertiveness to keep the patient's personal territory:
"He wanted to take the patient in lithotomy position half an hour earlier, I realized the patient will be bothered and suffer in this position, therefore, I told him that I will not allow you to position the patient, I will myself position her later."

Continued patient safety

The nurses achieved the outcome of continued patient safety through safety care. This sub-category included the concepts of cautery burn prevention, fixation and maintaining skin integrity in pressure. Participant 5 said:
"…If the patient is obese, for example, there is a high possibility of him/her falling during the operation. We fix him/her with a belt whit a special method."

Patient reassurance and peace

In the present study, the nurses achieved the outcome of patient reassurance and peace through safe care. This subcategory included "establishing a sense of humor between the nurse and the patient, breaking the barrier between the patient and the nurse, and effective interaction". Participant 8 said:
"The patient sometimes asks us, is my surgeon doing well? We tell him/her: yes, don't worry... our surgeon is very good."
Participant 18 said*:*
"The patients are worried about their personal privacy, they asked us to keep them about privacy after anesthesia. we say them; we are here, don't worry, we will cover you. They usually feel relieved."

Line story

The operating room is a complex and stressful place that requires speed, accuracy, concentration, skill, specialized knowledge, coordination, companionship, prediction, and support. The patient is surrounded by many dangers and various threats, all of which are likely to happen. It is as if the patient is on the edge of a razor, that any carelessness, mistake, error, which happens for any reason such as carelessness or inattention, lack of preparation, neglect, etc. may threaten patient's life. Operating room nurses understand the importance and threatening nature of patient care in this context and try to provide the best services to achieve safe care for the patients encountering slippery passage. In order to achieve this goal, they rely on their inner values such as faith in God, answering the inner call, and make decisions that improve their performance. In case of any mistake and its repetition, they try to revise their performance and, in this way, they also get help from the support of others. In the process of role modeling, more experienced and professional nurses tried to increase the sensitivity and concentration in work and draw attention to the vital aspects of work, especially in new employees, as well as monitoring and providing a supportive environment by the person in charge. Creating a safe environment and crystallizing sensitive and accurate personalities would help provide safe care. The support, help and compensation of the shortcomings, especially the newbies was very impressive. They considered this issue as an important factor in safe care of the patient and emphasized the role of knowledge and experience in the work to provide safe care. What was clearly expressed in the nurses of the operating room was the decision to excel in safe performance. This excellence in performance, which was done with the ultimate goal of the safe passage of the patient from the operating room, was a response to the problems that arose and the direct and indirect experiences of the incidents that occurred in the room.

Discussion

The results of the study showed that the main concern of the nurses who work in operation room is ″To maintain the patient's safety in the slippery passage of care″. In the other word, they know the patients are surrounded by risky and different threats during any operation period, therefore this dangerous environment is their main concern and they try to keep the patient's safety. In a similar study about nursing students' experiences in operation room, the nursing student expressed their emotions about this educational experience. They revealed that the operation room is very exciting environment, however they felt fear because of emergent and risky condition of the patients. The nursing students reported stress and anxiety because of the patients' condition. They said that many of experienced nurses in the operation room work rapidly and without any stress (18). However, in this

study, the participants with 11.5 years' work reported stressful and high-pressure conditions that made their performance as difficult as crossing a strait. One of the cause of stress may be related to hazard materials in the operation room. A Turkish study revealed that the main concern of nursing staff in operation room is about health of workers in the risky environment of the operation room and to work with different occupational risk factors like radiation or sharp tools (19) .

One of the factors which may cause stressful condition in the operation room is related to lack of understanding of the sensitive surgical situation and irresponsibility of some of the colleagues in the operation room. Responsibility like some of the other personal characteristics such as holistic nursing care, nursing vocation, personal standards of excellence, attention to detail and perfectionism may facilitate the patients' safety in the operation room (20). In the present study, the analysis process showed that the nurses tried to maintain the patient's safety based on their personal values like conscience, God pleasure and empathy with the patient. These values also facilitate the patients' safety in the surgical conditions.

The study showed that the nurses in the operating room tried to prevent the deviation of the mind, thoughts and mental concentration in order to take care of the patient vigilantly. In a similar study, it's confirmed that if the nurses or the other workers in the operation room, focus on their tasks by good monitoring the situation with the best cooperation and communication with the other team member, you might not delay or lose your attention and make a mistake in the operation room (21).

After comparing the statements from all the participants in the present study, patient safety was identified as the major role of all the operating room nurses. Patient safety was the major theme that emerged from this study, and it showed that operating room nurses play a pivotal role in intraoperative patient safety. The operating room nurses consider that the intraoperative safety of patients depend on the overall intraoperative nursing care as nurses are in close proximity to patients. Also, nurses can act as advocates when the patients cannot do for themselves.

One of the important findings of the study is that the nurses tried to rely on reviewing and seeking support as strategies of keeping patient safety. A qualitative study confirmed that team-based work via smooth flow, united effort, communication and positive attitude lead to effective team performance and coming over the barriers, adaptability and mutual support (22). Patient safety in the operating room is a top priority and a shared responsibility among all medical staff. It involves preventing errors, ensuring proper communication, and closely monitoring the patient's vital signs throughout the procedure. Surgical checklists, and strict adherence to protocols help reduce the risk of complications. Any lapse in focus, teamwork, or communication can jeopardize a patient's well-being. Therefore, a culture of vigilance, respect, and collaboration is essential to protect patients and achieve successful surgical outcomes. Teamwork is a crucial and valuable element on both individual and organizational levels and helps improving knowledge, experience and skills to make corrective actions. In a qualitative study, the nurses explained their responsibility for the other colleagues to confirm patient safety and ensure all things were available and sterile during operation time (23). Nursing care in operating room creates confidence-based relationship and event-related wellbeing. It ensures persistent wellbeing and safety by keeping a watchful eye. Thus, strategies should be designed to make a safe environment that enhances wound healing, recovery, and wellbeing (24). Moreover, frontline employees including nurses are in best position to watch and distinguish concealed preconditions that inadvertently advance from anticipated behaviors (25).

The present study also affirmed that adherence to universal protocol is a crucial component of patient safety. Similarly, Collins et al. (2014) also declared that checklists alone cannot counteract all errors. In addition, effective comprehension of the nature of gaffes, perception of the intricate dynamic between frameworks and people, and making a just culture support a common vision of patient safety (26). Furthermore, the Association of peri-operative Registered Nurses (AORN) recommends to articulate commitment to safety at all levels of the organization. Safety must be valued as the top priority in every healthcare organization and incentives and rewards must be provided to promote patient safety culture. In addition, AORN recognizes that the patient safety initiatives will fail in the absence of viable safety culture (27). In the same direction in our study, one of the participants said that she pays attention to everything and everyone to ensure the patient safety.

One of the other findings in the study is that the nurses decided to improve their performance with increasing tolerance, enhancing their abilities, getting support, reporting the incident and heartache with their colleagues. In another study in Iran, the researcher found that the nurses improved their

personality traits such as moral courage and spirituality. They took some examples of using spirituality in their practice and pointed to God and the Judgment Day as an important inhibitor in everyone life (28). In this study, many participants pointed to God and Judgment Day. Some of the nurses in our study expressed that they try to bear many difficulties just for faith to God.

Assertiveness and authority are the outcome of safe care in this study. The authority of the nurse, especially when the safety of the patient is at risk, can be in conflict with the authoritarianism of the surgeon. The study showed that sometimes the authority of the nurse as a person who knows patients well and tries to care the patient holistically, lead to satisfaction of the patient and safe care. In the other study, the researchers revealed that sometimes surgeon's authoritarianism as an interpersonal factor may lead to burnout for nurses who work in operation rooms (29).

One of the outcomes of safe care in this study was patient reassurance and peace. This concept may consider as nurse competency. In the same direction, one qualitative study in Sweden showed that the nurses try to create a relaxed, quiet and friendly atmosphere especially during greeting the patient in operation room. This concept was categorized as Person-centered care and one of the elements of nurse competencies in operation room (30).

The most important finding of the study was related to the concept of patient safety as the main concern of the nurses in operation room. However, the study was done in educational hospitals in Tehran which effects the generalizability of the findings.

Implications for practice

The findings of the present study showed that the main concern of the nurses in operating room was to maintain the patient's safety. The nurses try to maintain the patient's safety in the slippery passage of care with relying on values, deciding to improve performance, reviewing and seeking support. The outcome of these efforts was safe care which lead to vigilance, assertiveness and authority, continued patient safety, and patient reassurance and peace. Nursing managers can use the results of this research in macro and micro planning of operating room nursing as well as in determining patient care policies in the operating room in order to achieve safe care.

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Conflicts of interest

The authors declare no competing interests.

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Authors' Contributions

S.M. contributed to conceptualization, methodology, formal analysis, investigation, data curation, writing – original draft, and review & editing. M.P., S.J.P, F.A. and F.J.T. performed conceptualization, methodology, writing – review & editing, and supervision. All authors read and approved the final manuscript.

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