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Experience of Nurse Anesthetists In Overcoming The Ineffectiveness of Spinal Anesthesia Drugs: A Qualitative Study

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Abstract

Background Spinal anesthesia is the most commonly performed anesthetic procedure. There are 5% of spinal anesthesia out of 15 million surgeries per year in the world but with a frequency of ineffectiveness of around 1 to 17%, the researcher is interested in researching the experience of nurse anesthetists in overcoming the ineffectiveness of spinal anesthesia drugs. The purpose of this research is to find out how the experience of nurse anesthetists in overcoming the ineffectiveness of spinal anesthesia drugs.

Methods This study used a descriptive qualitative method with a phenomenological approach. Data collection used an in-depth interview method, with snowball sampling method. There were five participants who participated in this study with predetermined inclusion criteria and exclusion criteria.

Results The results of the study obtained four themes: first, Factors affecting spinal anesthesia. Second, safety and comfort of the procedure. Third, countermeasures for spinal anesthesia ineffectiveness. Fourth, obligations of the nurse anesthetist.

Conclusions In conclusion, Based on the experience of nurse anesthetists, factors that influence ineffectiveness include human resources both in experience and insight, preparation from patients, injection techniques, and drug quality.

Keywords: breast cancer, experience, mastectomy, qualitative

Introduction

Nurse anesthetists are health workers who have received special nursing education and will provide anesthesia care to patients. Nurse anesthetists are entitled to organize and be responsible for health services in the form of anesthesia management care before, during, and after anesthesia (Permenkes, 2016). The nurse anesthetists are responsible for patient monitoring, administration of anesthetic drugs, and maintenance of the patient's well-being during the entire period of anesthesia. One type of anesthesia that nurse anesthetists have used frequently in recent years is spinal anesthesia. More than 300 million surgical procedures are performed worldwide each year.

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Approximately 5% or 15 million surgical procedures are performed using spinal anesthesia techniques (Khan et al., 2017). The success of these procedures can be influenced by a number of factors, including patient age, patient position during the procedure, patient-based, technique, anesthesiologist, drugs, type of surgery, and cerebrospinal fluid characteristics as well as subarachnoid coverage (Demilie et al., 2024; Fitriani et al., 2020). However, it should be noted that the incidence of spinal anesthesia failure varies in the range of 1-17% (Yüksek et al., 2020).

Based on a preliminary study conducted by conducting random interviews with 3 nurse anesthetists at RSUD dr. Soedirman Kebumen, it was said that from July to September 2023 there was an average of 232 spinal anesthesia treatments per month, about 5% of 232 spinal patients per month experienced the ineffectiveness of spinal anesthesia drugs, the ineffectiveness of spinal anesthesia drugs could be caused by storage factors involving a direct impact on drug quality. Based on the above background, the researcher is interested in conducting research on the experience of nurse anesthetists in overcoming the ineffectiveness of spinal anesthesia drugs at RSUD dr. Soedirman Kebumen.

Methods

This study used descriptive qualitative research with a phenomenological approach. This research was conducted in IBS from June 24, 2024, to July 15, 2024, at RSUD dr. Soedirman Kebumen. The population studied was nurse anesthetists who experienced ineffectiveness of spinal anesthesia drugs at RSUD dr. Soedirman Kebumen. The activity studied was the experience of nurse anesthetists in overcoming the ineffectiveness of spinal anesthesia drugs. The data collection technique used snowball sampling of as many as 5 nurse anesthetists. This research has been approved by the ethics committee with letter number No. B.LPPM-UHB/559/06/2024.

The instrument in this study was a semi-structured in-depth interview approach. A voice recorder, field notes with an interview guide, and blank notes to record participants' conditions, attitudes, and facial expressions were the tools used during the interview procedure. The data analysis used in this study used an adaptation of Collaizi's method to determine keywords, categories, and themes from the interviews conducted during the research. At the end of the research phase, the researcher followed up with the participants to get clarification on the identified themes to ensure that the findings were accurate.

Results

This study involved post mastectomy clients totaling 6 (six) participants. The number of participants is in accordance with the saturation of data obtained from the analysis of participants' answers. The participant characteristics table is as follows:

Table 1. Charateristic of participant

Code	Participant	Age	Length of employment	education
P1	Mr. M	53	20 years	Rn.
P2	Mr. A	48	12 years	Nurse Anesthesia
P3	Mrs. T	44	13 years	Nurse Anesthesia
P4	Ms. R	24	1,4 years	Nurse Anesthesia
P5	Mrs. A	38	5 Months	Nurse Anesthesia

Table 2. Triangulation

Code	Participant	Age	Length of employment	education
T1	Mr. A	40	8 years	Rn.
T2	Mr. R	44	10 years	Rn.

This study obtained four themes related to the experience of nurse anesthetists in overcoming the ineffectiveness of spinal anesthesia drugs. The four themes include; 1) Factors affecting spinal anesthesia 2) Safety and comfort of procedure 3) Management of spinal anesthesia ineffectiveness 4) Obligations of nurse anesthetists.

Table 3. Theme 1

Code	Coding	Category	Theme
P1	Burnout, Stressor, Ineffective communication	Factors affecting spinal injections	Factors affecting spinal anesthesia
	Patient's ASA		
	Change in position		
P1 P5	Precision of injection		
P1 P2	Location of injection		
	Abnormal spine		
P3	Speed of injection (barbotage)		
P1 P2 P3 P4 P5	Correct patient position		
P4	tense patient position		
P1	drug mixing		
P2	Drug storage		

P3	Expired drug
P2	Storage temperature
P4	Drug quality

Factors affecting spinal anesthesia. Participants who have been working in the field of anesthesia for a long time, are aware of the work pressure received, this can affect individual performance at work, as seen from the level of boredom at work which continues to be done every day so that anesthesiologists feel bored and burdened by work pressure as a result they tend to be less enthusiastic and less focused which can cause ineffective communication, this affects non-technical problems in the act of giving spinal anesthesia. This can be seen from the participant's statements based on the interview results:

> *"...The level of boredom in the team or work, stressors arising from the environment such as ineffective communication..."* (P1, Mr. M, 53 years old)

Skills in actions such as spinal injections are one of the important aspects that every nurse anesthetist must know. Precision in determining the location and performing injections will affect the success or failure of spinal anesthesia, the wrong location such as too low can cause inappropriate spinal analgesics, so spinal injections are also adjusted to the operating area. Not only that, the speed of injection can also affect whether or not spinal analgesics will be given effectively. This can be seen from the participant's statement based on the results of the interview:

> *"...for example, ee injecting drugs that are ee not right on the drug target..."* (P1, Mr. M, 53)
> *"taking an injection location that is too low so that the need for surgery and our estimation of achieving the level of spinal analgesia is not appropriate,..."* (P1, Mr. M, 53 years old)
> *"... have to adjust the operating area" [focused looking forward with occasional glances at the interviewer]* (P2, Mr. A, 48 years old)
> *"well keep up the speed when administering spinal anesthesia drugs..."* (P3, Mrs. T, 44th)
> *"...yes most of all from the injection technique" [looking towards the floor]* (P5, Mrs. A, 38 years old)

The patient's anamnesis is no less important, namely the patient's ASA. Abnormal patient conditions with higher risks can affect the patient's response to anesthesia administration which allows the ineffectiveness of spinal anesthesia. This was obtained from the interview results.:

> *"...the patient has experienced a high degree of ASA that will also affect the patient's response to the administration of anesthesia" (P1, Mr. M, 53 years old).*

Positioning factors both from proper positioning to changes in position during and after injection are one of the most frequent factors and have a higher incidence of risk affecting the action of spinal anesthesia. Patients who are in a tense, stiff, and mobile position are said to interfere with and affect the effectiveness of spinal anesthesia. Therefore, determining the right sitting position and relaxing the patient during the injection is important. this also applies to patients with spinal anatomy.

> *"when in the injection there is a change in position, then the drug does not enter completely." [focus looking at the table in front] (P1, Mr. M, 53 years old)*
> *"Yes we prepare the patient ee maybe from the sitting position," (P1, Mr. M, 53 years old)*
> *"The first thing is starting from the patient's position, adjusting the patient's position ... abnormal spinal anatomy ee it will also affect" [focused looking forward with occasionally looking at the interviewer] (P2, Mr. A, 48 years old)*
> *"... too upright, ... both shoulders are tense like not relaxed..." [looking towards the floor] (P4, Mrs. R, 24 years old)*

Drugs play an important role in the effectiveness of spinal anesthesia, not only from patient and procedure factors. Drugs that are not well maintained due to inappropriate storage such as storage temperature to expired drugs will affect the drug's response to the patient's body. The following statement is taken from the interview results:

> *"...maybe the way the medicine is stored is not correct, or what is the name ee mixing for example with other drugs or with other liquids... maybe the dose is not correct...." (P1, Mr. M, 53 years old)*
> *"...the drugs may be expired, the storage is also a little bit might affect the effectiveness of the drug," (P2, Mr. A, 48 years old)*
> *"...some incidents may be from there are types of spinal drugs that must be ee limited in temperature..." (P2, Mr. A, 48 years old)*
> *"...drug storage maybe yes, drug storage or old or expired drugs..." P3, Mrs. T, 44 years old)*
> *"The second thing is the quality of the medicine... among the medicines, there may be a quality that is not the same even though the production is the same" (P4, Mrs. R, 24 years old).*

Table 4. Theme 2

Code	Coding	Category	Theme
P1	minimizing patient ASA	Standard Operating Procedure services	Safety and comfort of procedure
P4	Correct patient position		
P5			
P1	change of position after injection		
P4			
P2	sitting position		
	side lying position		
P2	relaxed patient position		
P3			
P4			
P4	patient interuction		
P1	injection precision		
P5			

P2 P5	injection location
P3	injection speed (barbotage)
P2	storage temperature
P2 P3	drug storage
P3 P4	drug quality, pharmaceutical service consultation

Safety and comfort of procedure. The improper position of the patient is an important factor in spinal anesthesia, therefore interventions are needed so that the patient's position is correct and does not hamper the service, a sitting position that is too rigid and upright can be positioned to relax and look down and reduce additional movement during spinal anesthesia. Not only that, abnormal spinal anatomy can be overcome either by sitting or lying on its side like a shrimp. Even after spinal anesthesia action also needs to be considered. The following statement is taken from the results of the interview:

"...we position the spine straight. Then ee what, don't move the patient much..." (P1, Mr. M, 53 years old)
"Yes, after the patient has been given a spinal injection and the medicine has entered, the patient is immediately put to bed in a supine position..." (P1, Mr. M, 53 years old)
"... the easiest is the sitting position, with the back relaxed head down ... to lie on the side ..." (P2, Mr. A, 48 years old)
"it [position] affects the difficulty of giving [spinal anesthesia], I should be sorry," P3, Mrs. T, 44th)
"... that means we have to e mee, give instructions to the patient to sit, sit first in a comfortable position ... we have inserted the drug and it turns out that the drug reaction is less, well we, first we head down, we head down first, then if we are already head down we instruct the patient to clear his throat or cough," (P4, Ms. R, 24 years old)
"Then prepare the sitting position, which must be precise, for example, the patient should look down and not move too much like that." (P5, Mrs. A, 38 years old)
"...the patient has experienced a high degree of ASA that will also affect the patient's response to the administration of anesthesia" (P1, Mr. M, 53 years old).

The act of injection is the next most important factor to consider. Precision in injection and determining the location of the injection must be following the operating area, for example, the lower operating area must adjust the injection slightly down and it is hoped that the analgesic is sufficient for surgery, and vice versa. The speed of injection can also affect the reaction of the drug to be administered, injecting too fast or too slow can cause ineffectiveness and even too high a spinal block. The following statement is taken from the results of the interview:

"Well, we have to make sure that the spinal needle is really in the right position..." (P1, Mr. M, 53 years old)
"Well if the area below for example in the pedis, in the toes, that maybe we can take it below..." (P2, Mr. A, 48 years old)
"...the point is, don't be too fast, don't be too slow, use feelings if I, [laughs]." P3, Mrs. T, 44 years old)
"... the injection technique, the spinal needle is not right, and then taking the space height of the injection location," (P5, Mrs. A, 38 years old).

Patients with higher ASA classifications (e.g., ASA III or IV) tend to have more complex medical conditions, such as chronic diseases or serious systemic disorders. These conditions may affect the metabolism and distribution of anesthetic drugs in the body, thus requiring careful preparation. For example, for patients with cardiovascular problems, the risk of bleeding should be prepared such as preloading fluids in advance, while if the patient has respiratory problems such as a history of asthma then more attention is given to premedication. The following statements are obtained from the interviews:

""...already hypovolemia or long fasting, it should be given a fluid preload first..."
"Usually, asthma patients are given premedication first," (P1, Mr. M, 53 years old)

Storage of spinal anesthesia drugs is very important to maintain their quality and effectiveness. The drug should be stored at the recommended temperature and following the storage procedures so that the quality of spinal anesthesia drugs can be maintained from the production process to the patient. However, if there is a drug that is less effective even though the storage is correct, then immediately confirm this with the pharmacy service. This effort aims to enable the pharmacy team to evaluate and handle the drug appropriately, ensuring that the patient will receive safe and effective treatment. The following statement is taken from the interview:

"... there are storage procedures, some are at room temperature, some must be put in the refrigerator ... maybe the storage of drugs is too long ... this may also need research too, so before the drug is used it must be shaken first." (P2, Mr. A, 48 years old)
"... It's just that usually the pharmacy staff usually ask if there is a drug that has no effect, then just ask 'where is the ampoule?' Like that, the pharmacy staff wants to check it, if we are just implementing it" P3, Mrs. T, 44 years old)
"Then the second thing is if there is a problem with the quality of the medicine, we confirm it with the pharmacy" (P4, Mrs. R, 24 years old)

Table 5. Theme 3

Code	Coding	Category	Theme
P2 P3 P4 P1 P2	Re-injections	Anesthesia techniques	Management of spinal anesthesia

P3	Combination with general anesthesia	ineffective ness
P4	Consultation with an anesthesiologist	
P5		

Management of spinal anesthesia ineffectiveness. Spinal anesthesia that does not show the expected effectiveness may require re-injections to achieve optimal results. This procedure should be done in consultation with the anesthesiologist to ensure that it is appropriate for the patient's condition and the medical procedure being performed. The following statement was taken from the interview:

> *"If for example there is ineffectiveness, if there is absolutely no effect, we usually repeat it, so we repeat the spinal," (P2, Mr. A, 48 years old)*
> *"When the medicine doesn't work, first there are those who wait until it takes effect for a long time, waited for maybe more than 15 minutes, then there are those who are immediately re-injected, re-spinalized" P3, Mrs. T, 44 years old)*
> *"... that means we consult with the anesthesiologist whether this wants to be re-spinalized like that," (P4, Mrs. R, 24 years old)*
> *"We consult our senior colleagues, or especially the anesthesiologist because we work as a team here with the stylist and the anesthesiologist, like that." (P5, Mrs. A, 38 years old*)

This was also stated by the triangulated person who confirmed that the re-injections were given following the doctor's consultation. The following statement was taken from the interview results.

> *"What I saw was injected again, given an injection in the spinal again, usually twice, there are several patients who are like that,"* (T2, Mr. R, 44 years old)

Ineffective spinal anesthesia may be considered in combination with general anesthesia in consultation with the anesthesiologist. The combination with general anesthesia aims to ensure that the patient experiences minimal to no anxiety and pain during the surgical procedure. This combination is often chosen to increase the effectiveness of anesthesia and provide better protection against discomfort. The following statements were taken from the interviews.

> *"...we have to treat symptomatically with oxygen, even bagging, masking and so on." (P1, Mr. M, 53 years old)*
> *"But if there is already an effect but it is not strong enough, we can use a combination with general anesthesia..." (P2, Mr. A, 48 years old)*
> *"... if they don't want to be re-injected, it is usually directly mixed with it, combined with GA." P3, Mrs. T, 44 years old)*

This was also stated by the triangulated who confirmed the combination of general anesthesia given. The following statement was taken from the interview:

> *"Sometimes in spinal anesthesia, he is still restless or afraid, then he will be given sleeping drugs, which means he will be put to sleep." (T2, Mr. R, 44 years old)*

Table 6. Theme 4

Code	Coding	Category	Theme
P1	Preparation of anesthesia machines, tools, drugs, and patients,	preparation and evaluation	Obligations of nurse anesthetists
P5			
P2	Preparation of the anesthesia triad		
P1	service provider experience		
P5			
P1	responsiveness		
P4			
P1	self-control		
P5			
P1	adding anesthetic insight		
P5			
P1	evaluating causes, and evaluating actions.		
P2			
P3			
P4			

Obligations of nurse anesthetists. Preparation of the anesthesia machine, equipment, drugs and patient is essential to ensure the safety and success of the surgical procedure. The anesthesia machine should be thoroughly checked to ensure it is functioning optimally and free from leaks or malfunctions. Anesthetic drugs must be prepared with the correct dosage and according to the patient's needs, and always available in sufficient quantities. The following statement was taken from the interview.

> *"such as the layout of tools and machines needed in the operating team such as the placement of the anesthesia machine itself"*
> *"Then the next is the preparation of drugs and emergency equipment that is not complete..." (P1, Mr. M, 53 years old)*
> *"We provide education to patients so that they are physically and mentally ready to be given anesthesia". (P1, Mr. M, 53 years old)*
> *"The important thing for surgery is that we must prepare the anesthesia triad," (P2, Mr. A, 48 years old)*
> *"... usually the patient is prepared first, the patient must be educated ... ee then after that prepare everything needed for what spinal techniques are rich in drugs, then what are the tools for spinal anesthesia" (P5, Mrs. A, 38 years old)*

Anesthesia care procedures inevitably have risks that will occur, dealing with undesirable situations is part and parcel of a nurse anesthetist's job. Therefore, having confidence and the ability to remain calm is essential to effectively manage such situations. Confidence comes from strong knowledge, adequate training, and sufficient clinical experience. A confident nurse anesthetist can make quick and

appropriate decisions, reduce the risk of complications, and provide the best care to the patient. The following statement was taken from the interview.

> *"Then also from eee the experience of the anesthesia service provider itself..." (P1, Mr. M, 53 years old)*
> *"then we as anesthesia human resources should not panic to face or handle..." (P1, Mr. M, 53 years old)*
> *"then also regarding the scientific basics of anesthesia must always be improved ..." (P1, Mr. M, 53 years old)*
> *"Because the speed of assessment affects the speed of action." (P1, Mr. M, 53 years old)*
> *"then the second thing is we have to be responsive, immediately consult to sp, An, that's all." (P4, Mrs. R, 24 years old)*
> *"Most of all, we have to have high work experience so that things don't happen so that everything runs smoothly," (P5, Mrs. A, 38 years old)*
> *"... most of all, we don't panic, we remain calm in responding to these things" (P5, Mrs. A, 38 years old)*
> *"ee then we must not get bored to keep learning ... and also we are also looking for experience ..." (P5, Mrs. A, 38* years old)

The statement was also confirmed by triangulation that nurse anesthetists are quick to respond to unexpected clinical conditions and provide comfortable and safe services. The following statement was taken from the interview results.

> *"Based on my experience here, the point is that the nurses are swift and dexterous if there are cases like that, immediately, that's all," (T1, Mr. A, 44 years old).*

Evaluation of the causes and actions that have been taken in anesthesia is an essential process to assess the effectiveness and safety of patients during anesthesia procedures. It involves a thorough review of all steps taken, including drug administration, anesthesia techniques used, and patient response during and after surgery. With appropriate measures in place, risks can be minimized, and patients receive safe and effective care. The following statement was taken from the interview.

> *"the first stage we have to assess the cause of the ineffective anesthesia event, what is the cause, we make a decision, Conclusion..." (P1, Mr. M, 53 years old)*
> *"... but maybe we also have to evaluate the actions we take with a different level of difficulty." (P2, Mr. A, 48 years old)*
> *"hu'uh evaluation again, evaluating what we have done" P3, Mrs. T, 44 years old)*
> *"important thing, means we have to evaluate yes," (P4, Mrs. R, 24 years old)*

Discussion

This study found that the factors that influence the ineffectiveness of spinal anesthesia are human resources, patient ASA, patient position, injection technique, and drug storage. Some of these factors have different characteristics. Stressors experienced by nurse anesthetists can affect the ineffectiveness of spinal anesthesia. High work pressure, lack of rest, boredom at work, and a non-conducive work environment can hurt performance and concentration when performing anesthetic procedures. Prolonged stress can decrease the nurse anesthetists' ability to perform injection techniques with precision, potentially leading to failure in achieving optimal anesthetic block. Therefore, stress management and psychological support for medical personnel are essential to ensure that they can work effectively and efficiently.

Research conducted by Demilie et al., (2024) found that the patient's ASA did not affect the effectiveness of spinal anesthesia drugs. However, based on this study, participants emphasized that the physical status of ASA must be considered and adjusted to the patient's clinical condition before anesthesia because it can affect the effectiveness of spinal anesthetic drugs. For example, patients with cardiovascular problems should be consulted first with a cardiologist before anesthesia is administered. This is important to ensure that the patient's heart condition is well managed and the risk of complications during anesthesia is minimized. In addition, patients with bleeding risks should be prepared with fluid preloading to maintain hemodynamic stability and reduce the chance of bleeding events during the procedure.

The position of the patient during a spinal anesthesia procedure greatly affects the distribution of anesthetic agents in the subarachnoid space. Improper positioning such as excessive straining and movement can impede drug flow and reduce the effectiveness of the blockade. Commonly used positions are the sitting or lateral position, depending on clinical needs and patient comfort, the side sleep position can also be performed when the patient is not able to sit. Correct positioning must be ensured to maximize the anesthetic effect and minimize the risk of complications. Therefore, interventions from the prescriber and agreement with the patient need to be considered to act according to the SOP (Demilie et al., 2024).

Correct injection technique is the key to successful spinal anesthesia. Factors such as the accuracy of the injection, the selection of the injection point, and the speed of the injection speed (barbotasse), play an important role in determining the success of the procedure. Less precise techniques can lead to failure to achieve the desired blockade too high spinal blockade, and even serious complications such as nerve injury (Demilie et al., 2024). This study found that drug storage can also affect the

ineffectiveness of spinal anesthesia. The quality and effectiveness of anesthetic drugs are greatly influenced by the way they are stored. Drugs stored under inappropriate conditions, such as improper temperature or exposure to excessive light, may degrade and lose potency. Proper storage by pharmaceutical guidelines is essential to ensure that drugs remain effective when used. However, in studies conducted by Demilie et al., (2024); Gill et al., (2020); and Yüksek et al., (2020) that drug storage was not considered, only the dose and type of anesthetic drugs were studied that could affect the ineffectiveness of spinal anesthesia drugs.

This study explains that the patient's position can be overcome by paying attention to aspects and cooperation from the patient himself. The patient is placed in a sitting position to facilitate access to the subarachnoid space. If the patient appears tense or stiff during the injection process, it needs to be addressed immediately, as muscle tension can make it difficult for the provider to reach the subarachnoid space with precision, which is very important to ensure even distribution of the anesthetic agent. Muscle tension can also cause a shift in needle position, potentially directing anesthetic drugs to unwanted areas, reducing the effectiveness of the anesthetic block, or even causing complications such as nerve injury. Therefore, it is important to provide clear instructions to help the patient feel more relaxed before and during the injection (Fitriani et al., 2020).

Injections that have been performed need a change of position to a supine or head down lying position depending on the reaction of the anesthetic drug can be recommended to support even distribution of anesthetic drugs. Similar to research conducted by Girard & Savoldelli, (2024).

The speed of injection also has the risk of changing the anesthetic effect, participants also explained that when the anesthesia provider has high experience, the injection speed can be estimated using “feeling” to ensure that the injection speed is neither too slow nor too fast. If the injection is done too slowly, the anesthetic drug may not spread evenly in the subarachnoid space. This may result in inadequate anesthetic distribution and reduced blockade effectiveness. Conversely, if the injection is performed too quickly, the risk of complications increases, leading to a sudden increase in pressure within the subarachnoid space and the risk of unintended blockade of the higher or higher spinal area. This can result in side effects such as decreased blood pressure or disturbances in central nervous system function (Rehatta et al., 2019).

This study found that drug storage is one of the factors that must be considered to avoid the ineffectiveness of spinal anesthesia drugs. Storage of anesthetic drugs should be carried out by the recommended temperature to maintain the stability and quality of the drug, usually in a cool and dry place or refrigerator to prevent deterioration. Mixing anesthetic drugs is usually done by the anesthesiologist to get the desired effect (Butterworth et al., 2022).

However, if there is a problem with anesthetic drugs, such as damage or inappropriate quality, consult the pharmacy service immediately.

Most other studies emphasized drug mixing and dosing over drug storage. However, based on participants' statements, drug storage is no less important in maintaining the effectiveness and safety of anesthesia.

Inappropriate storage, such as exposure to extreme temperatures or humidity, can damage the stability of the drug and reduce its effectiveness despite proper mixing and dosing. Therefore, equal attention should be paid to drug storage procedures to ensure that anesthetic drugs remain in optimal conditions so that they can deliver the desired results and reduce the risk of complications during the procedure.

Based on the participant's statement, re-injections by nurse anesthetists are carried out when there is an ineffectiveness of spinal anesthesia drugs to ensure that patients get the desired anesthetic effect. Before re-injecting, the nurse anesthetist will evaluate the cause of the ineffectiveness. Then in the re-injecting procedure, the dose given can vary depending on the direction of the anesthesiologist. Usually, the anesthesiologist gives half to full doses based on the initial dose that has been given. This decision is based on clinical evaluation and patient condition to ensure optimal anesthetic drug distribution and minimize the risk of complications.

This study also explained that the combination with GA is also performed by nurse anesthetists when there is an ineffectiveness of spinal anesthesia drugs. GA can be administered through various methods such as Total Intravenous Anesthesia (TIVA), the use of a Laryngeal Mask Airway (LMA), or intubation, depending on the type of surgery and the anesthesiologist's decision (Girard & Savoldelli, 2024).

Research conducted by Girard & Savoldelli, (2024) suggests that the choice of re-injections or combination with GA is still an important calculation. There are some concerns about repeating spinal anesthesia procedures with two important points to note. Firstly, excessive deployment of the second dose risks causing

high spinal or total blockade, and secondly it theoretically increases the risk of direct nerve trauma, as there is a risk of puncturing the nerve tissue adjacent to the previous injection site. In case of re-injection, additives such as opioids should be omitted and it is recommended to use half the initial dose in case of partial anesthetic effect to reduce the risk of high spinal.

This study explains that consultation with an anesthesiologist needs to be done because in Indonesia the authority for anesthesia is the responsibility of the anesthesiologist, but it is different if there is a delegation of authority to the anesthesiologist by the anesthesiologist.

Participants said that the experience of the nurse anesthetist is very important and will affect both the responsiveness in assessing and concluding the problem to provide action, as well as self-control to remain calm and not panic when experiencing unwanted things.

Research conducted by Demilie et al., (2024) found that the work experience of anesthesia service providers is a significant factor in the ineffectiveness of spinal anesthesia. Those providing spinal anesthesia with less than 2 years of work experience were 3 times more likely to experience ineffectiveness compared to those with more than 5 years of experience.

Participants also stated that the preparation of anesthesia machines, tools, drugs, and patients are important steps in ensuring the success and safety of anesthesia procedures.

Further results of this study found that evaluation of causes, and Evaluation of actions, by conducting a thorough evaluation of actions, nurse anesthetists can identify errors or deficiencies in procedures that may have contributed to anesthesia ineffectiveness, as well as make improvements to improve the quality of the anesthetist and the effectiveness of anesthesia in the future, Gill et al., (2020) also revealed that the ineffectiveness of spinal anesthesia can be minimized by proper evaluation of the patient's anatomy related to the spinal anesthesia procedure, proper storage of anesthetic drugs, and selection of the right dose and the right position during injection and immediately after administration until the drug adheres to the tissue. However, most other studies do not explain the significant influence and frequency given to the preparation and evaluation to avoid the ineffectiveness of spinal anesthesia drugs.

Conclusion

This study explored the experiences of nurse anesthetists in managing spinal anesthesia drug ineffectiveness. This study found four themes, including factors affecting spinal anesthesia, safety and comfort of action, overcoming spinal anesthesia ineffectiveness, and the obligations of nurse anesthetists. Based on the four themes, it was found that before anesthesia is administered, the most important first thing to remember is preparation and evaluation in action. Extensive experience can also affect performance both psychologically and anesthesia actions. Then it was found that drug problems, especially drug quality, which can be affected by storage procedures and storage temperature, can affect the ineffectiveness of spinal anesthesia and should be consulted immediately if the drug quality is not good. Shaking drugs before use is an option of some outside anesthesiologists, but it risks invisible deposition. Patients who have a high ASA risk such as in the cardiovascular, respiratory, and others also have a risk of complications to the ineffectiveness of spinal anesthesia should be consulted in advance, prepare preloading for patients at risk of bleeding to prepare appropriate premedication for patients. The patient is then given directions regarding the anesthetic action to be performed.

Limitations

This study has limitations in the interview venue, namely in the Central Surgical Installation as the desired approval place for participants to make the interview process, the interview process can be truncated due to sudden interactions from other people on the spot. This can be overcome by trying to find a place or room that is unlikely to have interruptions from other people. In addition, the triangulation in the study also answered questions with closed-ended answers, so the researcher needed to ask again and again to get the appropriate answer from the question.

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Author’s contributions

Made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data: IY, SS, HSM, AM, TH; Involved in drafting the manuscript or revising it critically for important intellectual content: IY, SS, HSM; Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content: IY, SS, HSM, AM, TH; Agreed to be accountable for all aspects of the work in

ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: IY, SS, AM. All authors read and approved the final manuscript.

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Availability of data and materials

The data that support the findings of this study are available from the corresponding author, [IY], upon reasonable request

Declarations

Ethics approval and consent to participate
Not applicable

Competing Interest

The authors declare no competing interest

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