Recovery room nurses' knowledge regarding postoperative airway emergencies in adults in private hospitals in Northern Gauteng, South Africa

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Abstract

Background: *Recovery room nurses should have the knowledge and skill to identify and manage postoperative airway emergencies in adult patients.* **Aim:** *To determine the knowledge of recovery room nurses regarding postoperative airway emergencies in adult patients in private hospitals in Northern Gauteng.* **Methods:** *A quantitative, descriptive, contextual research design was adopted, using a survey as research method. The research instrument was a questionnaire in the form of a measurement test. The sample consisted of all registered nurses on duty at a given time that volunteered to complete the questionnaire. Convenience sampling was thus applied. A thorough literature review, evaluation of the questionnaire by experts and a pilot study enhanced validity and reliability of the research.* **Results:** *The researcher analyzed the data, using descriptive statistics. The average score of respondents was forty-three per cent (43%), which was twenty-seven per cent (27%) below the set competency indicator of seventy per cent (70%). Only one respondent achieved a score above seventy per cent (70%).* **Conclusion:** *It was found that respondents lacked knowledge regarding six specific airway emergencies in postoperative adult patients. As the study was contextual, findings could not be generalized to other populations.*

Key words: *Recovery room; postanaesthesia nursing; postoperative complications.*

Background

In most cases recovery room nurses are responsible for the care of the postoperative patient in the immediate postoperative phase, and must therefore possess strong clinical assessment skills.[1] It is also essential that recovery room nurses are knowledgeable about the prevention and proper treatment of postoperative complications associated with airway emergencies. The application of knowledge of life-threatening conditions could prevent postoperative complications and prolonged hospitalization, as well as additional financial strain on the patient and/or medical insurance. Recovery room staff should have expertise in airway management and advanced life support.[2] It is therefore imperative that research be done to establish the knowledge base of recovery room nurses who manage patients in the immediate postoperative phase and who have to deal with emergencies as they arise.

According to Morgan, Mikhail and Murray, respiratory problems are the commonest and most serious complications in the post-anaesthesia care unit (PACU).[3] Oosthuizen stated that life-threatening dysrhythmias, inter alia, could be the result of respiratory complications.[4] Most of the respiratory problems are associated with airway obstruction, hypoventilation and hypoxia. Odom

stated that respiratory complications ranging from soft tissue obstruction to pulmonary oedema manifested as the primary life-threatening morbidity factor in the PACU or recovery room.[5]

Respiratory complications arise quickly and often unexpectedly. In many cases, the patient presenting with postoperative airway emergencies did not present pre-operatively with significant risk factors or other symptoms that could have indicated the possibility of any postoperative airway emergencies.

Aim

The aim of the study was to determine the knowledge of recovery room nurses in private hospitals in Northern Gauteng, South Africa, regarding postoperative airway emergencies.

Key concepts

The terms 'post-anaesthesia care nurse' and 'recovery room nurse'

It is important to note that the term 'post-anaesthesia care nurse' is used for a registered nurse in the United States of America (USA) who manages a patient during the immediate post-anaesthesia phase. In South Africa, nurses working in this area are known as recovery room nurses. Reference is made to the term 'post-anaesthesia care nurse' whenever the researcher refers to or cites USA-based sources; otherwise the term 'recovery room nurse' is used. The same principle applies when reference is made to the terms 'post-anaesthesia care unit' or 'PACU' and 'recovery room'.

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In the South African context, a recovery room nurse is defined as a nurse who is registered with the South African Nursing Council (SANC) and who is employed as a professional nurse in a recovery room. The recovery room nurse has either an additional post-basic nursing qualification or appropriate experience in post-anaesthesia or intensive care nursing.

Postoperative airway emergencies

Postoperative airway emergencies are post-anaesthesia related complications that originate in the respiratory system. These complications affect the flow of air (ventilatory status) and/or gas exchange in the lungs (oxygenation) of a patient who has just undergone surgery under general anaesthesia. These emergencies include soft tissue obstruction, laryngeal oedema, laryngospasm, bronchospasm, noncardiogenic pulmonary oedema, aspiration, hypoventilation and hypoxia.

Methods

A quantitative, descriptive, contextual research design was adopted to determine the knowledge of recovery room nurses regarding postoperative airway emergencies in adult patients in private hospitals in Northern Gauteng. In a contextual study, phenomena are studied because of their intrinsic and immediate contextual significance.[6]

In this study, a survey[7] was conducted using a structured questionnaire[8] with multiple-choice questions for data collection. The questionnaire consisted of two sections. Section 1 obtained biographical data from respondents, and the data were used to describe the research population. Section 2 consisted of multiple-choice questions and was compiled with the single purpose of measuring the knowledge of recovery room nurses regarding postoperative airway emergencies in adult patients.

The layout of the questionnaire is summarized in Table 1. The complete questionnaire is available on request from **annali.botha@up.ac.za**.

Population and sample

The research population included all registered nurses who were employed in the recovery rooms of five private hospitals in Northern Gauteng at the time of conducting the research. The researcher decided on convenience sampling as this study was done for a dissertation of limited scope. The sample then consisted of recovery room nurses who were on duty at the time of data collection and who volunteered to complete the questionnaire. Convenience sampling can introduce serious bias, as certain elements may be overrepresented or underrepresented. Generalization based on such samples is therefore extremely risky.[9]

Validity, reliability and competency indicator

Conducting an intensive literature review prior to compiling the questionnaire ensured validity and reliability of the research instrument. Experts reviewed the questionnaire for content validity. The questionnaire was also presented to experts in the field of study to obtain their opinions about the minimum mark (competency indicator) that could be expected of respondents as safe practitioners in a recovery room. The experts included an anaesthetist, a trauma nurse, two critical care nurses, and a lecturer in operating-theatre techniques. The consensus opinion was 70%, meaning that a respondent had to score at least 70% in this test to be regarded as knowledgeable in the field.

Ethical considerations

Written consent was obtained from the Faculty of Health Sciences' Research Ethics Committee within the University of Pretoria (UP). Written consent was also obtained from hospital authorities that were involved in the study.

Anonymity and confidentiality was ensured throughout the study. Respondents were fully informed about the aim of the research and consented to partake in the study through the voluntary completion of the questionnaire.

TABLE I: LAYOUT OF QUESTIONNAIRE		
Section	Question	Description of question and rationale for inclusion
Section 1 Biographical data	1,2 & 3	• Information was requested about the respondent's level of qualification, years of experience and appointment level. These data were used to describe the sample and population group and to establish relationships between the variables and the respondents' level of knowledge.
Section 2 (Theme 1 – 3) In-depth knowledge regarding postoperative airway emergencies	4-21 (4 – 9) (10 – 15) (16-21)	Eighteen multiple-choice questions were grouped together into three themes and numbered 4-9; 10-15 and 16-21. • Respondents had to match descriptions of anatomical and/or physiological disorders to a specific airway emergency. • Respondents were asked to match the clinical signs to the specific airway emergency. • Respondents were asked to match specific treatment to an airway emergency. These questions were important because they tested the in-depth knowledge needed to make a fast and accurate diagnosis when working in the clinical situation. Recovery room nurses, as members of a multidisciplinary team, have to strive for safe, quality patient care. Knowledge about disorders, clinical signs and treatment of emergencies can prevent a life-threatening situation.
(Theme 4) Knowledge regarding six specific postoperative airway emergencies that were treated as six separate knowledge units	22-27 (22) (23) (24) (25) (26) (27)	Six multiple-choice questions, each consisting of four statements, assessed respondents' knowledge about six specific postoperative airway emergencies often encountered in the recovery room, namely: • Soft tissue obstruction • Laryngeal oedema • Laryngospasm • Bronchospasm • Noncardiogenic pulmonary oedema • Aspiration These questions tested respondents' knowledge regarding risk factors, other predisposing factors, and medication that could contribute to postoperative airway emergencies. Knowledge of these aspects is important because a patient's medical history could include risk factors or other predisposing factors that could guide the nurse in diagnosing the specific life-threatening airway emergency.

Data analysis, scope and limitations of the study

Descriptive statistics were used to analyze data, and calculations were done by the researcher. The research could be considered as contextual as it was conducted in a constricted area, namely the recovery rooms of operating theatres in private hospitals in Northern Gauteng. Thus, findings of the study could not be generalized to other populations. Conclusions were valid for the specific context only.

Results

Response rate

Forty-three questionnaires were handed out to recovery room nurses in the recovery rooms of participating hospitals, and twenty-one respondents completed and returned questionnaires.

Section 1: Biographical data

The biographical data are summarized in Table II.

TABLE II: BIOGRAPHICAL DATA	
Level of qualification	*Number of respondents*
Recovery Room Experience	21
Diploma in Theatre Technique	3
Anesthesia / Recovery Room Course	2
Intensive Care Experience Only	2
Diploma in Intensive Care	1
Number of years of experience	*Number of respondents*
< 1 year	3
1-2 years	4
3-6 years	5
7-9 years	1
10> years	8
Appointment status	*Number of respondents*
Permanent Staff Member	19
Part-time Staff Member	1
Session Worker	1
(n = 21)	

Section 2: Knowledge base

This section assessed the actual knowledge of respondents concerning postoperative airway emergencies in adult patients and was the main focus of the study. The questions on the six specific postoperative airway emergencies (soft tissue obstruction, laryngeal oedema, laryngospasm, bronchospasm, noncardiogenic pulmonary oedema and aspiration) covered four themes, namely the anatomical/physiological disorder associated with the airway emergency, clinical signs, treatment and general knowledge.

Average percentage scored for each airway emergency

Refer to Figure 1. Respondents attained an average of 43% on questions regarding soft tissue obstruction, while the percentages for the four different themes on laryngeal oedema averaged out at only 19%. The average percentage for questions correctly answered on laryngospasm was 33%, while respondents attained an average of 51% on questions regarding bronchospasm. The percentages attained by respondents on questions regarding noncardiogenic

Figure 1: Column graph indicating average percentage scored for each airway emergency
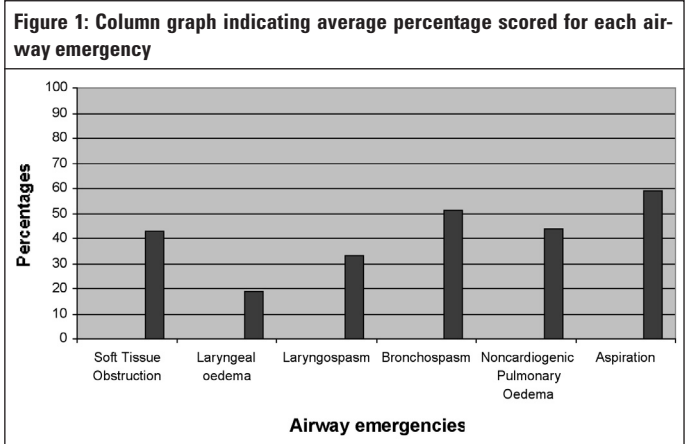
pulmonary oedema averaged out at 44%, while 59% was calculated as the average for questions on aspiration.

### Mean percentages attained for different themes

The questions on the six airway emergencies were regrouped into the four identified themes (anatomical/physiological disorder; clinical signs; treatment; and general knowledge), and the questions pertaining to each theme were addressed collectively. A percentage for each theme was calculated for each candidate, and then the mean scores were calculated. The mean scores are illustrated in Figure 2.

Figure 2: Column graph indicating mean scores attained on different themes
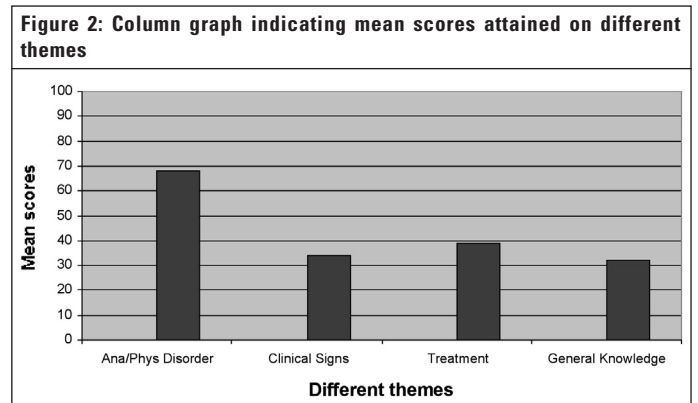
Recovery room nurses were fairly knowledgeable about the anatomical and/or physiological disorder associated with the specific postoperative airway emergency in adults - mean score 68%. However, a mean score of only 39% was calculated with regard to the treatment of postoperative airway emergencies and an even lower mean score of 34% was attained with respect to the identification of clinical signs and symptoms of postoperative airway emergencies in adults. A mean score of only 32% represented the general knowledge of respondents about risk factors.

Average percentage attained by each respondent for the questionnaire

The average percentage attained by each respondent for Section 2 (knowledge base) of the questionnaire was calculated. Figure 3 illustrates the average percentages attained by each respondent who participated in the survey. The mean score was 43%, which is well below the set competency indicator of 70%. Scores ranged from zero to 75%, and only one respondent attained a mean score above the competency indicator. Standard deviation (SD) was calculated at 20, 83.

Figure 3: Column graph indicating average percentages attained by respondents
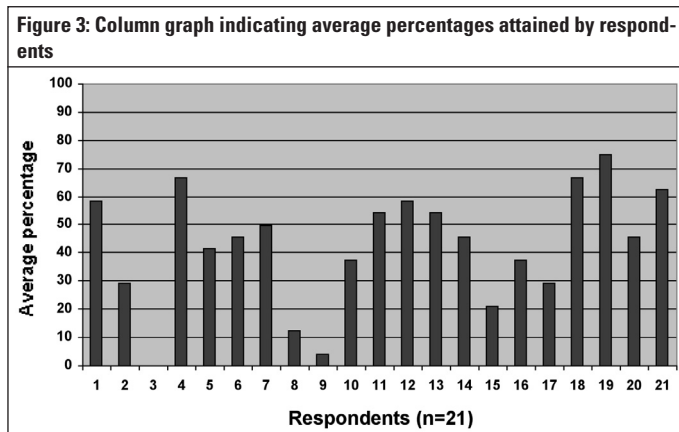
Relationship between knowledge level of respondents and additional qualifications

The averages scored by groups of respondents who had additional qualifications pertaining to recovery room nursing are set out in Table III. The averages were compared to the average attained by respondents who had no additional qualifications.

TABLE III: ADDITIONAL QUALIFICATIONS OF RESPONDENTS		
Additional qualification	Number of respondents	Average of group %
Theatre technique	3	24
Intensive care nursing background	3	42
Anaesthesia / Recovery room course	2	50
None	13	56

Three respondents who had a Diploma in Theatre Technique achieved an average score of 24%. Respondents (n=3) who either had intensive care experience and/or a Diploma in Intensive Care Nursing attained an average score of 42%. Two of the respondents completed an anaesthesia/ recovery room course and their scores averaged out at 50%. The group of respondents (n=13) who had no additional qualifications attained the highest average score, 56%.

Relationship between knowledge level of respondents and years of experience

Average scores of respondents when grouped together according to years of experience in the recovery room were set out in Table IV.

TABLE IV: AVERAGE SCORES OF GROUPS OF RESPONDENTS		
Years of experience	Number of respondents	Average for group %
< 1 year	3	32
1-2 years	4	46
3-6 years	5	53
7-9 years	1	29
≥10 years	8	40

A clear tendency did not emerge from these data. Nurses with seven to nine years of experience in this field scored the lowest (average 29%) followed by those with less than one year of experience (average 32%). The highest average score, 53%, was attained by the group with three to six years of experience.

Discussion

As the total average percentage achieved by the group of twenty-one respondents was 27% below the set competency indicator of 70%, it can be concluded that the knowledge of respondents about postoperative airway emergencies in adults was far below standard. The lowest total average score obtained by a respondent was zero and the highest was 75% (Figure 3). As was indicated previously, only one respondent achieved a percentage on or above the competency indicator – a performance standard that should be attainable by every recovery room nurse.

The researcher estimated and expected a response rate of twenty-five completed questionnaires, representing 58% of questionnaires distributed. However, the response rate of twenty-one out of forty-three, representing 49%, was regarded as satisfactory. Huysamen stated that acceptable response rates varied between 37% and 65%, depending on circumstances. He emphasized that a higher response rate did not necessarily indicate better representation of the population.

As convenience sampling was used, bias might have been a problem in this study. Recovery room nurses had a choice to participate or not. The aim of the study was known to prospective participants. There was a possibility that some recovery room nurses did not have the confidence to complete the questionnaire, because they might have argued that they lacked knowledge. The average percentage of the study population might therefore be even lower.

When results were broken down into the four different themes, it became evident that questions about the anatomical and/or physiological disorder of airway emergencies were answered best, while questions about the correct treatment of disorders were answered second best (Figure 2.) Clinical signs associated with disorders were less known and general knowledge about risk factors scored the lowest average percentage. Respondents' specialized knowledge regarding treatment and clinical signs of airway emergencies was far below standard.

Similar studies like this one could not be found. However, a study was conducted on the impact of the South African Nursing Council Regulation, Regulation R.212, on the training of theatre nurses in the northern area of the Eastern Cape Province in South Africa.[11]

Some of the findings were as follows:
- The majority of respondents in this study (85, 4%) indicated that they never had the opportunity to be trained, in order for them to be able to manage emergencies.[11]
- For tasks specified in this study, according to their own rating, 51, 2% of the respondents regarded themselves as not competent. This included performing cardiopulmonary resuscitation (CPR).[11]
- The majority of the respondents (92, 7%) felt that the revised training, in accordance with the regulation mentioned, was beneficial to theatre nurses, enabling them to provide quality, holistic care. They believed that, eventually, they would be able to handle emergencies better.[11]

Three other studies assessed critical care nurses' knowledge regarding CPR[12], intra-aortic balloon pump counter pulsation (IABC) therapy[13], and monitoring of central venous and pulmonary artery catheters (CVP & PA)[14]. In all three studies, critical care nurses achieved a higher average score than in this study,

namely 69, 4% (CPR), 53% (IABC) and 56% (CVP & PA), but these scores were also below the set competency indicators.

The recovery room nursing study, as well as the above three studies conducted within the critical care nursing environment, presents a bleak picture of the knowledge that South African nurses with post-basic training in specialized areas have.

Recommendations

Based on findings, the following recommendations were made for clinical practice, nursing education and nursing administration.

Clinical practice

- Recovery room nurses should have adequate and appropriate post-basic education and training to become clinically skilful.
- An in-service training programme orientating newly appointed staff members in the recovery room to important aspects of recovery room nursing, e.g. postoperative airway emergencies, should be implemented.
- Recovery room nurses should be updated on a continuous basis about theoretical and clinical aspects of post-anaesthesia nursing care, as well as current research findings and new technologies in this field.

Nursing education

- The subject content of recovery room nursing should be introduced into the basic training of student nurses.
- The practical component of recovery room nursing education should be broadened so that competent post-operative nursing care could be facilitated in a safe environment.
- Post-basic courses for recovery room nurses could include advanced courses in cardiac life support and pharmacology.
- Clinical preceptors and nurse educators could create and facilitate learning opportunities in the recovery room for different groups of nursing staff such as staff members managing postoperative patients in wards.

Nursing administration

- Nursing administration should implement in-service training programmes for recovery room personnel.
- Whenever candidates are evaluated for employment in the recovery room, great caution should be taken to appoint nurses who have relevant academic qualifications and experience.

Conclusion

Nurses working in the recovery rooms of five hospitals in Northern Gauteng, South Africa, did not have the necessary knowledge and competence needed to render quality nursing care to postoperative patients. Respondents failed to attain the performance standard set for recovery room nurses (competency indicator). The low performance standard was valid with reference to both specialized knowledge and general knowledge of six specific postoperative airway emergencies in adult patients.

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