

CRITICALLY ILL PATIENTS IN THE POSTANESTHESIA CARE UNIT: INTEGRATIVE REVIEW*

Pacientes críticos na Unidade de Recuperação Pós-anestésica: revisão integrativa

Pacientes críticamente enfermos en la Unidad de Cuidados Post-anestesia: una revisión integradora

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ABSTRACT: Objective: To identify articles related to nursing care of critically ill patients during the immediate postoperative period in the postanesthesia care unit. **Method:** Integrative literature review included the following steps: develop guiding question; establish inclusion and exclusion criteria; define the information to be extracted from the study; assess the studies included in the research; interpret the results; and present the review. The following databases and/or portals were used: BVS, PubMed, Scopus, COCHRANE, Web of Science, and CINAHL. **Results:** Seven articles were found. The nursing care evidenced in this study was composed of performing invasive and noninvasive hemodynamic monitoring, pulmonary physical examination, urinary output control, fluid, electrolytes and acid-base balance, laboratory tests of samples and their interpretation, and recommendations for interventions during respiratory distress. **Conclusion:** It became clear that there is a need for a critical eye associated with the nurses' clinical knowledge to provide patients with intensive care during their stay in the postanesthesia care unit.

Keywords: Postanesthesia nursing, Perioperative nursing, Intensive care.

RESUMO: Objetivo: Identificar artigos relacionados à assistência de enfermagem para pacientes críticos no pós-operatório imediato na recuperação pós-anestésica. **Método:** Revisão integrativa, que contempla as seguintes etapas: elaboração da questão norteadora; estabelecimento dos critérios de inclusão e exclusão; definição das informações a serem extraídas do estudo; avaliação dos estudos incluídos; interpretação dos resultados e apresentação da revisão. Foram utilizadas as bases de dados e/ou portais: BVS, PubMed, Scopus, COCHRANE, Web of Science e CINAHL. **Resultados:** Foram encontrados sete artigos. A assistência de enfermagem evidenciada por este estudo compreendeu na realização da monitorização hemodinâmica invasiva e não invasiva, no exame físico pulmonar, no controle do débito urinário, no balanço hidroeletrólítico e acidobásico, nas coletas de exames laboratoriais e sua interpretação e nas recomendações para intervenções em crises respiratórias. **Conclusão:** Evidenciou-se a necessidade de um olhar crítico associado ao conhecimento clínico do enfermeiro a fim de prestar cuidados intensivos durante a permanência do paciente na recuperação anestésica.

Palavras-chave: Enfermagem em sala de recuperação. Enfermagem perioperatória. Cuidados intensivos.

RESUMEN: Objetivo: Identificar los artículos relacionados con los cuidados de enfermería a los pacientes críticos en la recuperación posanestésica inmediata. **Método:** Revisión integradora que incluye las siguientes etapas: la preparación de la cuestión guiadora; lo establecimiento de los criterios de inclusión y exclusión; la definición de informaciones que se extraen del estudio; la evaluación de los estudios incluidos; la interpretación de los resultados y la presentación de la revisión. Se utilizaron las siguientes bases de datos y/o portales: BVS, PubMed, Scopus, COCHRANE, Web of Science y CINAHL. **Resultados:** Se encontraron siete artículos. Los cuidados de enfermería evidenciados por ese estudio comprendieron la realización del monitoreo hemodinámico invasivo y no invasivo, el examen físico pulmonar, el control del débito urinario, el equilibrio de líquidos y del ácido básico, las pruebas del laboratorio de muestras y su interpretación y las recomendaciones para intervenciones en las crisis respiratorias. **Conclusión:** Se evidenció la necesidad de una mirada crítica asociada con el conocimiento clínico de enfermeros para el cuidado intensivo durante la estancia del paciente en la recuperación anestésica.

Palabras clave: Enfermería posanestésica. Enfermería perioperatoria. Cuidados intensivos.

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INTRODUCTION

The postanesthesia care unit (PACU) is the unit responsible for the immediate postoperative care, which is composed of the period the patient leaves the operating room (OR) until he regains consciousness, he eliminates the anesthetics from his body, and his vital signs stabilizes (S1). For this reason, it is a sector whose purpose is to critically assess the postoperative patients, focusing on the prediction and prevention of the complications resulting from anesthesia or a surgical procedure (S2).

Some guidelines should be followed when planning the PACU to guarantee that its set purpose can be accomplished. One of these guidelines is related to the installation of the PACU: it should be situated within the Surgical Center (SC), or in its vicinity, to facilitate the transfer of the anesthetized patient, allow prompt access to healthcare professionals, and, in case a complication occurs, facilitate the referral of the patient back to the OR³.

According to the recommendations made by the Brazilian Association of Surgical Center, PACU and Supply and Sterilization Nurses (SOBECC), the number of beds in the PACU should be in accordance with the number of ORs plus one bed⁴. Every patient should be referred to the PACU after surgery, with a few exceptions, according to Resolution 1.363/1993 from the Brazilian Federal Council of Medicine.

Regarding the role of the nursing team, the care provided by them has changed over time; more and more, the focus is on providing specialized, individualized, and humanized care to the surgical patients². For this, the nurse refers the Standardization of Perioperative Nursing Care (SPNC), which allows the planning of individualized care and identifies the nursing diagnostics⁶.

The nurse, when caring for a patient in the immediate postanesthesia period, should have a specific and specialized knowledge concerning the standard of care to be provided, the anesthetics and their effects, and the pharmacodynamics of anesthesia and analgesia, in addition to knowing about the physiology, pathophysiology, surgical procedures, and the management of potential complications⁷.

It is well known that, for any type of patient in the PACU, the nurse should be watchful of the possible complications resulting from the surgical stress, which can cause various changes in the organic homeostasis, such as hypothermia, blood pressure changes, irregular heartbeat, respiratory

discomfort, alterations in fluid, electrolytes and acid–base balance, and bleeding, among others⁸.

What differentiates a PACU nurse from the nurse who provides care for critically ill patients? The ability to handle and use technology with a careful eye for clinical interventions and hemodynamic effects, which is a profile commonly seen in intensive environments. In 2000, the American Society of PeriAnesthesia Nurses (ASPAN) approved recommendations, which included the need for an adequate personnel to maintain a safe and competent nursing care for the critically and noncritically ill patients⁹. In the ASPAN standards, the nurses who work in the PACU should gain intensive care skills¹⁰.

Another problem is the high demand of surgical patients and the few beds available for the critical care, because of overcrowding, which results in an increase of admission of patients who require intensive care in the PACU. The use of this unit for the admission of critically ill patients, with the need for specialized care or with the risks of hemodynamic instability, has become a routine, seeing that there is a physical space and the appropriate supplies to guarantee support for this type of patient^{11,12}. Admitting a patient from the intensive care unit (ICU) to the PACU raises the question regarding how to guarantee the care for the critically ill patient with a clinical eye, aimed not only at his recovery from the effects of anesthesia but also at his comprehensive care so as to provide him with safe clinical care.

From this concern and from the author's professional experience as a resident nurse at an innovative institution, which introduced the acute care nurse to the critically ill and immediate postoperative care alongside the surgical nurse at the PACU, the need was raised to search the national and international literature for an evidence regarding nursing care for critically ill patients in the PACU.

OBJECTIVE

To identify, in the literature, articles related to nursing care for critically ill and immediate postoperative patients in the PACU, in studies published in the national and international scope.

METHODS

The integrative review is a research method that has a broader scope, as it allows the synchronic inclusion of experimental

and nonexperimental studies, theoretical, and empirical questions. Because of this, it allows for a better understanding of a health problem or phenomenon¹³.

The guiding question for this study was as follows: What evidence is there for the nursing care of critically ill patients in the PACU?

The inclusion criteria for the articles during the research and construction of the integrative review were as follows: articles published in the national and international scientific literature, available in Portuguese, English, or Spanish, accessible in the selected databases, without a year of publication limit, and which portrayed nursing care for critically ill patients in the PACU. The exclusion criteria included studies not available in their entirety, thesis, dissertations, and materials yet to be published, and qualitative studies and discussion, which did not direct nursing care and did not portray the presence of critically ill patients in the PACU.

The following portals and/or databases were used to select the articles: *Biblioteca Virtual em Saúde* (BVS); Elsevier SciVerse Scopus; National Library of Medicine (PubMed); Web of Science; Cumulative Index to Nursing and Allied Health Literature (CINAHL); and The Cochrane Library.

The study was done via an online access, following the preestablished inclusion and exclusion criteria from July 2014. For the research, the following descriptors from Health Sciences Descriptors (DeCS) and Medical Subject Headings Section (MeSH) were used, and the research methodology adopted was the acronym PICO¹⁴, where P stands for patient; I, intervention; C, comparison group, and O, outcome. For this study, the strategy was configured as: P, patients in the PACU, I, postoperative and postanesthesia nursing care, C, does not apply, and O, critical and intensive nursing care.

The research strategy was adapted according to the portal and/or database, that is, the use or omission of quotation marks, parentheses or descriptors, having as guidelines the study question, and the preestablished inclusion criteria of the integrative review.

In the PubMed portals, Web of Science, and the databases, Scopus and COCHRANE the research strategy utilized was as follows: ((*recovery room*) OR (*postanesthesia care unit*) OR *PACU*) AND ((*postanesthesia nursing*) OR (*postoperative care nursing*)) AND ((*critical care nursing*) OR (*intensive care nursing*)).

In the BVS portal, two search strategies were used, because, after the first one, it was noted that articles in Portuguese did not come up. Therefore, to amplify the search and reduce the bias, the strategy with the descriptors in Portuguese

was inserted. The first search was composed of: (*tw:(recovery room)*) OR (*tw:(post anesthesia care unit)*) OR (*tw:(PACU)*) AND (*tw:(post anesthesia nursing)*) OR (*tw:(postoperative care nursing)*) AND (*tw:(critical care nursing)*) OR (*tw:(intensive care nursing)*). While the second search contained: (*tw:(sala de recuperação)*) OR (*tw:(período de recuperação da anestesia)*) AND (*tw:(enfermagem pós-anestésica)*) OR (*tw:(cuidados de enfermagem)*) AND (*tw:(terapia intensiva)*) OR (*tw:(enfermagem em cuidado crítico)*) AND (*instance: "regional"*).

In the CINHALL database, the strategy was applied in the following ways: *MH recovery room* OR *MH postanesthesia care unit* OR *MH PACU* AND *MH post anesthesia nursing* OR *MH postoperative care* AND *MH critical care nursing* OR *MH intensive care nursing*.

At the end of the searches, 1,111 articles were found. After reading the titles and abstracts, 60 articles were selected, according to the preestablished inclusion and exclusion criteria. However, 16 of them were not available to read in their entirety, which resulted in a total of 44 articles.

Among the articles read in their entirety, 37 of them were excluded for not meeting the inclusion criteria; of these, five studies were qualitative, three were case studies, one a clinical discussion, two were final papers, two were published in annals, and 24 did not present the nursing assistance and/or did not report the presence of critically ill patients in the PACU, which resulted in seven articles included into the review (Figure 1).

The articles found in the search were first entered into an Excel table and analyzed, separately, by two evaluators based on their title and abstract. The ones that were analyzed differently were discussed to verify the possibility of their inclusion. Later, after the selection of the texts, they were read in their entirety, and those that did not meet the preestablished criteria were excluded.

For the included articles, data were collected by completing an adapted instrument¹⁵, which is composed of the following: identification of the article, methodological characteristics of the study (type, objective or problem, location and period of the study, intervention or care, assessment method, and instrument of measurement), results, and conclusions.

The articles were classified according to their level of evidence. To assess the quality of these texts, it is necessary to understand the methodological approach in which the study is inserted¹⁶. To assess the scientific evidence, the level of scientific evidence by the type of study was used according to the Oxford Centers for Evidence-based Medicine (CEBM)¹⁷.

To synthesize the articles, a synoptic table was used with the following focus: study, year, and country of publication, objective, type of study, results, and conclusion.

RESULTS

Although the research was done without a restriction for the year of publication, 57.14% of the studies were published after 2000, followed by 28.7% in the 1970s, and 14.28% in the 1990s. From the seven studies selected, all were theoretical, being a review of literature, without a scientific or updating method. According to the classification of levels of evidence in the CEBM¹⁷, all studies presented a level 5 of evidence, a score for low scientific evidence.

Although a few studies referred to critically ill patients, those that were found were close to the observed clinical practice. Descriptions were found regarding nursing care for patients admitted for abdominal aortic aneurysm repair and kidney transplantation; patients with adult respiratory distress syndrome and sleep apnea; and patients with respiratory distress, ineffective breathing pattern, and the need for invasive airway management.

Regarding the place of publication, six studies originated from the United States and one from the United Kingdom. As for the journal, four were published in the *Journal of PeriAnesthesia Nursing*, and one in each of the following: *Journal of Perioperative Practice*, *International Anesthesiology Clinics*, and *American Journal of Nursing*.

Chart 1 presents a panoramic synthesis of the studies included in this review according to country/year, type of study, results, and conclusion.

DISCUSSION

The presence of critically ill patients in the PACU, previously referred to the ICU, can be related to the fact that this unit contains befitting technology and has minimally invasive procedures, which are capable of providing these patients with care. This would explain a larger number of publications, which report this care in the PACU in the 2000s (21st century).

The PACU was developed to provide care for patients who needed continuous monitoring until full anesthesia recovery. Meanwhile, the ICUs were developed to provide care for more critically ill patients, offering nurses who are experienced in

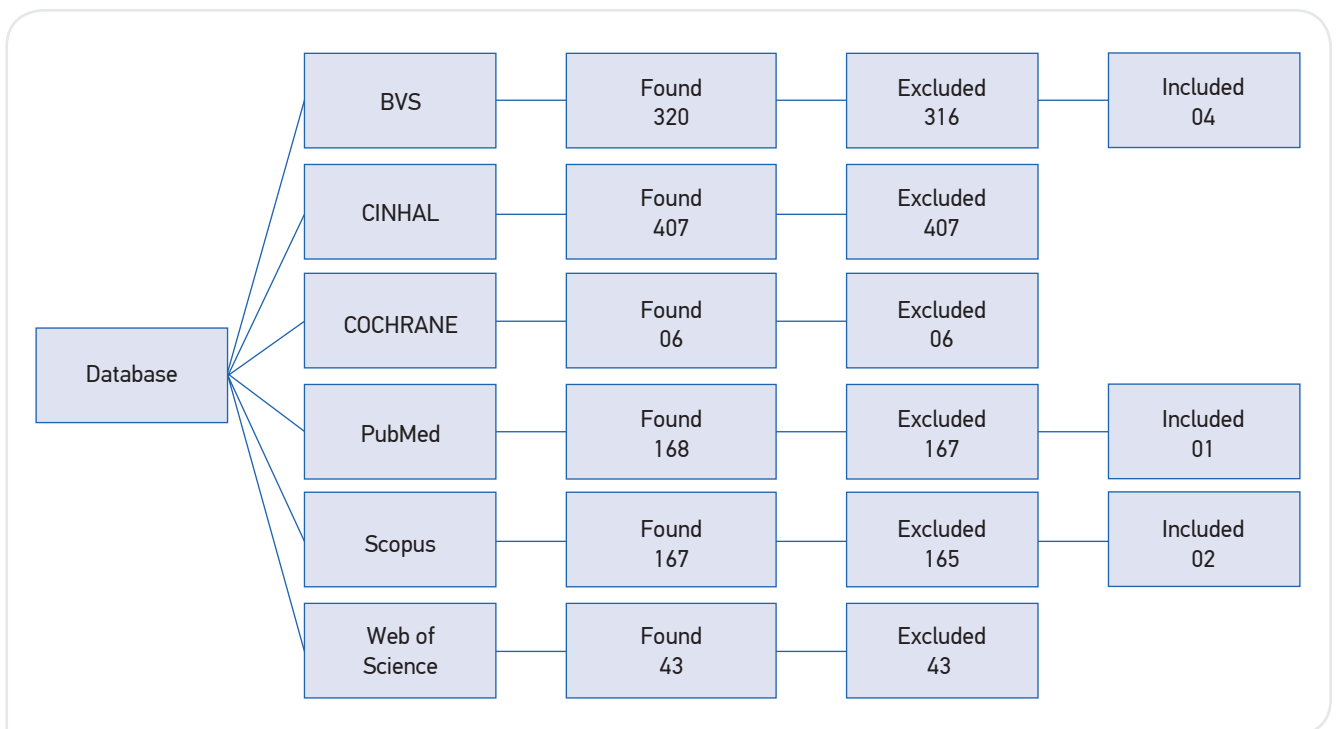


Figure 1. Diagram of the selection of the articles found in the databases that meet the inclusion criteria.

Chart 1. Panoramic synthesis of the studies included in the integrative review. São Paulo, 2014.

Study, year, and country	Objective	Results	Conclusion
S1 ¹⁸ , 2002, United States	Understand the abdominal aortic aneurysm (AAA) and patient management in the first few postoperative hours, for the implementation of nursing care.	On admission, assess skin integrity; laboratory results (renal function and red cells); neurovascular assessment (pallor, pulse, paraesthesia, pain, and paralysis in distal limb) every hour; hemodynamic monitoring (arterial pressure, central venous pressure, temperature, and, in some cases, pulmonary artery and cardiac output); urinary output monitoring; pulse oximetry (focusing on the reading of hemoglobin oxygenation) and pain (management and patient education). Every two hours, perform a physical abdominal examination (auscultation of bowel sounds, distention, nausea, vomit, and fever).	The postoperative patient with AAA needs intensive care; for this reason, quality assistance for the critically ill patient in the PACU can guarantee his adequate recovery, making it unnecessary for him to be referred to the intensive care unit.
S2 ¹⁹ , 2012, United Kingdom	Understand the essentials for caring for intubated patients and noninvasive mechanical ventilation patients in the PACU.	Observe breathing pattern (pulmonary auscultation, peripheral perfusion, and pulse oximetry); hemodynamic monitoring (arterial pressure control, cardiac output and vascular resistance, and pulse oximetry with a focus on the oxyhemoglobin, arrhythmias); control body temperature; assess blood gas results (control of acid-base balance), and observe neurological pattern.	Knowing the respiratory physiology is essential in understanding how various factors affect the homeostasis and the respiratory pattern to provide an adequate care for any patient in the PACU.
S3 ²⁰ , 1996, United States	Discuss respiratory distress syndrome in adults and the care provided in the PACU.	Assess breathing pattern (emphasis on the physical pulmonary examination); control pulse oximetry (focus on the oxyhemoglobin) and the hemodynamic standard (arterial pressure control and cardiac output).	The nurse should know the physiology and the signs/symptoms to assess and for fast intervention.
S4 ²¹ , 2003, United States	Identify the normal and abnormal findings of the renal transplant recipient and the care provided in the PACU.	Assess urinary output; maintain hydration; control the laboratory examinations (biochemistry); assess the hemodynamic standard (arterial pressure and venous central pressure); and manage pain.	When caring for a patient who is a renal transplant recipient, the nurse should be aware of the complications and provide an immediate care.
S5 ²² , 1971, United States	Discuss the factors that are necessary for the adequate respiratory assistance in the PACU.	Observe the breathing pattern and hemodynamic standard (arterial pressure control and cardiac frequency) and skin color; stimulate movement in the hospital bed; call patient's name to evaluate responsiveness; in cases where there is obstruction of airways, manage airways (open airway; aspiration; use of Guedel tube; and hyperextension of the head).	Adequate nursing care reduces pulmonary complications during this critical period for patients in the PACU.
S6 ²³ , 1975, United States	Recognize respiratory distress and provide the appropriate intervention.	Observe breathing pattern (coughing, respiratory rate, and pulmonary auscultation); hemodynamic standard (arterial pressure and cardiac rate); in case of airway obstruction, hyperextend the head by elevating it, turn patient's head sideways, use an oropharyngeal airway, clear secretions, provide adequate ventilation; assess blood gas, and relate it to the patient's physiology.	Recognize signs and symptoms for airway obstruction and intervene as soon as possible, with the intention of reducing risks.
S7 ²⁴ , 2006, United States	Identify the perianesthetic implications associated with the patient who has obstructive sleep apnea syndrome (OSA).	On admission, assess the level of consciousness, the breathing pattern, and hemodynamic standard; control pulse oximetry and pain (ice and transcutaneous electrical stimulation); keep the patient in a lateral position, except when contraindicated; and administer supplementary oxygen.	One must be aware of the risk factors, complications, and the care provided for these patients.

technology and with the proper knowledge concerning the treatment of this type of patient. However, in the last few years, hospitals have reduced the time of admission for procedures and the style of patient care has changed. Currently, a patient admitted for a carotid endarterectomy or a femoropopliteal bypass, for example, is referred to the PACU and is released to the inpatient unit, instead of going to the ICU. This generates a higher demand of intensive care from the PACU⁸.

Some investigations found in this study reported this type of experience. Studies S1¹⁸, S3¹⁹, S4²⁰, and S7²¹ reported nursing care in the PACU for patients admitted for abdominal aortic aneurysm, kidney transplantation, acute adult respiratory distress syndrome, and sleep apnea, whereas studies S2²², S5²³, and S6²⁴ reported alterations in breathing patterns and other critical situations, which could increase the gravity of the situation of the patient. Despite the little methodological rigor of these studies, they can indicate some general guidelines for the practice of the nursing professional in this new reality.

In the findings from this integrative review, monitoring cardiac output was described in studies S1¹⁸ and S4²⁰ as an aiding method for the nurse to assist and determine fluid replacement, as an adequate intravascular volume is maintained through appropriate blood flow, tissue perfusion, and blood pressure. Study S2²² reports blood pressure as an aiding method in diagnosing hypovolemia and hypotension, which may be measured using invasive and noninvasive forms. However, it is essential that the nurses assess the mean arterial pressure so as not to cause any problems in the fluid dynamics. Noninvasive monitoring measurements can facilitate the evaluation of the depth of the anesthesia and adapt pain management. In the anesthetized patient, the objective of the hemodynamic monitoring is to guarantee adequate tissue perfusion and the demand for oxygen, to prevent instability, and to provide the necessary therapy²⁵.

Study S1¹⁸, which involves the postoperative patient for abdominal aortic aneurysm, suggests the use of dopamine to support blood pressure and systolic cardiac output inferior to 90 mm Hg, until the diagnosis and adequate interventions are established for the cause of decrease in blood pressure. This type of action is recommended in another study, which mentions an intervention through the use of hemodynamic variables to determine if the cardiac output is adequate and, if not, establish an intervention for improvement by administering fluids and/or vasoactive and inotropic drugs²⁵. This peculiar eye and the knowledge regarding this type of monitoring are characteristics of intensive care nurses, as is the

handling of vasoactive drugs, which require a deeper understanding of their interactions, doses, and infusions.

The assessment of measurements from blood pressure was mentioned in all studies. However, the electrocardiogram for arrhythmia was only described in studies S2²², S5²³, and S6²⁴. In S1¹⁸, S2²², and S3¹⁹, the necessity was raised regarding the measurement of cardiac output, pulmonary artery pressure, and the vascular resistance of some patients, respectively.

Hemodynamic monitoring of the central venous pressure (CVP) was reported in S1¹⁸ and S4²⁰. In S1¹⁸, CVP is a part of the hemodynamic monitoring and should be used judiciously. In S4²⁰, the relationship between the CVP and the fluid management is discussed as being of extreme importance, which should be related to the urinary output for an adequate volume replacement. This same recommendation was observed in a study conducted with kidney transplant patients. It was suggested that the CVP be maintained between 10 and 15 cm of H₂O and the volume replacement with normal saline at 0.9% of 70 to 90 mL/kg. However, the hydration measurements should be associated with the clinical care through simple actions, such as measuring blood pressure, CVP, and the assessment of the appearance of edemas²⁶. It is a fact that the isolated value of CVP cannot be considered as an intervention, but it should be associated with other factors, including a clinical evaluation of the patient to be cared for²⁷.

Regarding the care for critically ill patients, another point found in the results of this study refers to bladder control. In the study S1¹⁸, the nurse was aware of an output inferior to 30 mL/h during two sequential hours, a fact that can be related to the presence of embolization, thrombus, edemas, obstruction of renal artery, kidney damage, and volume depletion, or it can characterize acute renal failure. In these cases, an immediate intervention is necessary along with informing the responsible surgeon about it.

The S4²⁰ indicated that it would be ideal to verify with the surgeon what the desired urinary production is in the PACU, because kidney patients can have anuria, oliguria, and/or polyuria. As is presented in the study S1¹⁸, production inferior to 30 mL/h can be related to some sort of complication, for example, possible acute tubular necrosis, renal obstruction, or urinary obstruction. In the cases of interruption of urinary output, the nurse should insert a Foley catheter and/or do a bladder irrigation. When there is a need to change the catheter, it should be done by the surgeon. Production over 500 mL/h, common in transplants with live donors, requires a rigorous monitoring to guarantee maintenance of the electrolytes.

A Brazilian study regarding the relationship between anesthesia and transplant revealed the importance of early diuresis in kidney transplants as a prognostic factor and found the presence of early diuresis in live donors. In the case of cadaveric donors, diuresis was less frequent owing to variable periods of ischemia and the need for electrolyte solutions and low temperatures to maintain the organ until it is transplanted. It is evident that nurses must know the type of donor to program the proper nursing care, seeing that it can be altered depending on the origin of the donated organ.

Another type of intervention found in critically ill patients is the need to manage electrolytes, as discussed in studies S1¹⁸ and S4²⁰. In both the studies, the importance of the control of renal function is mentioned, and it is recommended that samples for laboratory tests are collected when patients are admitted into and, if possible, when they are released from the PACU. In Brazilian institutions, only a doctor can request the collection of laboratory test samples, which does not invalidate the unit nurse from suggesting that the anesthesiologist or the surgeon make the request.

In S1¹⁸, apart from the tests to examine the renal function, hematological (hemoglobin, hematocrit, and platelets) and coagulation tests are added, which show tissue perfusion and signs of bleeding and monitor anticoagulants, common in the postoperative care for abdominal aortic aneurysm. In S4²⁰, other important electrolytes (ionized calcium, glucose, and sodium bicarbonate) are suggested for the control of postoperative care of major surgeries. Collecting laboratory test samples to manage the care provided was reported in other studies (S2²² and S6²⁴). In these, the collection of arterial blood gas to control the acid–base balance was discussed. The results of these examinations can aid in maintaining the adequate relationship between perfusion and ventilation and should be compared with the medical history of the patient.

In anesthetized patients, the functional residual capacity is reduced by 20%, which leads to the increase in hypoxemia risk²². The clinical diagnosis of hypoxemia is done by the presence of cyanosis. Nursing care regarding breathing patterns is presented in S2²², S3¹⁹, S5²³, S6²⁴, and S7²¹, which recommend that the nurse frequently assesses the respiratory depth, notice the ease of breathing, perform auscultation, and observe oxygen saturation at admission and release of a patient during recovery.

Pulse oximetry is the basic resource used to monitor an anesthetized patient as peripheral capillary oxygen saturation (SpO₂) is correlated to the arterial oxygen saturation (SaO₂).

Thus, it aids in the early detection of hypoxemia²⁸. Observing pulse oximetry was presented in the studies S1¹⁸, S2²², S3¹⁹, and S7²¹ as a measurement to evaluate the breathing pattern. However, in studies S1¹⁸, S2²², and S3¹⁹, the discussion is raised regarding the misapprehension of these data being common, because the values of oxygen saturation below 85% cannot be interpreted precisely. For this reason, the calculation of capillary oxygen is recommended. The fact is that pulse oximetry does not differentiate reduced hemoglobin from its other form, making it possible to overestimate the SaO₂²⁹.

One study regarding the limits of agreement between the SpO₂ and SaO₂ values in anesthetized and critically ill patients, in mechanical ventilation, to establish minimum values for SpO₂ associated with arterial saturation of capillary oxygen superior to 90%, revealed that values for SpO₂ equal to or higher than 99% were not associated with the occurrence of any SaO₂ inferior to 90%. Consequently, the use of capillary oxygen measurements, recommended in the studies from this integrative review, become more trustworthy in the assessment of breathing patterns in critically ill patients²⁹.

During the postanesthesia, the tongue is the most common cause of airway obstruction, an observation found in S2²², S3¹⁹, S5²³, S6²⁴, and S7²¹. However, only in the studies S5²³ and S6²⁴, recommendations were found for assisting a patient with reduction of air passage, with warnings regarding the hyperextension of the head, oropharyngeal airway, clearing of secretion, and ventilation with positive pressure through the bag valve mask.

Investigation S7²¹ portrays patients with sleep apnea and recommends the continuous positive airway pressure (CPAP) system as soon as it is possible, preferably when patients are admitted into the PACU. Once this patient has been operated on, hypoxemia and hypercapnia are the main concerns during postoperative care, with the first two hours requiring more attention, maintaining the head elevated to minimize the obstruction of air passage through superior airways³⁰. As in the clinical practice, in S7²¹, the nurse should request that the patient have his own equipment. In case the institution where he is at does not use this practice, its benefits for the patient should be discussed, as he is familiarized with the facial mask and how it functions and is comfortable with it, and this guarantees better results with positive pressure ventilation. This practice is observed in a Venezuelan study, which affirms the benefit of the use of a CPAP system as a way of keeping superior airways continuously open and reinforces the importance of requesting that the patient bring his own equipment to the hospital³⁰.

Another practice seen in the findings of this review is directed at the control of body temperature. When it is low, it is related to the metabolic rate of the organism, and it was mentioned in two studies: S1¹⁸ and S2²². In S1¹⁸, it is recommended that the patient is kept normotensive, to prevent vasoconstriction and to reduce the possibility of infection and cardiovascular events. In S2²², it is stated that hypothermia can interfere with the global consumption of oxygen and increase the demand on the respiratory system. Heat loss is common in patients subjected to general anesthesia, once the anesthetics alter the thermoregulation center of the hypothalamus, inhibit tremors, and produce peripheral vasodilatation. During the recovery from anesthesia, the inhibition disappears, and the tremors start when the temperature is lower than the thermal regulation threshold³¹. Among the implications that can occur as a result of hypothermia are: cardiovascular implications such as myocardial ischemia, arterial hypertension, tachycardia, and deep venous thrombosis; changes in coagulation such as platelet activation and coagulopathy; immunological changes such as the increase of surgical site infection; and hydroelectrolytic and endocrine metabolic changes³².

In a Brazilian study³¹, with the objective of assessing factors associated with the development of intraoperative hypothermia, it was evidenced that the longer the duration of a surgery, the lower the body temperature of the patient. This can occur in critically ill patients who are admitted into the PACU and who, characteristically, need major surgical procedures and, consequently, longer durations.

In regard to this necessity of maintaining normothermia in the perioperative care, a systematic review concluded that there is a moderate evidence when suggesting that carbon-fiber warming blankets are as efficient as forced-air heating system to avoid hypothermia and that circulating-water garment is the most efficient method to maintain normothermia³³.

The complexity of a critically ill patient and the amount of responsibility of a nursing professional at the PACU where he is admitted can be noted. This justifies the need for an acute care nurse to provide the adequate clinical care, owing to their specific knowledge regarding mechanical ventilation, hemodynamic monitoring, and administration and handling of vasoactive and/or inotropic drugs.

CONCLUSION

This integrative review presented contributions from the international literature to the nursing care of critically ill patients who should be recovering in the ICU but who have been referred to the PACU. It was evidenced that there is a need for a nurse with a critical eye in addition to the clinical knowledge to provide an intensive care during the patient's stay at the PACU. The presence of an acute care nurse in the PACU can enhance the quality of nursing care and reduce the possibilities of complications for critically ill patients.

The development of studies regarding this type of patients is considered paramount, as is the use of the results of these studies for the evidence-based practice in the SC area.

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