Safety of Patients Transferred From the Operating Room to the Intensive Care Unit

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What is the best way to improve care and focus on patient safety for a patient transferred directly from the operating room to the intensive care unit?

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Roberta Kaplow, RN, PhD, AOCNS, CCRN, CCNS, replies:

On the basis of the physician’s preference or the intraoperative course, patients may be admitted directly from the operating room to the intensive care unit (ICU). Therefore, ICU nurses must be familiar with standards of care for patients in the immediate postoperative period, anesthetic agents, and management of potential complications. By focusing on the following aspects of postanesthesia care, patient safety and optimal outcomes can be achieved.

As with other ICU admissions, patients are attached to monitoring equipment and hand-off communication occurs. A comprehensive assessment is then performed. All relevant data are collected, as defined by critical care nursing standards. Vital signs are recorded every 5 minutes for 20 minutes, then every 15 minutes and as needed. Surgery-specific data are also collected. Pain management should begin upon ICU admission.

To help anticipate postanesthesia hemodynamics, ICU nurses should appreciate the effects of commonly used agents. Examples of such effects include tachycardia (from enflurane or isoflurane), hypotension (from enflurane, sevoflurane, or desflurane), decreased cardiac output (from desflurane), and decreased systemic vascular resistance (from enflurane or sevoflurane). Enflurane and halothane sensitizes the heart to catecholamines.

Cardiac output affects the degree to which an inhalation agent moves from alveoli to arterial blood. As anesthetic agents reach the tissues, the more blood-rich tissue receives more anesthetic agent. As some inhalation agents are fat-soluble, they are absorbed in adipose tissue. Because adipose tissue is not very vascular, recovery from inhalation agents is prolonged in overweight patients.1

Because inhalation agents are eliminated through respiration and are respiratory depressants, nursing care includes administration of oxygen, encouraging deep breathing, and monitoring for respiratory depression. Nursing care also entails monitoring for cardiovascular effects, preventing or treating postoperative nausea and vomiting, and pain management because inhalation anesthetics (except for nitrous oxide) have no analgesic properties.1

The recovery process of neuromuscular blocking agents is from larger to smaller muscle groups.1 As these agents do not possess analgesic or amnestic properties, appropriate medications must be provided.

Once clinically indicated, the patient is assessed for signs of readiness for weaning from mechanical ventilation. Typical parameters plus sustained head lift of more than 5 seconds and strong hand grips are considered.

Patients who received an inhalation agent require the “stir-up regime.” Patients need to be “stirred-up” by elevating the head of bed,
Familiarity with common complications of the immediate postoperative period and their management is essential. Hypoventilation and hypoxemia are 2 frequently reported complications. These are typically related to the anesthetic agents administered. Timely recognition of the problem by pulse oximetry and end-tidal carbon dioxide monitoring and assessment of the patient are essential. Treatment varies depending on the cause of the problem.

Laryngospasm, commonly related to intubation, aspiration, or suctioning, may occur. The patient should be encouraged to cough, as coughing may be all that is required. Positive pressure ventilation with a bag-valve-mask may be needed. If a laryngospasm does not respond to positive pressure ventilation within 1 minute, the patient is typically treated with a short-acting neuromuscular blocking agent and reintubation.

Noncardiogenic pulmonary edema may occur as a consequence of an acute obstruction of the upper part of the airway. Protein and fluid accumulate in alveoli with no elevation in pulmonary artery occlusive pressure. Signs and symptoms include tachypnea, tachycardia, decreased oxygen saturation, crackles, and frothy sputum. Treatment includes supplemental oxygen, respiratory support, and administration of diuretics. Hypotension is common in the immediate postoperative period. It typically is caused by hypovolemia from fluid losses during surgery. Other causes may include cardiac dysfunction, low systemic vascular resistance, dysrhythmias, or hypoxemia. As with other critically ill patients, initial treatment includes administration of boluses of isotonic fluid and reversing the underlying cause. Administration of blood products, inotropic agents, or vasoconstrictors may be necessary. The patient may be placed in modified Trendelenburg position.

Hypertension is another common postoperative complication. It is thought to be related to sympathetic activation and can lead to cardiac, neurological, and surgical site complications. Treatable causes include pain, anxiety, hypothermia, and hypoxia. Cardiac dysrhythmias may manifest postoperatively; most commonly, bradycardia, tachycardia, and premature ventricular contractions occur. Ventricular tachycardia or fibrillation may occur in patients with electrolyte imbalances, hypoxemia, or hypothermia. Guidelines of the American Heart Association should form the basis of treatment.

Malignant hyperthermia is a genetic disorder involving a hypermetabolic response to select inhalation agents and succinylcholine. When patients are exposed to a triggering agent, release of calcium inside muscle cells, sustained muscle contraction, and increased energy utilization occur. When muscle cells run out of energy and die, intracellular potassium spills into the bloodstream and myoglobin is released; these can lead to cardiac arrest, renal or liver failure, coagulopathies, or brain injury. Signs and symptoms associated with malignant hyperthermia include muscle rigidity, tachycardia, tachypnea, elevated levels of end-tidal carbon dioxide, cyanosis, hyperkalemia, acidosis, and hyperthermia.

Thermoregulation is essential. Potentially adverse effects of hypothermia include vasoconstriction, increased afterload, increased oxygen demand, or thrombus formation; angina or myocardial infarction; decreased platelet function, cardiac output, or heart rate; and dysrhythmias. Shivering causes increases in oxygen demand, bleeding times, blood viscosity, and risk for metabolic acidosis, along with hyperventilation and hypoxia.

A patient may be discharged from post anesthesia care when physiological criteria are met. These criteria may include airway patency, oxygen saturation, vital signs, level of consciousness, muscle strength, and pain control. A scoring system, such as the Aldrete Scoring System, evaluates the effects of sedation on the patient’s neurological, circulatory, and respiratory systems. This system uses a grading system from 0 to 2 for level of activity, level of consciousness, respiratory ability, blood pressure, and color. The modified Aldrete Scoring System evaluates oxygen saturation instead of color. Patients must score at least 8 or reach their baseline to be considered recovered from anesthesia.

As with other ICU admissions, while a patient is recovering, it is essential for the patient’s family to be updated on the patient’s status. Communication with the family at regular intervals is pivotal. Visitation is recommended.

unlike contraindicated, and encouraged to deep breathe at frequent intervals. Deep breathing facilitates gas exchange by moving the inhalation agent from higher concentration (patient’s lungs) to lower concentration (environment).
Malignant hyperthermia may develop 24 hours postoperatively. Malignant hyperthermia can be treated with dantrolene sodium, which inhibits release of calcium, and hyperventilation with 100% oxygen to increase minute ventilation and decrease carbon dioxide levels. Other treatments include administration of sodium bicarbonate, cooling measures, and treatment of hypertension and dysrhythmias.

Pseudocholinesterase deficiency is a rare genetic condition in which the body has a deficiency in the enzyme pseudocholinesterase, which is necessary for metabolism of succinylcholine and numerous anesthetic agents. A patient with pseudocholinesterase deficiency has prolonged paralysis and requires mechanical ventilation until the agent wears off. The patient should be reassured, and sedatives and analgesics should be provided.

Patients in the immediate postoperative period have high levels of vulnerability and complexity and have uncertain levels of stability, resiliency, and predictability. ICU nurses should possess knowledge of anesthetic agents and possible complications in order to optimize outcomes for these vulnerable patients.

Financial Disclosures
None reported.

References

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