Care of the PACU Patient in the ICU
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Objectives:
• Describe three primary concerns in the post anesthesia patient
• Discuss two complications seen in the post anesthesia patient
• Describe a focused assessment for a patient recovering from general anesthesia

Outline:
• Purpose
• Goal
• Introduction to general anesthesia
• Primary concerns
• Complications
• Admission process

Introduction: Indications of admission
• Patients may be admitted directly from the OR to the ICU due to:
  – Type of surgical procedure
  – Intraoperative course
  – Acuity of the patient
  – Physician preference
Introduction: Purpose

• The nurse must assess the patient for the effects of anesthesia
  – It's not just the standard assessment performed on other ICU patients. It should be focused.
• Thus, the nurse must be familiar with:
  – Standards of care for immediate post operative patients
  – Types of anesthesia
  – Potential complications

“Why must we?”:

• Regulatory agencies, such as the Joint Commission, state that the same standard of care be provided to patients no matter where they receive that care
  – Provision of Care Section, PC.01.02.01

Introduction: Rationale

• The patient is most vulnerable during the initial Phase 1 post operative (total anesthetized) state
  • Aging process impacts metabolism of anesthetics
  • Adipose tissue absorbs agents
  • Dangerous potential complications

Patient Goal:

• Return to baseline function
• Prevent complications
• Ensure clearance of anesthetic medications
**Introduction to general anesthesia:**

- **Induction agents**
- **Inhalation gases**
- **Neuromuscular blocking agents**
  - “Balanced anesthesia” technique, is more easily controlled with fewer side effects

**Induction agents:**

- Cause quick loss of consciousness
- Cause rapid increase in depth of anesthesia
- Etomidate, thiopental, propofol

**Inhalation gases:**

- Make a patient unconscious, amnestic, and very little analgesia
- Reversible and dose dependent
- Desflurane, isoflurane, sevoflurane
- Side effects may include hypotension, tachycardia, dysrhythmias, bronchodilation, reduced response to hypoxemia

**Neuromuscular blocking agents:**

- AKA Neuromuscular relaxants
  - Used to facilitate intubation, retraction of skeletal muscles, use of less inhalation agents
  - Do not provide analgesia or amnesia
  - Act on neuromuscular junction
    - Classified: Non-depolarizing vs. depolarizing agent
Neuromuscular blockers:

- **Depolarizing**
  - i.e. succinylcholine
  - Cause depolarization at receptor
  - Blockade in 30-60 sec
  - Half-life 4-6 min
  - Can cause increase in intracranial pressure, intraocular pressure, & intragastric pressure
  - Adverse effects: Myalgia, fasciculations, histamine release, hyperkalemia, MH

- **Non-depolarizing**
  - i.e. Pancuronium, rocuronium, vecuronium, cisatracurium
  - Prevent acetylcholine from interacting with receptor, preventing depolarization
  - Blockade and half-life longer
  - May cause histamine release (rocuronium)

Reversal of neuromuscular blocker:

- Can assess with use of peripheral nerve stimulator
- **Anticholinesterase agent**
  - Inhibit acetylcholinesterase. So, acetylcholine levels increase and replace neuromuscular blocker
  - Neostigmine, edrophonium
  - Agents give muscarinic affects such as bradycardia, increased secretions, bronchospasm, hyperperistalsis.
  - Give antimuscarinic such as atropine glycopyrrolate

General Anesthesia:

- Loss of conscious, sensation, skeletal muscle relaxation and loss of control of sympathetic response to noxious stimuli (including coughing & gagging), amnesia, analgesia,
- Use combination of medications

Primary Concerns: Airway maintenance

- Use of artificial airways
  - Use of oral or nasal airway
- Evaluation for extubation
  - Head lift for 5 seconds
Primary Concerns: Airway maintenance

- **Laryngospasm**
  - S&S:
    - Wheezing, crackles, tachypnea, tachycardia, decreased pulse ox, but normal filling pressures
    - Related to intubation, aspiration, suctioning, histamine release from meds (morphine, meperidine, protamine, rocuronium)
    - May result in non-cardiogenic pulmonary edema
    - Can happen at any time but highest risk post extubation
  - Treat with coughing, positive pressure ventilation with bag-valve-mask, racemic epinephrine, steroids, possible neuromuscular blocker and re-intubation

Primary Concerns: Hypoxemia/hypoventilation

- Give supplemental oxygen
- Consider reversal medications: Neostigmine, edrophonium
  - Can cause bradycardia and hypotension so glycopyrrolate or atropine given
- Remember, inhalation agents are eliminated through respiration
  - Encourage pt. to cough & deep breath
  - Splint incision

Primary concerns: Hemodynamic stability

- Hypotension
  - Inhalation agents depress sensitivity of baroreceptors
    - Treat with alpha adrenergic i.e. phenylephrine
  - Due to inadequate fluid replacement or blood loss
    - Treat with fluids or blood products
- Hypertension
  - Due to pain, anxiety, hypothermia, hypoxia, catecholamine release, full bladder, reversal agent
  - Treat cause
Complications of anesthesia: Nausea & vomiting

• Incidence
  – Affects 30% of patients
    • 75 million pts/year
    • Most common complication
  – May even occur 24 hours after procedure

Complications of anesthesia: Nausea & vomiting

• Risk factors
  – Female (premenopausal)
  – Non-smoker
  – Surgical manipulation of organs
  – Laparoscopic surgery
  – Eye or middle ear surgery
  – Inhalation gases
  – Opioids
  – Hypovolemic patient
  – History of motion sickness

Nausea & vomiting:

• Complications
  – Wound dehiscence, evisceration, increased ICP, hypertension, aspiration, electrolyte imbalances

Nausea & vomiting:

• Treatment
  – Prophylactic treatment
  – Limit head movement
  – Keep NPO
  – Give IV Fluids
  – Antiemetics: Ondansetron, promethazine, metoclopramide
  – Aspiration prevention measures
  – Head of bed elevated
  – Cool environment
  – Aromatherapy/accupressure
Complications of anesthesia: Pain management

- Inhalation agents do not provide analgesia except for nitrous oxide
- Non-verbal pain scoring system
- Non-pharmacologic pain relief measures

Complications of anesthesia: Emergence delirium

- "Dissociated state in which pt is inconsolable, irritable, uncompromising, uncooperative, thrashing, crying, or incoherent" (Hudek, 2009)
- Signs & symptoms:
  - Usually seen within 15-30 min after surgery
  - May be seen up to 24 hours after
  - Restlessness, confusion, disorientation, combative

Emergence delirium:

- Cause/risk factors:
  - Preexisting delirium, pain, bladder distention, hypoxia, age (pediatric & elderly), anxious, poor adaptability, large blood loss, ETOH withdraw, rapid emergence, hypoglycemia, ketamine, inhalation agents, and ophthalmological, otorhinolaryngological, breast, & abdominal surgeries
- Incidence:
  - All types of anesthesia
  - 5.3%, (12-15% for children & elderly)

Emergence delirium:

- No identified way of preventing this
  - Pre-medication with anti-anxiety med is not beneficial
- Treatment
  - Treat cause (i.e. hypoxia, bladder distention)
  - Promote patient safety (i.e. prevent self extubation), remain calm, reorient patient, provide quiet environment, give benzodiazepine, limit feelings of "confinement"
Primary concerns: Thermoregulation: Hypothermia

- Temp less than 36°C (96.8°F)
- Incidence: Especially in elderly and children
- Reduced metabolic rate can prolong effects of anesthetics
- Complications include vasoconstriction, increased afterload, thrombus formation, angina, decreased platelet function, bradycardia
- Shivering causes increased oxygen needs
  - Warmers

Primary concerns: Thermoregulation: Hyperthermia

- Think Malignant hyperthermia!
  - But could be sepsis, blood transfusion reaction

Complications of anesthesia: Malignant hyperthermia

- Definition
  - Hypermetabolic disorder of skeletal muscles
  - Pharmacogenetic disorder
    - Inherited
    - Genetic autosomal dominance

Physiology of MH:

- Defect in cell membrane that when combined with a trigger causes:
  - Release of calcium from sarcoplasmic reticulum resulting in hypermetabolic state
  - High oxygen consumption → ATP depletion → high production of lactic acid, CO2, & heat → leak of potassium from cell
Triggering agents of MH:

- Depolarizing neuromuscular blockers
  - Succinylcholine
- Inhalation anesthetics
  - Desflurane
  - Isoflurane
  - Sevoflurane
  - Halothane
  - Ether

Signs & symptoms of MH:

- Temperature increase (late sign)
- Muscle rigidity
- Increase CO2
- Hypoxemia
- Increased respiratory rate
- Increase heart rate
- Cardiac arrhythmia
- Acidosis
- Hyperkalemia

Treatments of MH:

- Discontinue triggering agents
- Administer Dantrolene sodium
  - 2.5 mg/kg
  - Repeat dose every 5 minutes until symptoms subside
  - Max dose is 10 mg/kg
  - Continue maintenance dose with 1 mg/kg every four to six hours for 24 – 48 hours after the event
- Perform cooling measures
  - NG & rectal lavage
  - Cooled IV fluid
  - Cooling blanket
  - Ice packs
  - Bypass

Admission Process:

- Report
  - Past medical history and history of present illness
  - Preoperative status/stability
  - Procedure performed
  - Type of anesthesia
  - Length of surgery
Admission process: Report

- Significant events during procedure
  - Such as hypotension or excessive bleeding
- Inclusion of most recent vital signs, pulse ox, and temperature
- Medications administered
  - Reversal agents
  - Antibiotics
  - Vasopressors
- Intake & output
  - IV access & location and fluids administered
  - Urine output & estimated blood loss
  - Presence of dressings, wounds, & drains

Standards for assessment:

- Vital signs
  - Every 15 minutes until recovered
  - Includes pulse oximetry, respirations, BP, HR; With pain & temperature every 30 min
- Aldrete Scoring System
  - Grading system
  - Five categories
  - 0-2 score for each category
  - Assess every 30 min
  - Must score 8 or higher to be “recovered”

Aldrete Scoring System

- Breathing
  - Adequate volume & rate, Dyspnea, or Apnea
- Circulation
  - Blood pressure 20% , 20-30%, or greater than 30% of pre-admission level
- Activity
  - Moves all 4 extremities, moves 2, or unable
- Level of consciousness
  - Awake & oriented, arousable, or responsive to tactile
- Oxygen saturation
  - Maintains O2 saturation ≥90% on RA, Needs O2 for saturation ≥90, or sat ≤90%

“Discharge criteria”

- Awake, alert, oriented
- Vital signs within 15-20% of baseline
- Catheters functional
- Temperature at least 36 C and stable
- Present gag reflex
- Tolerates PO intake
- Can ambulate
- Has voided
Perform complete physical assessment:

• Perform every 30 minutes until “recovered”

• Cardiovascular
  – Hemodynamic stability
  – Assess BP & HR every 15 minutes

• Respiratory
  – Readiness for extubation
    • Head lift for 5 seconds
  – Humidified oxygen
    • Pulse ox of at least 92%
  – Respiratory depression
  – Assess respirations every 15 min

Physical assessment:

• Gastrointestinal
  – Drainage tubes
  – Bowel sounds
  – Nausea & vomiting (assess every 30 min)

• Renal
  – Intake & output
  – IVs & foley (bladder distention)
  – Assess urine output every hour

Physical assessment:

• Skin integrity
  – Dressings
    • Antibiotics started within incision time period
    • Antibiotics discontinued from end of anesthesia time period
  – Complications from positioning
  – Assess on admission and every two hours, but assess wound every 30 min

• Musculoskeletal
  – Strength & sensation
    • Return of function after neuromuscular blockers from large to small muscle groups

Physical assessment:

• Neurological
  – Level of consciousness & orientation
  – Pupils
  – Bilateral motor and sensory
    • Reversal of neuromuscular blocking agents
  – Dermatone level for spinal anesthesia
  – Pain
    • Non-verbal or verbal

• Categories from the Standards for Peri-Anesthesia Care by ASPAN
Conclusion:

- And by working “together, stronger, and bolder”, we can improve patient care.
  - “Together, stronger, bolder”
    - Mary Stahl, AACN’s President 2011
- But, do you dare to?
  - “Dare to…”
    - Kathryn Roberts, AACN’s President 2012

Questions?

Thank you for your attention

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