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NEWSLETTER

PAKISTAN SOCIETY OF ANAESTHESIOLOGISTS KARACHI - CHAPTER

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Pakistan Society of Anaesthesiologists Karachi - 2013-2014

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Inside this Issue:

- Editor's Note
- Monitoring standards in post anaesthesia care unit
- Common complications in the recovery room & their management
- Pitfalls of pulse oximetry in recovery room
- 2013-AAGBI Guidelines on immediate post-anaesthesia recovery

EDITOR'S NOTE

Recovery from anaesthesia can become a life threatening process if appropriate resources and adequately trained staff are not available.

The 2013 guidelines of the Association of Anaesthetists of Great Britain and Ireland recommend that sufficient number of trained staff should be available throughout all operating hours, along with adequate monitoring facilities to recover patients from both general as well as regional anaesthesia in a designated area which is now being referred to as post-anaesthesia care unit (PACU).

It is imperative for the anaesthesiologists to implement these guidelines and ensure that same standards are maintained in any area where anaesthesia is administered including obstetric theaters, cardiac catheterization laboratories, radiology suites, dental clinics, psychiatric wards or day care hospitals.

Dr Madiha Hashmi

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MONITORING STANDARDS IN POST ANAESTHESIA CARE UNIT

Most post anaesthesia care unit (PACU) incidents leading to serious morbidity or mortality are related to inadequate monitoring. Monitoring starts while the patient is being transferred from operating room (OR) to PACU, and this period is usually complicated by lack of adequate monitors, access to drugs or resuscitative equipment. Sometimes unstable patients should be transported with portable monitors (ECG, pulse oximetry and blood pressure)

Patients who have received general anaesthesia, regional anaesthesia, monitored care anaesthesia or regional anaesthesia are transferred to PACU. Generally, these patients need basic monitoring, which includes ECG, pulse oximetry, non-invasive blood pressure and temperature monitoring. Clinical monitoring of a patient by a trained staff nurse is mandatory. It includes monitoring of consciousness, colour of the patient, breathing pattern, pulse, vomiting, pain score, sensory level if regional anaesthesia has been used, soakage of dressing, position of the patient, surgical drains and monitoring of urinary output if patient is catheterized.

The most important and life threatening complication is hypoventilation in the immediate postoperative period and it is because of tongue fall back, laryngospasm, oedema of vocal folds, foreign bodies, tumour, bronchospasm, residual effects of drugs and many more. Pulse oximetry indicates the state of oxygenation in arterial blood, but if there is hypoventilation, CO₂ will accumulate and then capnography will help us get the correct picture. Capnography should be available for use for patients who require tracheal intubation or are already intubated.

Depending on the nature of work undertaken in the OR, a proportion of bed station should have the facility of monitoring invasive arterial blood pressure, central venous pressure and pulmonary artery pressure continuously. Nerve Stimulators and spirometry may be required for selected cases. In diabetic patients blood sugar monitoring is also required.

References

1. Post Anaesthesia Care; Clinical Anaesthesiology; Morgan & Mikhail 5th edition
2. Denisa H, Misty K. Post Anaesthesia Care Unit Chapter 14, 2012 Operating Room Design Manual
3. The early recovery period: Smith & Aitkenhead, Text book of anaesthesia 6th edition.

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KARACHI - CHAPTER

Volume 17:
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UPCOMING CONFERENCES / MEETINGS / SYMPOSIA

34th Annual PSA Conference
April 26-27, 2014
Movenpick Hotel, Karachi

Applied Pharmacology in Anesthesia
July 14-17, 2014
Clearwater Beach, Florida

Pain Review Course 2014
July 26-31, 2014
San Antonio, USA

ESRA 2014 & Pain Therapy
36 September 2014
Seville, Spain

**14th International Congress of
Cardiothoracic & Vascular
Anaesthesia (EACTA Annual Meeting
2014)**
1719 September 2014
Florence, Italy

**12th Annual Symposium on Regional
Anesthesia, Acute Management and
Perioperative Medicine**
September 20-21, 2014
NY, USA

Anesthesiology 2014
October 11-15
New Orleans, LA

13th Annual Pain Medicine Meeting
1316 November 2014
San Francisco, United States

**4th World Congress of Regional
Anaesthesia & Pain Therapy**
2428 November 2014
Cape Town, South Africa

**Ultrasound Guided Regional
Anesthesia
And Vascular Access Workshop**
December 10, 2014
Miami, Florida

COMMON COMPLICATIONS IN THE RECOVERY ROOM & THEIR MANAGEMENT

Emergence from general anaesthesia and surgery may be accompanied by a number of physiologic disturbances that affect multiple organ systems. The post-anaesthetic care unit (PACU). must be appropriately staffed and equipped to manage patients and their potential complications.

Respiratory Complications

AIRWAY OBSTRUCTION: In unconscious patient is most commonly due to the tongue falling back against the posterior pharynx. Other causes include laryngospasm, secretions, vomits, a retained throat pack or blood in the airway, glottic edema or External pressure on the trachea.

Management: Supplement O₂, jaw thrust and head tilt maneuver, oral or nasal airway, laryngeal mask airway or endotracheal intubation. Refractory laryngospasm should be treated with a small dose of intravenous succinylcholine 10-20mg and positive pressure ventilation with 100% oxygen.

HYPOVENTILATION: In the immediate postoperative period, the residual effects of inhaled anesthetics, opioids and sedatives can significantly depress ventilatory response to carbon dioxide. Significant hypoventilation is clinically apparent when PaCO₂ is > 60 mm Hg or PH is < 7.25.

Residual neuromuscular blockade, neuromuscular, pulmonary or neurological disease, incisional pain, abdominal distention, sepsis etc can also contribute to inadequate ventilation.

Management: Assess the problem, supplemental oxygen, external stimulation of patient to wake fullness, pharmacologic reversal of opioids or benzodiazepine effect, assisted or control ventilation.

HYPOXEMIA: Postoperative moderate hypoxemia with increasing duration or severity results in progressive acidosis and circulatory depression. Pulse oximetry facilitates early detection. Arterial bloodgas may be performed to confirm diagnosis and guide therapy. Hypoxemia is usually caused by hypoventilation and increased Right to left intrapulmonary shunting or both (pulmonary atelectasis, parenchymal infiltrates, pneumothorax).

Factors contributing to postoperative Arterial Hypoxemia Congestive cardiac failure, pulmonary edema, alveolar hypoventilation, pulmonary embolus, increased O₂ consumption (shivering), sepsis, obesity.

Management: Oxygen supplement, controlled or assisted mechanical ventilation, chest radiograph, chest tube if pneumothorax is suspected, diuretics for circulatory fluid overload, bronchoscopy for reexpanding lobar atelectasis

Circulatory Complications

Hemodynamic compromise in the PACU patients manifest as

HYPOTENSION: May be due to many causes

- * **Intravascular volume depletion** Persistent fluid losses, ongoing third spacing of fluid, surgical bleeding etc
 - * **Increased capillary permeability:** Sepsis, burns
 - * **Decreased cardiac output:** Myocardial ischemia/infarction, cardiomyopathy, valvular disease, cardiac dysrhythmias, pulmonary embolus, tension pneumothorax
 - * **Decreased vascular tone** Sepsis, allergic reactions, spinal shock etc.
- Management:** Significant hypotension, 20-30% reduction in blood pressure below the patient's baseline level usually requires correction.
- * Fluid bolus of 250-500ml crystalloid or 100-250ml colloid
 - * In severe hypotension, a vasopressor or inotrope (dopamine or epinephrine)
 - * Failure of a patient with severe hypotension to respond to initial treatment requires invasive hemodynamic monitoring
 - * Tension pneumothorax pleural aspiration

HYPERTENSION: Patients with history of essential hypertension, Arterial Hypoxemia, hypovolemia, emergence excitement, shivering, increased intracranial pressure, increased sympathetic nervous system activity (hypercapnia, pain, agitation, urinary retention)

Management: Mild to moderate elevations effective pain control, sedation intravenous β -adrenergic blocker (Labetalol, esmolol, metoprolol) and marked hypertension in patients with limited cardiac reserve requires intra-arterial pressure monitoring. Intravenous infusion of nitroprusside and nitroglycerin.

ARRHYTHMIAS: Hypoxemia, hypercarbia, acidosis, residual effects from anaesthetic agents, increased sympathetic nervous system activity, pre-existing cardiac or pulmonary disease electrolyte abnormalities predispose patients to arrhythmias in PACU.

Bradycardia represents the residual effects of cholinesterase inhibitors, opioids, β -adrenergic blockers, spinal anesthesia



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Tachycardia may be due to anticholinergic agent, β -agonist, reflex tachycardia from Hydralazine, pain, fever, hypo-volemia and anemia.

Premature atrial and ventricular beats represent electrolyte imbalance, increased sympathetic tone etc

Management: Identify and correct the underlying cause i.e. hypoxemia or electrolyte imbalance, O₂ supplement and pharmacological treatment

Nausea and Vomiting

PONV is associated with anaesthetic and analgesic agents, type of surgical procedure, intrinsic patient factors, and following spinal or epidural anaesthesia

Management: Pharmacological options include selective 5 hydroxytryptamine receptor antagonist (ondansetron 4mg), metoclopramide 0.15mg/kg iv, dexamethasone 4-8 mg I/v and adequate hydration (20ml/kg) after fasting

Shivering and Hypothermia

Due to intra-operative hypothermia, the effects of anaesthetic agents, spinal and epidural anaesthesia

Management: consists of using forced air warming devices, heating blankets, O₂ supplementation, meperidine 0.35-0.4 mg/kg, low dose ketamine 0.5mg/kg intravenous.

Surgical Bleeding

Assessment and monitoring of drains and bleeding is mandatory and surgeon notified.

Management: Blood sample for CBC and cross matching and appropriate replacement of blood products.

References

1. Practice guidelines for post anaesthetic care. *Anesthesiology*, V 118. No 2. Feb 2013
2. Millers Anesthesia, 7th Edition

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PITFALLS OF PULSE OXIMETRY IN RECOVERY ROOM

Pulse oximetry represents the greatest advancement in patient monitoring in the last three decades. It has the unique advantage of continuously monitoring the saturation of hemoglobin with oxygen, easily and noninvasively, providing a measure of cardio-respiratory function. The pulse oximeter combines the two technologies. One is spectrophotometry which measures hemoglobin oxygen saturation and the other one is optical plethysmography which measures pulsatile changes in arterial blood volume at the sensor site.

Knowing the limitations of this widely used monitor is imperative.

- It is mandatory to have a good pulse waveform to calculate the ratio of pulsatile to non-pulsatile absorbance and derive the oxygen saturation. Whenever the peripheral pulsations are poor the pulse oximetry fails to give accurate readings, i.e. in case of hypotension, hypovolaemia, hypothermia, infusion of vasoactive drugs, peripheral vascular disease and proximal blood pressure cuff inflation.
- Motion of the sensor relative to the skin may produce a prolongation in the detection time for hypoxemia without giving a warning if the patient is moving due to shivering, pain or anxiety or being transported.
- Hypoventilation and hypercarbia may occur without a decrease in hemoglobin oxygen saturation, especially if the patient is receiving supplemental oxygen so pulse oximetry should not be relied upon to assess the adequacy of ventilation.
- There may be a significant delay between a change in alveolar oxygen tension and a change in the oximetry reading. It is possible for arterial oxygen to reach dangerous levels before the pulse oximetry alarm is activated. Measurement of SpO₂ is less accurate at low values and 70% saturation is generally taken as the lowest accurate reading.
- Pulse oximetry readings may be affected by profoundly decreased hemoglobin concentration i.e. hemoglobin level less than 5 g/dl.
- Abnormal hemoglobin or hemoglobin variants may interfere with pulse oximetry if their absorption properties are similar to those of oxyhemoglobin or deoxyhemoglobin. Whenever carboxyhemoglobinaemia is suspected, co-oximetry (not pulse oximetry) is recommended for the measurement of oxyhemoglobin because a falsely reassuring normal pulse oximetry reading may mask life-threatening arterial desaturation.
- Intense daylight, fluorescent, incandescent, xenon, and infrared light sources have been reported to cause inaccurate pulse oximetry readings.
- Artificial acrylic nails and nail polish can potentially affect pulse oximeter readings if the polish absorbs light at 660 nm and/or 940 nm.

Despite problems and limitations, pulse oximetry remains the standard of care and intelligent use can truly help save lives and prevent disasters due to hypoxic events.

References:

1. Booker R. Pulse oximetry. *Nurs Stand*. 2008; 22:394.
2. Eugene S, John BD, John WR, et al. Supplemental oxygen Impairs detection of hypoventilation by pulse oximetry. *Chest*. 2004; 126:1552-58.
3. Perkins GD, McAuley DF, Giles S, et al. Do changes in pulse oximeter oxygen saturation predict equivalent changes in arterial oxygen saturation? *Crit Care*. 2003; 7:67.

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GUIDELINES ON IMMEDIATE POST-ANAESTHESIA RECOVERY 2013 Association of Anaesthetists of Great Britain and Ireland

1. After general, epidural or spinal anaesthesia, all patients should be recovered in a specially designated area (henceforth 'post-anaesthesia care unit', PACU) that complies with the standards and recommendations described in this document.
2. The anaesthetist must formally hand over the care of a patient to an appropriately trained and registered PACU practitioner.
3. Agreed, written criteria for discharge of patients from the PACU to the ward should be in place in all units.
4. An effective emergency call system must be in place in every PACU and tested regularly.
5. No fewer than two staff (of whom at least one must be a registered practitioner) should be present when there is a patient in a PACU who does not fulfil the criteria for discharge to the ward.
6. All registered practitioners should be appropriately trained in accordance with the standards and competencies detailed in the UK National Core Competencies for Post Anaesthesia Care.
7. All patients must be observed on a one-to-one basis by an anaesthetist or registered PACU practitioner until they have regained control of their airway, have stable cardiovascular and respiratory systems and are awake and able to communicate.
8. All patients with tracheal tubes in place in a PACU should be monitored with continuous capnography. The removal of tracheal tubes is the responsibility of the anaesthetist.
9. There should be a specially designated area for the recovery of children that is appropriately equipped and staffed.
10. All standards and recommendations described in this document should be applied to all areas in which patients recover after anaesthesia, to include those anaesthetics given for obstetric, cardiology, imaging and dental procedures, and in psychiatric units and community hospitals. Only registered PACU practitioners who are familiar with these areas should be allocated to recover patients in them as and when required.
11. Patients' dignity and privacy should be respected at all times but patients' safety must always be the primary concern.
12. When critically ill patients are managed in a PACU because of bed shortages, the primary responsibility for the patient lies with the hospital's critical care team. The standard of nursing and medical care should be equal to that in the hospital's critical care units.
13. Audit and critical incident reporting systems should be in place in all PACUs.

[Anaesthesia 2013 Whitaker et al. | Guidelines: Immediate post-anaesthesia recovery](#)

14th Asian Australasian Congress of Anaesthesiologists held in Auckland, New Zealand February 2014

