Anaesthetic emergencies in the operating theatre and post operative complication

433

ANAESTHESIA

Objectives:

1. Learn a common approach to **emergency medical problems** encountered in intraoperative and postoperative period.
2. Study post-operative respiratory and hemodynamic problems and understand how to manage these problems.
3. Learn about the predisposing factors, differential diagnosis and management of PONV.
4. Understand the causes and treatments of post-operative agitation and delirium.
5. Learn about the causes of delayed emergence and know how to deal with this problem.
6. Learn about different approaches of post-Operative pain management

Aspiration

- **Definition**

inhalation of gastric contents can occur in patients who do not have fully functional upper airway reflexes. Impaired protective airway reflexes.

- **Signs**

Gastric contents visible within breathing circuit/airway adjunct (e.g. LMA), decreased SaO2 ,Wheeze/stridor, Tachycardia , Airway pressure.

Regurgitation of gastric contents can happen in any patient who does not have fully functioning upper airway protective reflexes Those at risk include:

1. Inadequate period of preoperative starvation
2. Delayed gastric emptying (e.g. opiates, pain, bowel obstruction, pregnancy at term.
3. Insufficient/lack of cricoid pressure at induction of anaesthesia early extubation in an at-risk patient in supine postion .
4. Morbid obesity

- **Treatment**

100% oxygen,Call for help, 30% Head-down position to prevent/limit aspiration, Oropharyngeal suction,Tracheal intubation if needed, including tracheal

Suctioning, Postoperatively: physiotherapy, oxygen.

Some advocate antibiotics and steroids

Air embolism

- **Definition:** air embolism results from inadvertent introduction of air into the circulation, usually via the venous system.

- **Causes**

Neurosurgery (dural sinuses are non-collapsible),Caesarean section (e.g. if exposed veins are raised above level of heart),Central line insertion/removal,Epidural catheter placement,(if loss of resistance to air is used),Entrainment through an intravenous line (especially if pressure-assisted),Situations where high pressure,gas is used (laparoscopy)

- **Signs**

Increased HR, Decreased BP, *S*aO2 and ETCO2 (end-tidal co2) (acute due to ventilation–perfusion mismatch), Murmur (millwheel, due to air circulating around the cardiac champers)

- **Treatment**

100% Oxygen, Airway, breathing, circulation and call for help, Flood surgical site with saline, Position patient in Trendelenburg/left lateral decubitus position, Consider inserting a central venous catheter to aspirate gas, Consider hyperbaric chamber if indicated.

Laryngospasm

- **Definition:**

is the complete or partial adduction of the vocal cords, resulting in a variable degree of airway obstruction.

- **Causes:**

• Airway manipulation

• Blood/secretions in oropharynx (causes irritation to the larynx)

• Patient movement

• Surgical stimulus

• **Failure to deliver anaesthetic agent**

- **Sings:**

• Partial/complete airway obstruction

• Paradoxical respiratory effort in a spontaneously breathing patient (abdominal/ chest see-saw movements as respiratory effort attempts to overcome the obstruction).

- **Treatment:** Some or all might be needed

• Positive pressure ventilation with high flow oxygen (e.g. CPAP or IPPV)

• **Deepening of anaesthesia (e.g. i.v. propofol)**

• Suxamethonium with or without tracheal intubation – causes rapid muscle relaxation and ceases vocal cord opposition .

- **Complications:**

decreased SaO_2, Aspiration, Bradycardia (especially in children),Pulmonary oedema

Anaphylaxis

- **Definition:**

this is an acute severe type 1 hypersensitivity reaction when an antigen (trigger) reacts with immunoglobulin IgE bound to histamine rich mast cells and basophils.

- **Symptoms**

Anxiety, feeling of impending doom,Rash, itch,Wheeze, shortness of breath, Abdominal pain, diarrhoea, vomiting, Chest pain

- **Signs**

Angioedema, (e.g. skin, lips, throat),Rash, flushing, urticaria, Tachycardia, bradycardia, dysrhythmias, Hypotension, Bronchospasm

- **Treatment**

Basic resuscitation based on Airway Breathing Circulation (ABC),Remove suspected cause,Call for help, Give patient 100% oxygen, tracheal intubation if necessary, Elevate legs if hypotension (increases venous return),Start cardiopulmonary resuscitation (CPR) if needed,Give epinephrine 50µg in repeated doses; consider epinephrine infusion,Give large volumes of fluid, e.g. normal saline or Hartmann's solution

- **Secondary treatment**

Chlorpheniramine 10mg (H1 antagonist),Hydrocortisone 200mg,Consider alternative vasopressor if unresponsive to epinephrinem Consider salbutamol i.v./nebulizer, aminophylline, for persistent

Bronchospasm, High dependency or intensive care transfer.

Malignant hyperthermia

- **Definition:**

this occurs after exposure to a triggering agent (volatile anaesthetics or suxamethonium) and results in loss of normal calcium homeostasis within skeletal muscle cells. (Usually happens during induction)

- **Signs:**

Muscle rigidity

Tachycardia

Hypercapnia, acidosis

Hyperkalemia

Cyanosis

Hyperthermia/sweating

Treatment

- Call for help/stop surgery if possible
- Stop trigger/change anaesthetic breathing circuit
- Give 100% oxygen
- Hyperventilate
- Active cooling
- Dantrolene I.v.
- Treat complications as they arise:
  - renal failure/hyperkalaemia
  - coagulopathy
  - cardiovascular complications

Status asthmaticus

This is a severe acute exacerbation of asthma refractory to conventional β2 agonist therapy and is a medical emergency.

- **Signs:**

tachypnoea; use of accessory respiratory muscles (e.g. abdominal, sternocleidomastoid), and intercostal and subcostal recession; wheeze might be minimal or absent; tachycardia; pulsus paradoxus >10 mmHg (a reduction in blood pressure on inspiration); sweating; tiring; confusion.

- **Treatment:**

• give supplemental oxygen to maintain *S*aO294–98%;

• β2 agonist (either salbutamol or terbutaline) via O2 driven nebulizer;

• continuous nebulization can be used if there is a poor initial response;

• intravenous β2 agonists should only be used when the inhaled route is unreliable;

• steroids – either oral prednisolone or i.v. hydrocortisone;

• nebulized ipratropium (anticholinergic);

• consider i.v. magnesium sulphate when life-threatening or poor initial response to treatment; aminophylline might also be considered in this situation.

Cardiac arrest
Advanced life support algorithm

During CPR

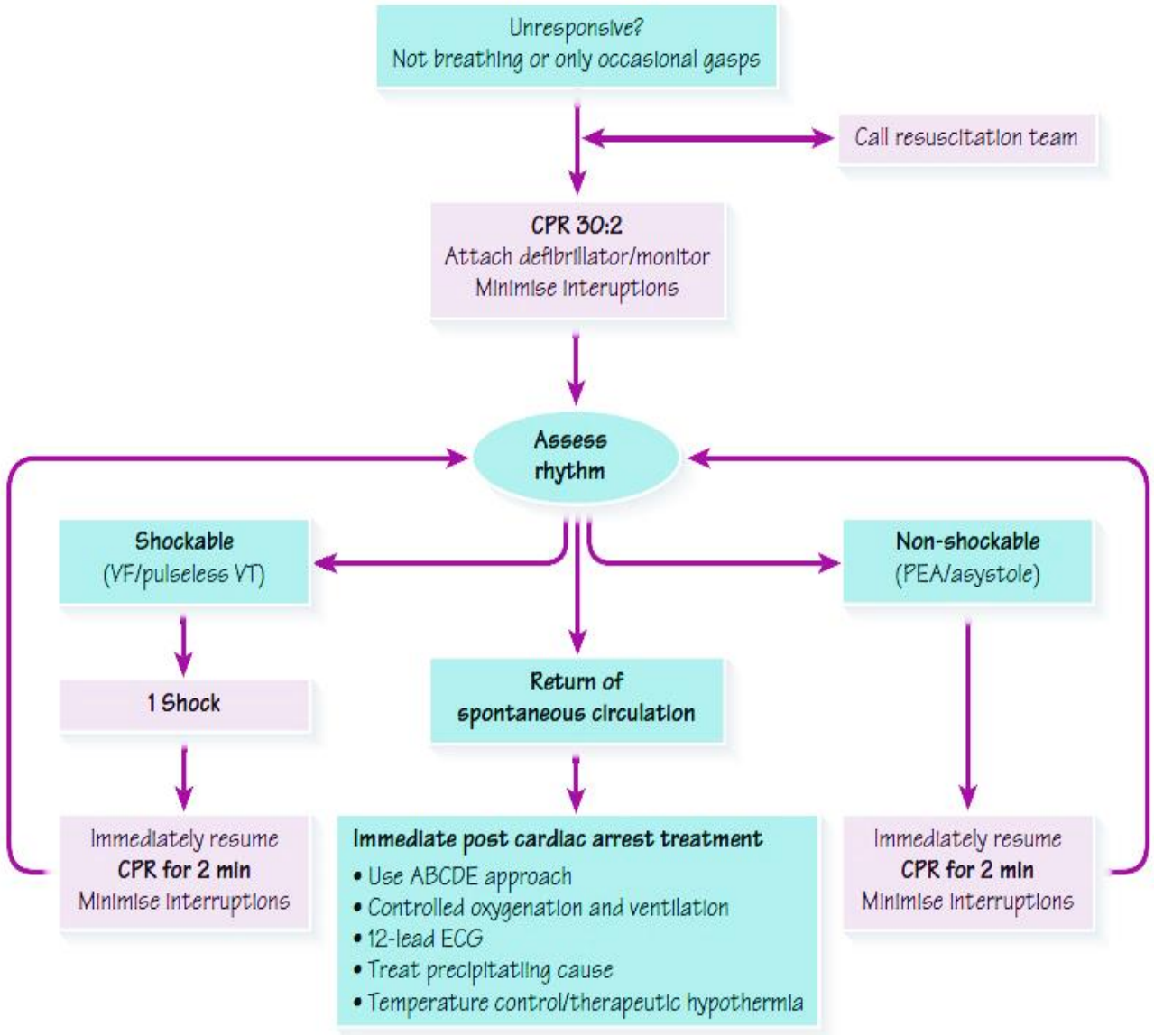
- Ensure high-quality CPR rate, depth, recoil
- Plan actions before interrupting CPR
- Give oxygen
- Consider advanced airway and capnography
- Continuous chest compressions when advanced airway in place
- Vascular access (intravenous, intraosseous)
- Give adrenaline every 3–5 min
- Correct reversible causes

Reversible causes

- Hypoxia
- Hypovolaemia
- Hypo-/hyperkalemia/metabolic
- Hypothermia
- Thrombosis – coronary or pulmonary
- Tamponade – cardiac
- Toxins
- Tension pneumothorax

VF – ventricular fibrillation
VT – ventricular tachycardia
PEA – pulseless electrical activity

Figure 24.2 Advanced life support algorithm



Failed intubation (reproduced from the Difficult Airway Society, with permission)

1. Assess the likelihood and clinical impact of basic management problems:

- **Difficulty with patient cooperation or consent**
- **Difficult mask ventilation**
- **Difficult supraglottic airway placement**
- **Difficult laryngoscopy**
- **Difficult intubation**
- **Difficult surgical airway access**

2. Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management.

3. Consider the relative merits and feasibility of basic management choices:

- **Awake intubation *vs.* intubation after induction of general anesthesia**
- **Non-invasive technique *vs.* invasive techniques for the initial approach to intubation**
- **Video-assisted laryngoscopy as an initial approach to intubation**
- **Preservation *vs.* ablation of spontaneous ventilation**

Direct laryngoscopy

Any problems

Call for help

Plan A: Initial tracheal intubation plan

•Initial tracheal intubation plan

Direct laryngoscopy

– check: neck flexion and head extension

• Laryngoscope technique and vector

• External laryngeal manipulation

– by laryngoscopist

• Vocal cords open and immobile

• If poor view:

Introducer (bougie) – seek clicks or hold-up

and/or alternative laryngoscope

Failed intubation

Plan B

Secondary tracheal intubation plan

ILMA or LMA

Not more than 2 insertions

Oxygenate and ventilate

Failed oxygenation

(e.g. SpO2 < 90% with FiO2 1.0)

via ILMATM or LMATM

Plan C

Maintenance of oxygenation, ventilation, postponement of surgery and awakening

Revert to face mask

Oxygenate and ventilate

Reverse non-depolarising relaxant

1 or 2 person mask technique

(with oral ± nasal airway)

Failed ventilation and oxygenation

Plan D

Rescue techniques for

can't intubate, can't ventilate' situation

Post Anesthesia Care Unit (PACU)

- The role of the anaesthetist is not limited to theatres. There may be a
- number of postoperative responsibilities to undertake, both in the
- recovery room and on the surgical ward.
- After receiving anesthesia for a surgery or procedure a patient is sent to the PACU to recover and wake up .
- The PACU is a critical care unit where the patient's vital signs are closely observed ,pain management begins , and fluids are given .
- The nursing staff is skilled in recognizing and managing problems in patients after receiving anesthesia .
- The PACU is under the direction of the Department of Anesthesiology.

PACU

Design should match function ,Location: 1-Close to the OR.

2-Access to x-ray, blood bank & clinical labs.

Monitoring equipment,Emergency equipment,Personnel

Admission to PACU

Steps:

Coordinate prior to arrival,

Assess airway,

Administer oxygen,

Apply monitors,

Obtain vital signs,

Receive report from anesthesia personnel.

PACU - ASA Standards

1. Standard I
   All patients should receive appropriate care
2. Standard II
   All patients will be accompanied by one of anesthesia team
3. Standard III
   The patient will be reevaluated & report given to the nurse
4. Standard IV
   The patient shall be continually monitored in the PACU
5. Standard V (At least for 45 minutes)
   A physician will signing for the patient out of the PACU

Initial Assessment

1. Color
2. Respiration
3. Circulation
4. Consciousness
5. Activity

Monitoring in the PACU

Baseline vital signs.

Respiration

- RR/min, Rythm
- Pulse oximetry

Circulation

- PR/min & Blood pressure
- ECG

Level of consciousness

Pain scores

Patient Care in the PACU Admission

- Apply oxygen and monitor
- Receive report

Monitor & Observe & Manage

- ❾ To Achieve
  - Cardiovascular stability
  - Respiratory stability
  - Pain control

Discharge from PACU

Aldrete Score

Score	Activity	Respiration	Circulation	Consciousness	Oxygen Saturation
2	Moves all extremities	Breaths deeply and coughs freely.	BP ± 20 mm of preanesth. level	Fully awake	Spo2 > 92% on room air
1	Moves 2 extremities	Dyspneic, or shallow breathing	BP ± 20-50 mm of preanesth. level	Arousable on calling	Spo2 >90% With suppl. O2
0	Unable to move	Apneic	BP ± 50 mm of preanesth. level	Not responding	Spo2 <92% With suppl. O2

Discharge From the PACU

- Standard Aldrete Score:
  - Simple sum of numerical values assigned to activity, respiration, circulation, consciousness, and oxygen saturation.
  - A score of 9 out of 10 shows readiness for discharge.
- Post-anesthesia Discharge Scoring System:
  - Modification of the Aldrete score which also includes an assessment of pain, N/V, and surgical bleeding, in addition to vital signs and activity.
  - Also, a score of 9 or 10 shows readiness for discharge.

Discharge criteria from PACU

- Easy arousability
- Full orientation
- Ability to maintain & protect airway
- Stable vital signs for at least 15 – 30 minutes
- The ability to call for help if necessary
- No obvious surgical complication (active bleeding)

Postoperative management

opioids

Side effect	Potential problems
Respiratory depression, sedation and cough suppression	• Apnoea, • Gastric aspiration • Respiratory infection
Nausea and vomiting	• Electrolyte imbalance • Dehydration and malnutrition • Wound dehiscence • Delayed discharge
Reduction in peristalsis	• Constipation • Ileus and urinary retention • Slow return to GI function after bowel surgery

Common PACU Problems

- Airway obstruction
- Hypoxemia
- Hypoventilation
- Hypotension
- Hypertension
- Cardiac dysrhythmias
- Hypothermia
- Bleeding
- Agitation
- Delayed recovery
- “PONV”
- Pain
- Oliguria

1. Airway Obstruction (Most common)

■ **Causes**

Most common: tongue fall back

❾ posterior pharynx

May be foreign body,Inadequate relaxant reversal,Residual anesthesia

■ **Management**

Patient's stimulation, Suction, Oral Airway, Nasal Airway,

Others:

- Tracheal intubation
- Cricothyroidotomy
- Tracheotomy

2. Hypoventilation

- **Causes:**

Residual anesthesia

Narcotics

Inhalation agent

Muscle Relaxant

Post oper - Analgesia

Intravenous

Epidural

Close observation,

Assess the problem,

- **Treatment :**

Reverse (or Antidote):

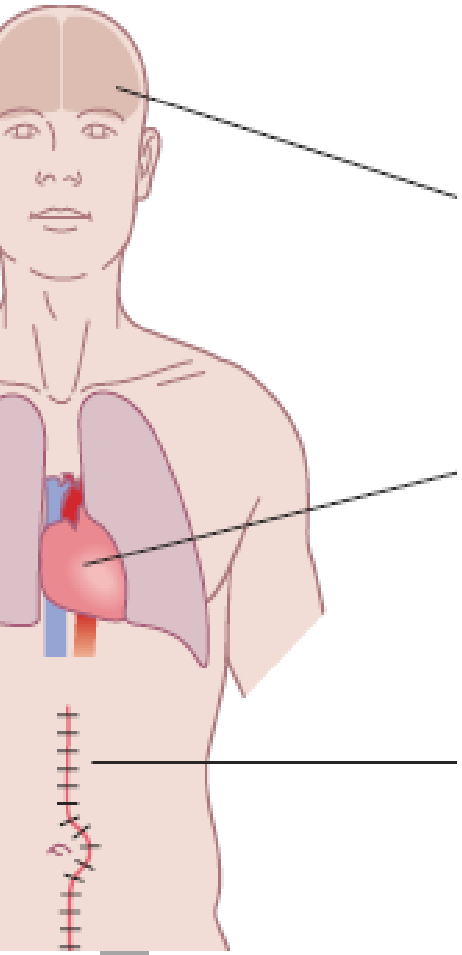
Muscle relaxant : Neostigmine

Opioids : Naloxone

Midazolam : Anexate

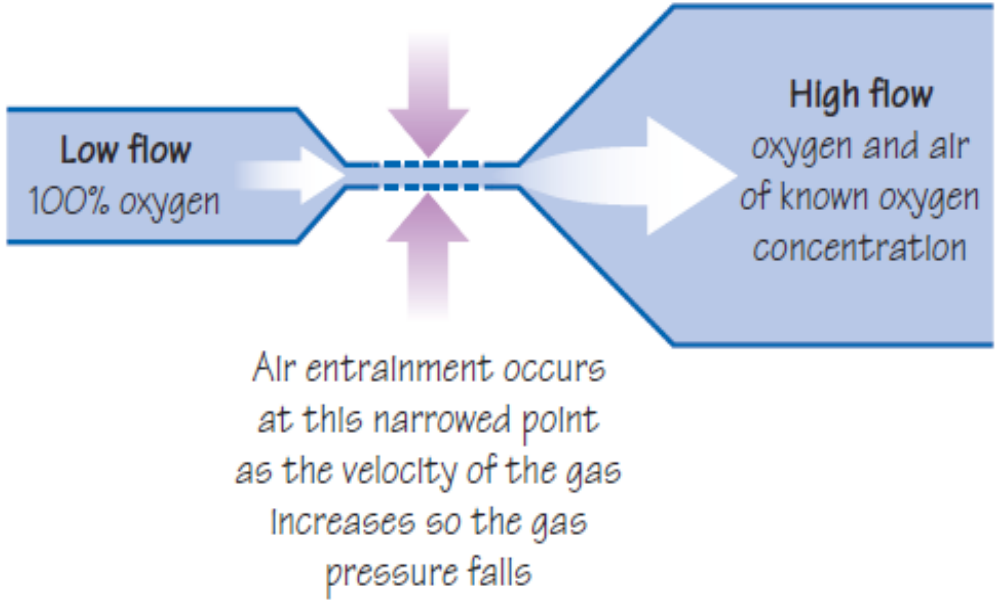
Oxygen therapy

2 Hazards of postoperative hypoxaemia



Hazards	Consequences
CNS	• Cerebral ischaemia • Confusion • Postoperative cognitive dysfunction (see Chapter 28)
CVS	• Myocardial ischaemia and infarction • Arrhythmias
Other	• Reduced wound healing • Increased postoperative infections • ? Anastomotic breakdown • ? Bacterial translocation across bowel wall leading to sepsis

Figure 34.3 Venturi effect



3. Hypertension

Common causes: e.g.

- Pain
- Full Bladder

Hypertensive patients

Fluid overload

Excessive use of vasopressors

Treatment

Effective pain control

Sedation

Anti-hypertensives:

- Beta blockers
- Alpha blockers
- Hydralazine (Apresoline)
- Calcium channel blockers

4. Hypotension

Decreased venous return

- Hypovolemia,
  - ↓ fluid intake
  - ↑ losses
  - Bleeding
- Sympathectomy,
- 3rd space loss,
- Left ventricular dysfunction

Fluids

Patients will require i.v. fluids until they are able to drink normally

maintenance and interoperative fluid losses;

replacement of pre-existing losses (e.g. dehydration preoperatively);

replacement of postoperative losses (e.g. nasogastric losses, bleeding).

The types of fluid are:

- isotonic crystalloid (most often used);
- colloids (for maintaining intravascular volume, early bleeding);
- blood and blood products (for significant haemorrhage,coagulopathy).

5. Dysrhythmias

- **Secondary to**

  Hypoxemia

  Hypercarbia

  Hypothermia

  Acidosis

  Catecholamines

  Electrolyte abnormalities.

- **Treatment**

Identify and treat the cause,

Assure oxygenation,

Pharmacological

6. Urine Output

- **Oliguria Causes**
  - Hypovolemia,
  - Surgical trauma,
  - Impaired renal function,
  - Mechanical blocking of catheter.
- **Treatment:**
  - Assess catheter patency
  - Fluid bolus
  - Diuretics e.g. Lasix

7. Post op Bleeding

- **Causes:**

Usually Surgical Problem,

Coagulopathy,

Drug induced

Treatment of Post op Bleeding

- **Treatment:**

• Start i.v. lines ➲ push fluids

• Blood sample,

- CBC,

- Cross matching,

- Coagulopathy

• Notify the surgeon,

• Correction of the cause

8. Hypothermia

Most of patients will arrive cold

Treatment:

Get baseline temperature

Actively rewarm

Administer oxygen if shivering

Take care for:

Pediatric,
Geriatric.

9. Altered Mental Status

- Reaction to drugs?
  - Drugs e.g. sedatives, anticholinergics
  - Intoxication / Drug abusers
- Pain
- Full bladder
- Hypoventilation
- Low COP
- CVA

Treatment of Altered Mental Status

- Reassurances,
- Always protect the patient,
- Evaluate the cause,
- Treatment of symptoms,
- Sedatives / Opioids if necessary.

10. Delayed Recovery

Systematic evaluation

Pre-op status

Intraoperative events

Ventilation

Response to Stimulation

Cardiovascular status

The most common cause:

Residual anesthesia ➲ Consider reversal

Hypothermia,

Metabolic e.g. diabetic coma,

Underlying psychiatric problem

CVA

11. Postoperative Nausea & Vomiting "PONV"

- **Risk factors**

  Type & duration of surgery (Laparoscopic surgeries),

  Type of anesthesia,

  Drugs,

  Hormone levels,

  Medical problems,

  Autonomic involvement.

- **Prevention of PONV**

NPO status

Dexamothasone,

Droperidol,

Metoclopramide,

H_2 blockers,

Ondansetron,

Acupuncture

12. Postoperative Pain

- Causes:
- Incisional: Skin and subcutaneous tissue
- Laparoscopy Insuflation of Co_2
- Others:
  - Deep cutting, coagulation, trauma
  - Positional nerve compression, traction & bed sore.
  - IV site needle trauma, extravasation, venous irritation
  - Tubes drains, nasogastric tube, ETT
  - Surgical complication of surgery
  - Others cast, dressing too tight, urinary retention

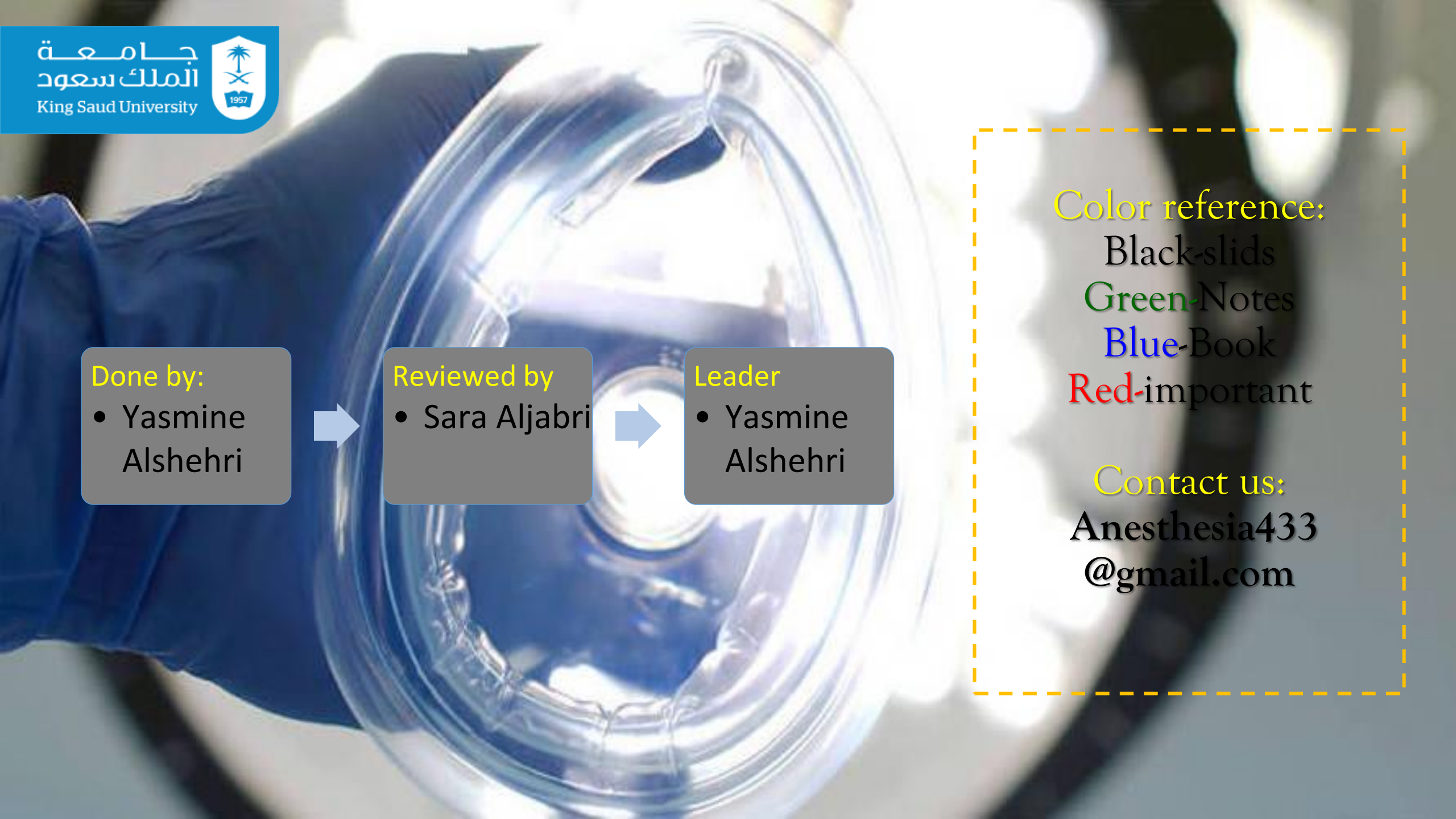
Table 34.2 Common methods of administering analgesics

Analgesic	Method
Opioids	I.m., I.v. (PCA), epidural/spinal, oral, intra-articular
Paracetamol	I.v. and oral (rarely p.r.)
NSAIDs	Oral, p.r., I.v.
Local anaesthetic	Wound, epidural/spinal, various nerve blocks. Intra-articular

Referral to high dependency unit/intensive care unit

Table 34.3 Levels of postoperative care

Level of care	
0 (ward)	Patients needs met on normal ward
1 (HDU)	Patients at risk of their condition deteriorating, or who require advice from the ICU team
2 (ICU)	Patients with a single failing organ system or requiring detailed observation/intervention
3 (ICU)	Patients requiring ventilation (alone), advanced respiratory support alone or support of at least two organ systems



جامعة الملك سعود
King Saud University

Done by:
- Yasmine Alshehri

Reviewed by
- Sara Aljabri

Leader
- Yasmine Alshehri

Color reference:
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Blue-Book
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Contact us:
Anesthesia433
@gmail.com