

2-2 Hypoxia / desaturation / cyanosis v.1

Using these steps from start to end should identify any cause of unexpected hypoxia in theatre.

Avoid spending excessive time and attention on one aspect until you have run through the whole drill.

START

1 Adequate oxygen delivery

- Pause surgery if possible.
- Increase fresh gas flow AND give 100% oxygen AND check measured F_iO_2 .
- Visual inspection of entire breathing system including valves and connections.
- Rapidly confirm reservoir bag moving OR ventilator bellows moving.
- If SpO_2 low, is it accurate? Consider whether poor perfusion could be the problem.

2 Airway

- Check position of airway device and listen for noise (including over larynx and stomach).
- Check capnogram shape compatible with patent airway.
- Confirm airway device is patent (consider passing suction catheter).
- Isolate patient from anaesthetic machine and breathing system (Box B).
- Once machine/breathing system problem excluded, consider whether airway device should be replaced or its type changed.

3 Breathing

- Check chest symmetry, rate, breath sounds, SpO_2 , measured VT_{exp} , $ETCO_2$.
- Feel the airway pressure using reservoir bag and APL valve (Box C) <3 breaths.
- Consider potential causes and actions (Box D).
- Consider muscle relaxation to optimise ventilation.

4 Circulation

- Check heart rate, rhythm, perfusion, recheck blood pressure.
- If circulation unstable, consider if this is secondary to hypoxia.

5 Depth

- Ensure adequate depth of anaesthesia and analgesia.

6 If not resolving call for help AND check arterial blood gas, 12-lead ECG, chest X-ray.

Box A: CRITICAL CHANGES

If problem worsens significantly or a new problem arises, call for help and go to **START** of **GUIDELINE 1-1 Key basic plan**.

Box B: ISOLATE EQUIPMENT

Ventilate using self-inflating bag connected **DIRECTLY** to tracheal tube connector. **DO NOT** use HME filter, angle piece or catheter mount:

- If problem resolves: assume problem with machine, circuit, HME, filter, angle piece or catheter mount: check and replace.
- If increased pressure manually confirmed: re-connect machine.

Box C: AIRWAY PRESSURE

Remember that airway “feel” depends on your APL valve setting. You can only “feel” a maximum of what the APL valve is set to. Measured expired tidal volume gives additional information.

BOX D: POTENTIAL CAUSES AND ACTIONS

- Hypoxia with increased airway pressure → **2-3**
- Inadequate movement or expired volume: assist/increase ventilation.
- Asymmetrical chest expansion: exclude bronchial intubation/foreign body/pneumothorax.
- Consider potential actions: tracheal/bronchial suction; bronchodilator; PEEP; diuretic; bronchoscopy.
- Consider potential causes:
 - Laryngospasm and stridor → **3-6**
 - Bronchospasm → **3-4**
 - Anaphylaxis → **3-1**
 - Circulatory embolism → **3-5**
 - Cardiac ischaemia (or infarction) → **3-12**
 - Cardiac tamponade → **3-9**
 - Sepsis → **3-14**
 - Malignant hyperthermia crisis → **3-8**
 - Aspiration, pulmonary oedema, congenital heart disease