Royal Cornwall Hospitals
NHS Trust

Removal of Supraglottic Airway Devices Standard Operating Procedure

V1.0

August 2025

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Data Protection Act 2018 (UK General Data Protection Regulation – GDPR) Legislation.

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1. Introduction

Supraglottic airway devices (SAD) are commonly used in theatre for maintaining airway patency. This Standard Operating Procedure (SOP) defines the equipment, staffing and procedural requirements for the safe removal of SADs in recovery areas.

2. Purpose of this Standard Operating Procedure

2.1. Define the minimum equipment and monitoring requirements for caring for patients with SADs in recovery areas.

2.2. Supplementary educational information regarding capnography.

3. Ownership and Responsibilities

3.1. Role of the Anaesthetist

The primary anaesthetist is responsible for:

- Being immediately available until the SAD is removed and the patient is safely maintaining their own airway.

3.2. Role of Recovery Staff

All recovery staff members are responsible for:

- Awareness and adherence to the procedures outlined in this SOP.

3.3. Role of the Managers

Line managers are responsible for:

- Ensuring safe staffing levels.
- Ensuring availability and maintenance of monitoring equipment as described in this SOP.

4. Standards and Practice

4.1. Supraglottic airway devices (SAD) are commonly used in theatre for maintaining airway patency. These include 1st generation Laryngeal Mask Airway (LMA) devices (e.g. LMA classic) and 2nd generation LMA devices (such as the AMBU Auragain). SADs are commonly removed in recovery during emergence from anaesthesia.

4.2. All patients with an SAD in recovery must be cared for in a dedicated bay by a qualified recovery practitioner (1:1 staff/patient ratio). There must also be an additional qualified recovery practitioner available within the recovery suite.

4.3. An oxygen supply and suction equipment must be available at the bedside.

4.4. Physiological monitoring must be continued and will include:

- ECG.
- SpO2.
- NIBP.
- Capnography - see Appendix 3.

4.5. A breathing circuit attached to oxygen must be applied to the SAD – a “T-piece” may commonly be used in adults or “Mapleson F” circuit in paediatrics. A “Mapleson C” or “Waters” circuit should also be immediately available.

4.6. An anaesthetist must remain with the patient until adequate spontaneous ventilation is established and a satisfactory hand-over has been completed.

4.7. An anaesthetist must be immediately available within the theatre/recovery suite until all SADs have been removed and physiological observations are stable.

4.8. Oxygen cylinders and self-inflating “AMBU” bag must be available in recovery in case of oxygen pipeline failure.

4.9. The SAD should not be removed until the patient is showing signs of emergence from anaesthesia and there is sufficient evidence that the patient’s protective airway reflexes have returned. These signs may include:

- Eye opening.
- Responding to verbal commands.
- Head movement.
- Reaching for the SAD.

4.10. If the SAD is cuffed, in normal circumstances the cuff should not be deflated as this aids clearance of secretions from the airway at removal. Suction equipment should be immediately available, and be switched on, to allow for further secretion removal if required.

4.11. Supplementary oxygen should subsequently be administered to the patient via a device such as a simple face mask.

4.12. Face mask oxygen with capnography can also be considered.

4.13. In some circumstances, a decision made be made by the anaesthetist/ anaesthetic team to remove the SAD whilst the patient is anaesthetised or “deep” (i.e. no sign of airway reflexes are present). In this case, the anaesthetist should perform, or be present throughout, the removal, and should not leave until satisfied that the patient is breathing normally (with or without the use of airway adjuncts and/or manual jaw thrust) with supplementary oxygen in situ. An anaesthetist should be immediately available until the patient is maintaining their own airway and airway reflexes have returned.

5. Dissemination and Implementation

This document forms part of the ACSA recommendations for the department. It should be made available in the Trust document store. The policy should be included in Trust induction for recovery staff and for routine training of recovery staff.

6. Monitoring compliance and effectiveness

Information Category	Detail of process and methodology for monitoring compliance
Element to be monitored	Compliance with all components of SOP.
Lead	Recovery lead R Evans.
Tool	Ad Hoc audit of recovery practice during SAD removal.
Frequency	Annual.
Reporting arrangements	Report to ACCT governance.
Acting on recommendations and Lead(s)	ACCT governance. Governance lead, Recovery lead.
Change in practice and lessons to be shared	Remedial action to be discussed in ACCT governance meetings with changes to SOP as required.

7. Updating and Review

Routine 3 yearly review

8. Equality and Diversity

8.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the Equality Diversity And Inclusion Policy or the Equality and Diversity website.

8.2. Equality Impact Assessment

The Initial Equality Impact Assessment Screening Form is at Appendix 2.

Appendix 1. Governance Information

Information Category	Detailed Information
Document Title:	Removal of Supraglottic Airway Devices Standard Operating Procedure V1.0
This document replaces (exact title of previous version):	New Document
Date Issued / Approved:	August 2025
Date Valid From:	August 2025
Date Valid To:	August 2028
Author / Owner:	Mark Lambert, Consultant Anaesthetist
Contact details:	01872 258197
Brief summary of contents:	Guidance for safe removal of supraglottic airway devices in recovery areas.
Suggested Keywords:	Recovery, supraglottic, airway,
Target Audience:	**RCHT:** Yes **CFT:** No **CIOS ICB:** No
Executive Director responsible for Policy:	Chief Medical Officer
Approval route for consultation and ratification:	ACCT Care Group Board
Manager confirming approval processes:	Doug Riley
Name of Governance Lead confirming consultation and ratification:	Suzanne Barber Interim Governance Lead
Links to key external standards:	None

Information Category	Detailed Information
Related Documents:	Chapter 2: Guidelines for the Provision of Anaesthesia Services for the Perioperative Care of Elective and Urgent Care Patients 2025. https://rcoa.ac.uk/gpas/chapter-2 Recommendations for standards of monitoring during anaesthesia and recovery 2021. https://anaesthetists.org/Home/Resources-publications/Guidelines/Recommendations-for-standards-of-monitoring-during-anaesthesia-and-recovery-2021
Training Need Identified:	No
Publication Location (refer to Policy on Policies – Approvals and Ratification):	Internet and Intranet
Document Library Folder/Sub Folder:	Clinical / Anaesthetics

Version Control Table

Date	Version Number	Summary of Changes	Changes Made by
July 2025	V1.0	Initial issue	Mark Lambert Consultant Anaesthetist.

All or part of this document can be released under the Freedom of Information Act 2000.

All Policies, Strategies and Operating Procedures, including Business Plans, are to be kept for the lifetime of the organisation plus 6 years.

This document is only valid on the day of printing.

Controlled Document.

This document has been created following the Royal Cornwall Hospitals NHS Trust The Policy on Policies (Development and Management of Knowledge Procedural and Web Documents Policy). It should not be altered in any way without the express permission of the author or their Line Manager.

Appendix 2. Equality Impact Assessment

Section 1: Equality Impact Assessment (EIA) Form

The EIA process allows the Trust to identify where a policy or service may have a negative impact on an individual or particular group of people.

For guidance please refer to the Equality Impact Assessment Policy (available from the document library) or contact the Equality, Diversity, and Inclusion Team rcht.inclusion@nhs.net

Information Category	Detailed Information
Name of the strategy / policy / proposal / service function to be assessed:	Removal of Supraglottic Airway Devices Standard Operating Procedure V1.0
Department and Service Area:	Anaesthetics
Is this a new or existing document?	New
Name of individual completing EIA (Should be completed by an individual with a good understanding of the Service/Policy):	Mark Lambert, Consultant Anaesthetist
Contact details:	01872 258197

Information Category	Detailed Information
1. Policy Aim - Who is the Policy aimed at? (The Policy is the Strategy, Policy, Proposal or Service Change to be assessed)	Recovery Staff, Anaesthetist.
2. Policy Objectives	Guidance for safe removal of supraglottic airway devices in recovery areas.
3. Policy Intended Outcomes	Safe removal of supraglottic airway devices.
4. How will you measure each outcome?	Annual audit.
5. Who is intended to benefit from the policy?	Patients, recovery staff.

Information Category	Detailed Information
6a. Who did you consult with? (Please select Yes or No for each category)	• Workforce: Yes • Patients/ visitors: No • Local groups/ system partners: No • External organisations: No • Other: No
6b. Please list the individuals/groups who have been consulted about this policy.	**Please record specific names of individuals/ groups:** Department of anaesthesia. ACCT. Recovery staff.
6c. What was the outcome of the consultation?	Approval
6d. Have you used any of the following to assist your assessment?	**National or local statistics, audits, activity reports, process maps, complaints, staff, or patient surveys:** No.

7. The Impact

Following consultation with key groups, has a negative impact been identified for any protected characteristic? Please note that a rationale is required for each one.

Where a negative impact is identified without rationale, the key groups will need to be consulted again.

Protected Characteristic	(Yes or No)	Rationale
Age	No	
Sex (male or female)	No	
Gender reassignment (Transgender, non-binary, gender fluid etc.)	No	
Race	No	
Disability (e.g. physical or cognitive impairment, mental health, long term conditions etc.)	No	
Religion or belief	No	
Marriage and civil partnership	No	

Protected Characteristic	(Yes or No)	Rationale
Pregnancy and maternity	No	
Sexual orientation (e.g. gay, straight, bisexual, lesbian etc.)	No	

A robust rationale must be in place for all protected characteristics. If a negative impact has been identified, please complete section 2. If no negative impact has been identified and if this is not a major service change, you can end the assessment here.

I am confident that section 2 of this EIA does not need completing as there are no highlighted risks of negative impact occurring because of this policy.

Name of person confirming result of initial impact assessment: Mark Lambert, Consultant anaesthetist .

If a negative impact has been identified above OR this is a major service change, you will need to complete section 2 of the EIA form available here:
Section 2. Full Equality Analysis

Appendix 3. Capnography

Capnography is the measurement of carbon dioxide (CO_2) content of expired gas from a patient's airway. A capnograph is a specific type of CO_2 monitor used in medicine that displays its values as waveform (Capnogram) alongside a numerical value- the end tidal carbon dioxide ($ETCO_2$). Both the waveform and the value for $ETCO_2$ give us important information to aid patient assessment.

In anaesthesia and critical care, capnography has several uses including:

- Confirmation of correct endotracheal tube placement following intubation.
- Monitoring the ongoing patency of a patient's airway (both with and without devices in situ).
- As an aid to assessment of adequate ventilation.
- Potentially also to alert to a fall in cardiac output or cardiac arrest.

Both the Royal College of Anaesthetists (RCOA) and the Association of Anaesthetists of Great Britain and Ireland (AAGBI) recommend that standard monitoring in recovery units should include capnography:[1,2]

- For intubated patients.
- For patients with a supraglottic or other similar airway device in situ.
- For patients who remain deeply sedated.

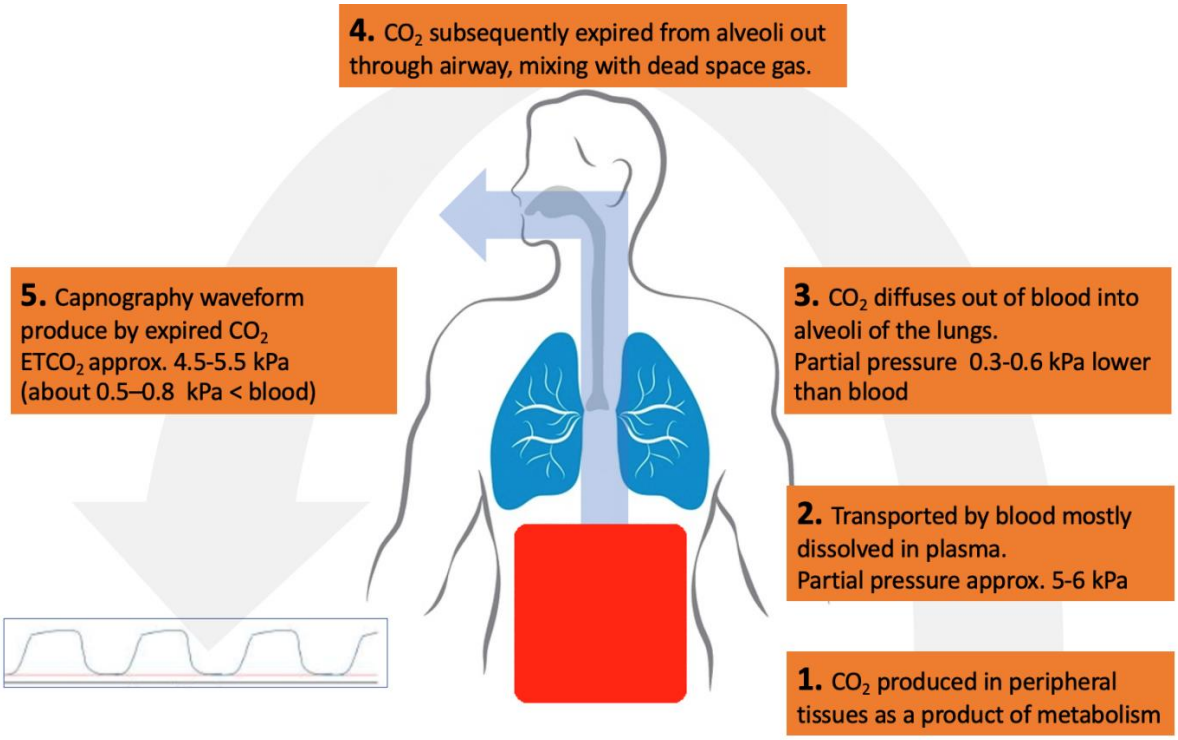
Ideally in these case capnography monitoring should be present from the induction of anaesthesia to full recovery. Although it is acknowledged that a brief interruption of monitoring may be acceptable for transfer over short distances.

References:

1. Chapter 4: Guidelines for the Provision of Anaesthetic Services for Postoperative Care 2019; Royal College of Anaesthetists. https://rcoa.ac.uk/gpas/chapter-4
2. Recommendations for standards of monitoring during anaesthesia and recovery 2015: Association of Anaesthetists of Great Britain and Ireland. https://anaesthetists.org/Home/Resources-publications/Guidelines/Standards-of-monitoring-during-anaesthesia-and-recovery

Basic Science of Capnography

Physiology:



Carbon dioxide, a product of normal metabolism, is only excreted from the body via the lungs. Air and other gas mixtures that we give to patients only contain insignificant amounts of Carbon dioxide (~0.04%). Therefore, the presence of carbon dioxide in expired gas confirms that there is a patent airway allowing air to flow in and out of the lungs.

End tidal Carbon dioxide is measured as a partial pressure, just like carbon dioxide and oxygen levels on blood gases. The standard units in the UK are also the same -kilo Pascals (kPa) although it can be measured in other units such as millimeters of mercury (mmHG).

End tidal CO_2 is roughly equivalent to arterial CO_2 ($paCO_2$) although due to several factors there is a small drop between the two. Normally $ETCO_2$ should be around 0.5 - 0.8 kPa less than $paCO_2$. This may be increased in patients with acute or chronic lung pathology.

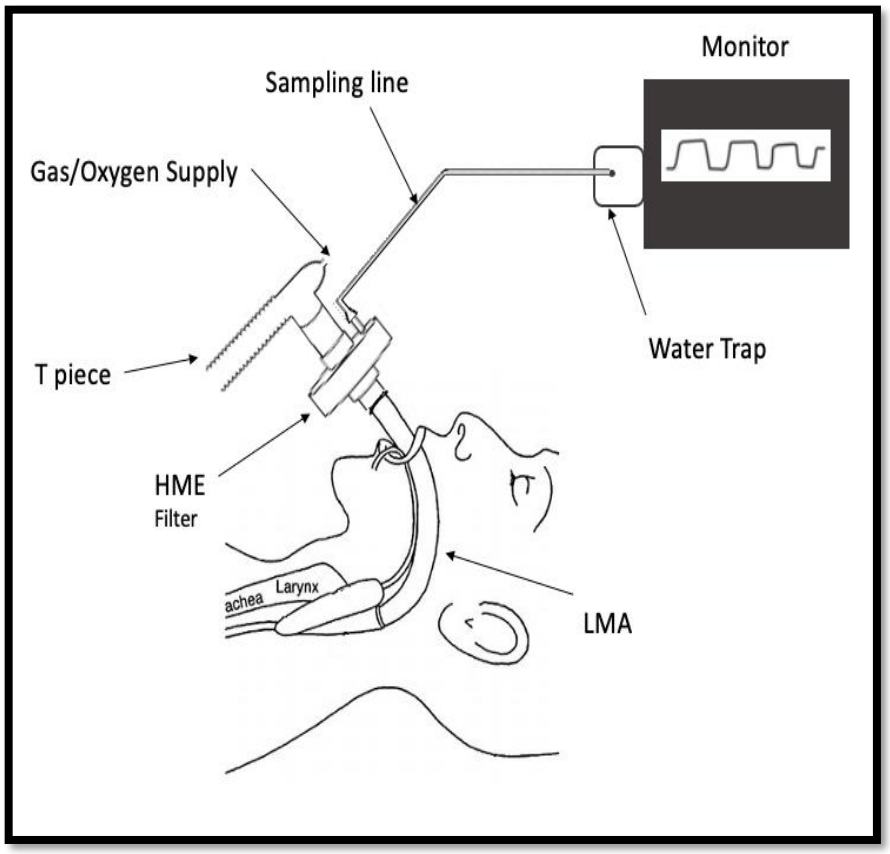
Equipment

Capnography equipment generally comes in two configurations:

- Side stream- a sampling line draws gas from the breathing circuit to a separate analyser. This is what we use in RCHT theatres and recovery. One advantage of using this with the anaesthetic machine is that it also allows us to measure anaesthetic gases.

- Mainstream- the analyser is inside the breathing circuit and has a lead connecting it to the monitor. This is used in RCHT Critical care and resus. It has many advantages but downsides for theatres are that it needs to be replaced between patients and it adds bulk to the patient's airway.

Example of a side stream analyzer set up connected to LMA for a recovery patient



Components:

- Sampling line- withdraws gas from breathing circuit at a constant rate.
- Water trap prevents water vapour entering analyser where it can interfere with measurement.
- Analyser measures CO_2 based on principle of infra-red absorption.
- Monitor to display waveform

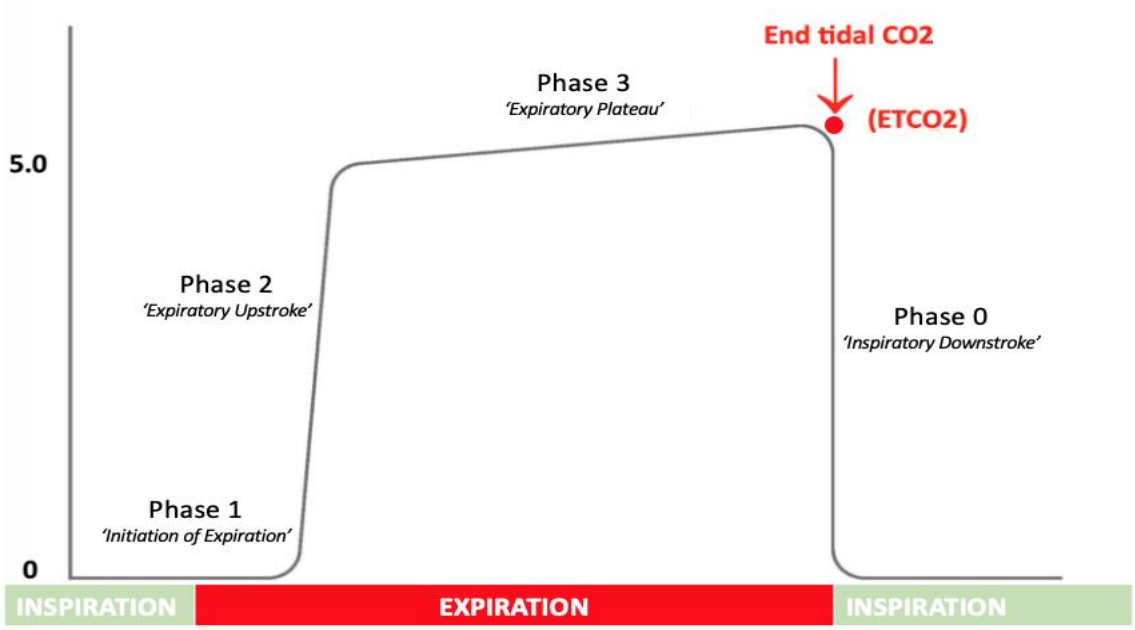
Notes:

- There is a small delay in responsiveness of the analyser (seconds) due to the time taken for the gas sample to travel up the sampling line.
- Potential issues with equipment include
    - multiple points where disconnection can occur.
    - sampling line can become kinked or blocked with condensation.
    - to avoid contamination, sampling line should be connected to the distal side of filter.

The Normal Capnogram Waveform

Each waveform represents a single breath out.

Normal End tidal CO_2 is approximately 4.5 -5.5 kPa.



Stages of a normal capnogram:

Phase 1, Initiation of expiration: CO_2 level starts at a baseline of 0 during inspiration. At this point the sampling line is measuring the gas being supplied to the patient, which has negligible CO_2. As the patient starts to breathe out, gas from the dead space will reach the sample line first, so initially there is no rise in CO_2.

Phase 2, Expiratory Upstroke: as the breath continues, alveolar gas starts to pass the sample line and there is a rapid rise in the CO_2 level.

Phase 3, Expiratory Plateau: expired gas is now purely from alveoli and CO_2 level is maintained at a near constant level. There is usually a slight upward gradient as the alveoli that empty last have greater CO_2 levels.

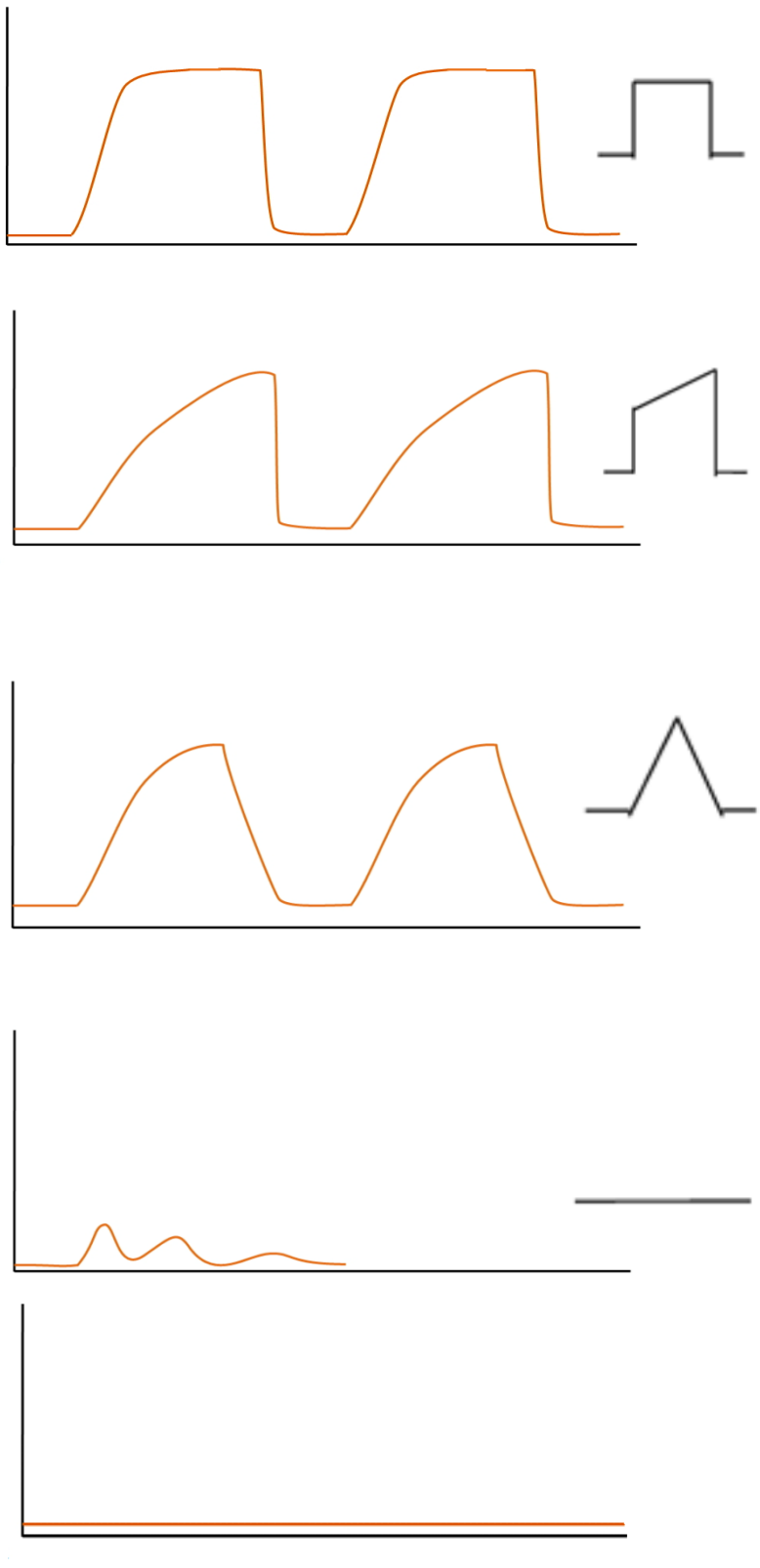
Phase 0, Inspiratory Downstroke: CO_2 rapidly returns to baseline as patient takes a breath in and fresh gas from the external supply re-enters the sampling area.

Capnography also provides an alternative way of assessing respiration rate by allowing you to count the number of waveforms per minute.

Abnormalities of Capnography

A useful interpretation device is the Bath ICU, 'Hat and Caps' tool. (Cook TM, Kelly FE, Goswami A. 'Hats and caps' capnography training on intensive care. *Anaesthesia* 2013; **68**: 421).

In each case of abnormality, it is important to fully assess the patient.



"TOP HAT" = GOOD

Normal Trace

"ASCOT HAT" = OK

Sawtooth shaped trace with more gradual upslope.

May indicate:

- Bronchospasm
- Mild obstruction

"DUNCE HAT" = BAD

Less verticle upslope and downslope

Indicates:

- Significant leak
- Partial obstruction

E.g. displaced LMA starting to obstruct

" NO HAT" = BAD

May be barely perceptible trace or complete flat line.

- Airway obstruction
- Oesophageal intubation
- Displaced airway device
- Apnoea
- Reduced/loss of cardiac output
- Disconnection or blockage of capnography equipment (will cause a flat line)

End tidal CO_2 Values

Normal range is approximately 4.5 to 5.5 kPa.

This number is less useful than interpretation of the waveform. However, an extremely low or high $ETCO_2$ is a cause for concern. This needs to be interpreted as part of the whole clinical picture.

In the case of a low $ETCO_2$ one should always consider whether this is actually an obstructing airway.

- Is the trace normal?
- What is the condition of the patient?

Example of causes of abnormal $ETCO_2$ in recovery	
Reduced $ETCO_2$	**Raised $ETCO_2$**
Always consider obstructing airway with reduced airflow. Common: • Hyperventilation- may be due to pain. Less common: • Hyperventilation due to acidosis or hypoxia. • Reduced blood flow through lungs- reduced cardiac output states, PE. • Reduced production of CO_2 – e.g., hypothermia.	Common: • Hypoventilation (A mildly raised $ETCO_2$ may be considered acceptable in patients recovering from general anaesthesia). Also: • Underlying respiratory disease i.e. COPD. • Increased production of CO_2: Sepsis, tourniquet release, shivering.