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Non-Surgical Extubation Guideline

1. Purpose

The aim of this document is to provide guidance and structure for selecting and assessing patients appropriate for non-surgical extubation in WA Country Health Service (WACHS) Hospitals.

Acutely / critically unwell patients presenting to WACHS Hospitals may at times require intubation for non-surgical indications, such as:

- altered/depressed conscious state
- behavioural control
- intoxication and overdose
- acute psychiatric illness
- respiratory failure
- threatened airway.

Such non-surgical intubated patients are usually transferred to Perth metropolitan hospitals for on-going management (Bunbury Hospital may be the transfer site for sites in the South West). This is in contrast to the majority of surgical patients who may be intubated and undergo general anaesthesia in WACHS hospitals to facilitate an elective or emergency surgical procedure and are usually extubated in the operating theatre following surgery.

The majority of patients who undergo intubation for non-surgical reasons are usually not safe for extubation at most WACHS hospitals due to the on-going condition which necessitated intubation, however for select patients it may be reasonable to consider extubation at a WACHS hospital if the condition necessitating intubation has resolved or been treated.

Given the remoteness of some WACHS hospitals from Perth tertiary hospitals, delays for retrieval by Royal Flying Doctor Service (RFDS) may be lengthy due to logistical constraints, and in such cases the treating doctor may consider (or be requested by RFDS to consider) extubating the patient at that hospital.

It is worth noting that some patients are at high risk of failed extubation, and this should be taken into account before proceeding. Failed extubation (reintubation with 72 hrs of extubation) risk factors are[1]:

- Excessive secretions
- Fever and sepsis
- Prolonged intubation
- cardiac failure
- Encephalopathy
- GI bleeding
- Seizures.

2. Guideline

2.1 Patient Suitability for Extubation

Careful attention should be given to the patient's disposition and the underlying condition necessitating intubation. Ensure the following factors are satisfied:

- the underlying condition has resolved or has been treated adequately so that the patient will likely tolerate extubation and is unlikely to require re-intubation
- the clinical disposition and any required definitive management is appropriate for on-going management at that hospital
- objective markers (e.g., blood alcohol level for alcohol intoxication, CT scan) have been assessed to determine resolution of the patient's underlying condition
- the multi-disciplinary team has considered the patient's suitability for extubation at the particular hospital, including:
    - intensive care consultant
    - anaesthetist (i.e., rural generalist anaesthetist / GP-anaesthetist, specialist anaesthetist or anaesthetic DMO)
    - local senior medical officer
    - senior nurse to discuss appropriate nurse skill-mix and staffing (ensuring availability of 1:1 nursing pre, during and post extubation period until deemed clear) and emergency department patient flow
    - other relevant consultant specialists e.g., toxicologist / psychiatrist / duty anaesthetist if relevant: document name and title in the patient healthcare record.

An anaesthetist, intensivist or FACEM with experience in extubation should be physically present at extubation and be ready to undertake re-intubation if necessary.

Advice **must** be sought from the Intensive care unit (ICU) consultant at the hospital to which the patient would be otherwise transferred. A senior registrar may answer the phone numbers below, particularly after hours. While the case may be discussed with the senior registrar, these extubations should not occur overnight and hence, it is expected the ICU consultant of the tertiary referral hospital will be involved in the discussion and plan for day-time extubation.

Royal Perth Hospital (RPH)
Contact the ICU 'Consultant C' at RPH via switchboard on 08 9224 2244, if unavailable then contact the on-call ICU consultant. Telehealth can be organised at the discretion of the ICU consultant.

Sir Charles Gairdner Hospital (SCGH)
Contact the on-call ICU consultant or senior registrar at SCGH via switchboard on 08 6457 3333. Telehealth can be organised at the discretion of the ICU consultant.

Fiona Stanley Hospital (FSH)

- FSH SWITCH 08 6152 2222
- Duty Consultant 08 6152 2171 (0800-2200hs)
- External Reg 08 6152 8801

Bunbury Hospital
Contact ICU registrar or ICU consultant on call through switch 08 9722 1000

The names and roles of clinicians involved in the decision to extubate at site must be documented in the patient's healthcare record:

- treating doctor
- ICU / high dependency unit (HDU) consultant
- senior nurse
- senior medical officer

2.2 Structured Assessment of Readiness for Extubation using the 'VOICE' Acronym

Reverse Muscle Relaxants

Document time this has been assessed as reversed:

- Consider assessing 'Train of Four' with a nerve stimulator prior to reversal, or be very confident of negligible muscle relaxant effects, e.g., last dose of paralysis must be discussed with local anaesthetic or ICU doctor and recommend > 2 hours. Note that patients with renal failure may experience prolonged paralysis.
- Administer a dose of sugammadex 200 mg intravenously if there is any concern over residual neuromuscular paralysis if aminosteroid agents have been used (vecuronium or rocuronium). Improvement in strength should be seen within 5 minutes of administration.

Refer to the Australian Injectable Drug Handbook for administration information.

Sedation

Turn sedation off:

- In preparation, strongly consider switching **early** from morphine and midazolam to propofol (with or without fentanyl) sedation, to allow faster de-sedation when ready for assessment.
- Alternatively, a dexmedetomidine infusion may be considered if medical and nursing staff are suitably trained and experienced.

Criteria for Extubation

The patient must be able to fully satisfy **all** the following criteria:

Ventilate

- Can the patient take a normal tidal volume breath, with a normal respiratory rate and have a normal partial pressure of carbon dioxide ($PaCO_2$) on blood gas?
- Set the ventilator to pressure support ventilation (PSV) with positive end expiratory pressure (PEEP) 5 cmH_2O and pressure support less than 10 cmH_2O.
- Assess the patient's **tidal volume** (TV)**, respiratory rate** (RR) **and check $PaCO_2$** on arterial blood gas (ABG) / venous blood gas (VBG) (if available). Target parameters TV 7-10 mL/Kg ideal body weight (IBW), RR 10-20 breaths per minute (BPM), $PaCO_2$ 35-45 mmHg.
- **Ensure pressure support is equal to or less than 10 cmH_2O otherwise hypoventilation may be masked.**

Oxygenate

- Set PSV with PEEP 5 cmH_2O and pressure support less than 10 cmH_2O.
- Set fraction of inspired oxygen (FiO_2) less than 40%.
- Ensure **saturations greater than 95%** on pulse oximetry.
- Corroborate ABG with saturation of oxygen (SaO_2).
- Check chest X-ray and examine their chest for radiological evidence of ongoing lung pathology (e.g. consolidation, aspiration, oedema).
- **Ensure you don't have any additional PEEP otherwise shunt may be masked.**

Invariate

- The underlying condition necessitating intubation has likely **resolved or been treated adequately** to not require re-intubation e.g., sufficient time for detoxication with blood alcohol level of zero.
- The patient is otherwise stable and does not need any investigations, procedures, operations, transfers that require them to remain intubated for the time being.
- The clinical course is improving and expected to continue improving on my current treatments.
- Assess that metabolic state is normal (fever, sodium (Na+), blood sugar level (BSL), metabolic acidosis etc.).

Cooperate

- Ensure adequate **alertness, cooperation, and conscious state**.
- Does the patient obey commands? E.g., "Stick out your tongue, squeeze my hands, wriggle your toes". Should be consistent and reproducible.

Expectorate

- Can the patient give a strong cough, enough to bring secretions up to their mouth and clear them? This is actually a test of strength.
- Ask them to cough or suction the endotracheal tube (ETT) and elicit a cough.
- Lift arms in air and hold for 3 seconds, lift head off pillow and hold for 3 seconds. This also tests for residual neuromuscular paralysis at the same time.
- Assess the quantity and consistency of respiratory secretions: aspiration or pneumonia may have a large secretion load that warrants continued ventilation, antibiotics and chest physiotherapy rather than extubation.

ATTENTION

Consider cuff leak check:

- In patients with airway swelling (e.g., post-anaphylaxis, neck surgery, epiglottitis) or those intubated for a long time (greater than 5 days), always check for a cuff leak prior to extubation.
- Use a Yankauer sucker to aspirate for secretions above the cuff.
- On PSV 10/5 deflate the cuff and listen for air leak. Should be an obvious sound in the back of their mouth.
- No cuff leak = No extubation, as high risk of stridor post-extubation.

Give dexamethasone 8 mg intravenously twice a day and promote diuresis, further management and consideration for transfer as per advising ICU specialist team'

2.3 Procedure for Extubation

It is **strongly recommended** that extubation should **only take place during daylight hours** after multi-disciplinary involvement for careful consideration of suitability for extubation and undertaking a structured assessment of readiness for extubation (refer to section 2.2).

Preparation

In preparing for extubation:

- Ensure adequate staffing including anaesthetist ready to undertake re-intubation and 1:1 nursing care is available, including the post extubation period until deemed clear.
- Allocate roles and discuss airway plan in case of re-intubation.
- Be aware of grade of laryngoscopy at original intubation.
- Prepare appropriate airway trolley equipment and emergency medications ready to undertake re-intubation.
- Ensure suction is available.
- Ensure patient has fasted for 4 hours. Aspirate naso / orogastric tube if present.
- Ensure Hudson mask with non-rebreather available and connected to oxygen at 15 L/min. Ambu bag connected to oxygen at 15 L/min.
- Explain the procedure to the patient.
- Position patient bed head-up to facilitate ventilation. However, be prepared to rapidly re-position to an ideal intubating position (with pillows available) in case bag-mask ventilation or re-intubation is required.
- Pre-oxygenate with FiO_2 100%.
- Consider connecting the patient to the Ambu bag with 100% oxygen for a trial of spontaneous breathing prior to extubation. Observe work of breathing, oxygen saturation, chest movement and respiratory rate.
- Suction ETT as needed, suction posterior pharynx.

Extubation

To extubate:

- Remove tapes or cut ties.
- Ask the patient to take a deep breath in (as one person applies positive pressure with the Ambu bag), open mouth fully and cough (as the other person deflates the cuff and removes ETT as soon as the cuff is deflated).
- Suction the mouth and back of throat immediately post-extubation.
- Apply supplemental oxygen to the patient. This can usually be commenced with a Hudson mask at 10 L/min. Alternately, humidified nasal oxygen can be used but this needs to be set up prior to extubation.
- Record extubation time on patient chart and perform and record full respiratory assessment, monitoring closely for signs of respiratory distress or airway obstruction.
- Encourage the patient to deep breath, cough, speak and mobilise as able.
- Reduce oxygen flow as tolerated to oxygen saturation target and apply humidification via saline nebs if required.
- Monitor ability to swallow. Withhold fluid / diet until evident that the need for re-intubation is unlikely.
- The patient should remain in an area capable of providing post extubation care and re-intubation if necessary for a minimum of 4 hours. Consider HDU as the most appropriate location for monitoring and on-going care following successful extubation.

3. Roles and Responsibilities

Extubation must be directly overseen by suitably trained medical staff who are competent and credentialled for anaesthetics practice, in collaboration with nurses competent in airway management.

All staff are required to work within policies and guidelines to make sure that WACHS is a safe, equitable and positive place to be.

4. Monitoring and Evaluation

4.1 Monitoring

Monitoring of compliance with this document is to be carried out by relevant Emergency Department annually using the following means or tools:

- Emergency department nurse unit manager to keep a record of all elective extubations undertaken in the emergency department to report to morbidity and mortality audit committee
- Morbidity and mortality audit to capture all elective extubations performed in the emergency department.

4.2 Evaluation

Review and evaluation of this guideline will occur every 3 years or sooner if required and be facilitated via the Emergency Medicine Leadership Group.

5. Compliance

Guidelines are designed to provide staff with evidence-based recommendations to support appropriate actions in specific settings and circumstances. As such, WACHS guidelines should be followed in the first instance. In the clinical context, where a patient's management should vary from an endorsed WACHS guideline, this variation and the clinical opinion as to reasons for variation must be documented in accordance with the Documentation Clinical Practice Standard.

6. References

1. Weinberg JA, Stevens LR, Goslar PW, et al. Risk factors for extubation failure at a level I trauma center: does the specialty of the intensivist matter? Trauma Surgery & Acute Care Open [Internet] 2016 [cited 2024 May 30];1:e000052. doi: 10.1136/tsaco-2016-000052
2. Difficult Airway Society Extubation Guidelines: Extubation Algorithms 2012 http://das.uk.com/guidelines/das-extubation-guidelines1. Reproduced from Popat M, Mitchell V, Dravid R, Patel A, Swampillai C, Higgs A. Difficult Airway Society Guidelines for the management of tracheal extubation. Anaesthesia 2012; 67: 318–340, with permission from the Association of Anaesthetists of Great Britain & Ireland/Blackwell Publishing Ltd [Accessed 15 March 2023]
3. Expert opinion and structured approach to assess readiness for extubation: Professor Luke Torre, Head of Department Intensive Care Unit, Sir Charles Gairdner Hospital, Perth, WA. 2023

7. Definitions

Term	Definition
Anaesthetist	At WACHS sites this is inclusive of rural generalist anaesthetist, GP anaesthetist, specialist anaesthetist or anaesthetic DMO (DMO will not need to consult if they make the decision to extubate).

8. Document Summary

Coverage	WACHS wide
Audience	Medical officers and nurses working in WACHS emergency departments or high dependency units
Records Management	Health Record Management Policy
Related Legislation	*Health Practitioner Regulation National Law (WA) Act 2010* *Medicines and Poisons Act 2014* (WA) *Medicines and Poisons Regulations 2016* (WA)
Related Mandatory Policies / Frameworks	• Clinical Handover Policy - MP 0095/18 • Consent to Treatment Policy - MP 0175/22 • Credentialing and Defining Scope of Clinical Practice Policy - MP 0084/18 • Clinical Governance, Safety and Quality Framework
Related WACHS Policy Documents	• Adult Airway Management Clinical Practice Standard • Airway Suctioning Clinical Practice Standard • Aseptic Technique Policy • Credentialing Requirements for Non-Specialist Anaesthetics Guideline • Hand Hygiene Policy • Oxygen Therapy and Respiratory Devices - Adults Clinical Practice Standard • Patient Identification Policy • Recognising and Responding to Acute Deterioration Policy • Recognising and Responding to Acute Deterioration Procedure
Other Related Documents	• Australian Injectable Drug Handbook
Related Forms	• MR140A Adult Observation & Response Chart – A-ORC
Related Training Packages	Nil
Aboriginal Health Impact Statement Declaration (ISD)	ISD Record ID: 3164
National Safety and Quality Health Service (NSQHS) Standards	1.27, 2.07, 6.03, 6.09, 8.03, 8.04, 8.06 – 8.10
Aged Care Quality Standards	Nil
Chief Psychiatrist's Standards for Clinical Care	Nil

9. Document Control

Version	Published date	Current from	Summary of changes
2.00	6 June 2024	6 June 2024	This is a new WACHS-wide guideline that supersedes Extubation Guideline – Broome Hospital

10. Approval

Policy Owner	Executive Director Clinical Excellence
Co-approver	Executive Director Nursing and Midwifery Services
Contact	WACHS Clinical Director Emergency Medicine
Business Unit	Clinical Excellence and Medical Services
EDRMS #	ED-CO-22-67374

This document can be made available in alternative formats on request.