



ANZCA and FPM CPD Program

Central nervous system oxygen toxicity ER session guideline

Purpose

This guideline assists hospitals, private practice groups and other course providers develop and conduct Central Nervous System oxygen toxicity (CNS-OT) emergency Response (ER) sessions. It defines the learning objectives and other requirements for education providers to become recognised CNS-OT ER providers for the purposes of the [ANZCA and FPM CPD program](#).

For CPD participants, this guideline provides information on what recognised CNS-OT ER sessions involve and how to record this activity.

Related documents

1. [CNS-OT ER activity recognition of suitability application form](#)
Course providers must apply for college recognition of your session as a suitable CNS-OT ER activity for the ANZCA and FPM CPD program. Providers are encouraged to develop sessions that also satisfy local needs, incorporating local staff, work environments and equipment.

Importance of CNS-OT ER education

A CNS-OT event is an uncommon side effect of exposure to a high partial pressure of oxygen. In the hyperbaric environment, published incidence is 0.024% (2.4 per 10,000 treatments)¹. This figure is lower than previously reported in Australia² and may reflect reduced risk through modification of treatment tables or an improvement in oxygen delivery equipment that avoids re-breathing.

CNS-OT may present with prodromal symptoms such as sweating, twitching and tunnel vision, followed by a tonic-clonic seizure. It is most commonly brief and resolves spontaneously as the brain's partial pressure of oxygen is reduced. However, patients are at risk of serious harm during a CNS-OT convulsion.

The occurrence of any medical emergency in the hyperbaric environment requires consideration of several factors, which can make management difficult. The chamber is considered a "remote" environment and thus both the patient and attendant are unable to immediately receive assistance. The effects of rapid decompression on both the attendant and the patient must be considered.

It is a requirement of the Australian and New Zealand Standard for work in a compressed environment (AS/NZS 4774.2) that facilities have emergency protocols in place³.

Prompt recognition and management reduce the risk of patient harm and emergency drills require practice.

Definitions

Personnel

Clinical Lead: The medical officer nominated by each department/group/other educational provider to provide oversight of the CNS-OT ER sessions conducted by that provider but does not need to be directly involved in each CNS-OT ER session.

- Must be at specialist level and appropriately skilled and experienced to oversee the development of session content.

- Ideally will have medical education experience and/or credentials.
- Encouraged to complete a provider course for the algorithm being taught, where one has been established.
- May assume the role of lead facilitator for a particular session.

Lead Facilitator: The doctor who oversees the conduct of a specific CNS-OT ER session.

- Must be at least at the level of advanced training year 2 (ATY2) or equivalent.
- Must be appropriately skilled and experienced to deliver the session content.
- Ideally will have medical education experience and/or credentials.

Instructor: A health professional who conducts the individual “hands-on” skills stations/ scenario rehearsals with guidance from the lead facilitator.

- May not be a medical officer.
- Must be appropriately skilled and experienced to deliver the session content.
- Ideally will have medical education experience and/or credentials.

Recommended resources

Recognised emergency algorithms

At this stage, ANZCA and the DHM Sub-Committee do not endorse any one emergency algorithm for CNS-OT situations. However, departments have specific procedures for emergencies as recommended by ASNZ 4774.2 for all accredited departments.

Recommended readings

Suitable references to develop algorithms are:

- Cooper JS, Phuyal P, Shah N. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Oxygen Toxicity. [Updated 2020 Aug 29]; [cited 2020 October 15]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK430743/>
- Hampson N, Atik D. Central nervous system oxygen toxicity during routine hyperbaric oxygen therapy. Undersea Hyperb Med. 2003; 30(2):147-53.
- Bitterman N, Bitterman H. Oxygen toxicity. In: Mathieu D, editor. Handbook on hyperbaric medicine. Dordrecht (The Netherlands): Springer; 2006. p. 731-65.

Session format

This activity requires ANZCA and FPM CPD participants to complete a recognised education session, with acceptable formats including practical simulations, workshops or online learning resources.

Learning objectives

Scope of CNS-OT ER sessions

As a minimum, education sessions are required to provide the opportunity for participants to meet the learning objectives listed below. Objectives marked with an asterisk (*) require participants to actively engage in hands-on activities to practice this skill during the session.

Mandatory learning objectives

By the end of the education session, participants will be able to:

1. Recognise and explain potential risk factors for CNS-OT.
2. Recognise and communicate clinical symptoms and signs that may precede a CNS-OT event.
3. Recognise and communicate the onset of a CNS-OT event.
4. Recognise other causes of seizure possibilities (e.g. hypoglycaemia, epilepsy).
5. Demonstrate the key features of initial assessment.*

6. Describe decompression requirements and understanding of decompression requirements.
7. Describe the pharmacology of anti-convulsant medications and know when it is appropriate to administer them.
8. Utilise Crisis Resource Management (CRM) principles in managing a medical emergency.*
9. Facilitate the safe removal of the patient from the chamber ensuring a patent airway prior to decompression.*
10. Provide safe management and discharge plan for the patient.
11. Formulate and explain a coherent plan to administer any future hyperoxic exposure.

Session structure

The education session in a hyperbaric facility is required to:

1. Provide pre-course reading relevant to the early identification and management of CNS-OT.
2. Have a minimum total duration of ninety (90) minutes and provide hands-on activities, which include scenario-based rehearsal, to achieve objectives marked with an asterisk (*).
3. Provide case-based discussion or scenario based simulation.
4. Be facilitated by an appropriately skilled clinician with experience of management of CNS-OT.
5. Be conducted by a lead facilitator and provide four (4) participants (this is usually a multi-disciplinary team). Instructors need to observe each participant while they are working through scenarios and provide verbal feedback to ensure they are achieving the objectives of the session.
6. Course directors who wish to record information relating to the performance or conduct of participants must obtain written consent and adhere to the privacy policies of their organisation and location. ANZCA and FPM do not collect this information and it is optional for the course provider and director to do so.

Session materials

The following materials (in hard or electronic format) may be provided to facilitators and/or participants as relevant:

- Facilitator guide (including equipment list, scenario outlines)
- Participant list (date, venue, participant names)
- Session learning objectives and outline
- Session evaluation form (feedback from participants)
- Certification of completion, including ANZCA recognition code and session duration in hours (must be provided to participants).

ANZCA and FPM CPD portfolio recording

Participants record this activity under

- Category 3 *Emergency response: CNS-OT ER* with the Certificate of completion uploaded as evidence.

Facilitators who are also CPD participants record this activity under

- Category 3 *Emergency response: CNS-OT ER* with confirmation of facilitation uploaded as evidence.

References

1. Sherlock S, Way M, Tabah A. Audit of practice in Australasian hyperbaric units on the incidence of central nervous system oxygen toxicity. *Diving Hyperb Med.* 2018; 48(2): 73-8.
2. Banham ND. Oxygen toxicity seizures: 20 years' experience from a single hyperbaric unit. *Diving Hyperb Med.* 2011; 41(4): 202-10.
3. Standards Australia, Standards New Zealand. (AS/NZS 4774.2:2019) Work in compressed air and hyperbaric facilities, Part 2: Hyperbaric Oxygen facilities. Originated in Australia as AS

4774.2-2002. Jointly revised and designated as AS/NZS 4774.2:2019. Sydney (NSW) Standards Australia; 2019.

Change control register

Version	Author/s	Reviewed by	Approved by	Approval date	Sections modified
1	Dr Susannah Sherlock	DHM Sub-Committee	CPD Committee	2021	Created
2		CPD team L Roberts		2023	<ul style="list-style-type: none"> Updated branding Incorporated change control register

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