



Maternity Education Program

Anaesthetic Toxicity

Participant Resource Kit

CSDS



Clinical Skills Development Service



Maternity Education Program (MEP)

The resources developed for MEP are designed for use in any Queensland Health facility that care for patients/women who are pregnant/birthing or postnatal. Each resource can be modified by the facilitator and scaled to the needs of the learner as well as the environment in which the education is being delivered, from tertiary to rural and remote facilities.



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Anaesthetic Toxicity – Facilitator Resource Kit

Published by the State of Queensland (Queensland Health), Apr 2022



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Who is this resource kit for?

This resource kit provides educators with up-to-date information to provide knowledge and skills to clinicians on how to manage anaesthetic toxicity in a pregnant person. The resource kit provides a full scenario with supporting documents to run an anaesthetic toxicity simulation.

Target audience

Midwifery and medical staff providing maternity care

Duration

45 mins – including simulation and debrief (15 mins for set up not included)

Group size

Suited to small groups (6 – 8)

Learning objectives

By the end of the session the learner should be able to:

- Recognise the signs and symptoms of local anaesthetic systemic toxicity (LAST).
- Recognise and respond to a clinically deteriorating patient.
- Manage a maternal collapse/maternal cardiac arrest to include:
 - calling for help early
 - calling appropriate teams.
- Demonstrate clinical management for LAST including drug therapy.
- Make a plan for birth of the baby within five (5) minutes if cardiac arrest or longer with maternal collapse.

Facilitation guide

1. Utilise 2D pictures to maternal positioning.
2. Utilise a PowerPoint presentation to assist learners prior to session.
3. Allow learner to apply actions in a simulated LAST case.
4. Conduct group debrief following simulation.

Supporting documents

1. Participant Resource Kit
2. List of further readings
3. Maternal LAST flow diagram
4. LAST simulation including:
 - Simulation set up photos
 - Pathology results
 - CTG
 - ECG



Overview

Local anaesthetics are widely used in obstetric anaesthetics. With an increasing number of epidurals and spinal anaesthetics being used today clinicians need to be aware of the risks and management.

As with all drugs and interventions they are not without risks. There were a total number of five maternal deaths (both direct and indirect) due to anaesthetic causes in 2009-2018 (1). Even though the numbers are low, clinicians need to understand the importance of prompt management to prevent serious outcomes.

Local anaesthetic systemic toxicity (LAST) is a set of neurologic and cardiovascular signs and symptoms resulting from elevated plasma levels of local anaesthetic (LA). Neurologic sequelae range in severity, the central nervous system (CNS) may present with excitation or depression or might be nonspecific. Signs and symptoms of LAST include perioral (mouth) numbness, tinnitus, drowsiness, disorientation, agitation, seizure, or loss of consciousness. Cardiovascular morbidity results from electrophysiological abnormalities (dysrhythmia) or depressed cardiac contractility. Cardiovascular toxicity can present with bradycardia, tachycardia, hypotension, hypertension, ventricular tachycardia, ectopy, and asystole (2).

LAST is caused by a high circulating plasma concentration of local anaesthetic. In pregnancy there is enhanced sensitivity to local anaesthetics and there are several reasons for this increased sensitivity. Epidural vein distension increases local anaesthetic absorption and catheter migration may be more likely.

During pregnancy there is increased cardiac output with increased perfusion of potential target sites and a reduction in the clearance of local anaesthetics which may lead to accumulation of local anaesthetic when repeated doses or infusions are used.

The effects of oestrogen and progesterone appear to alter the heart muscle electrophysiology sufficiently to increase the risk of arrhythmias and cardiotoxicity in general.

If cardiac arrest develops in a pregnant patient resuscitation is further complicated by physiological changes during pregnancy including aortocaval compression by the gravid uterus which reduces venous return and cardiac output, thus causing hypotension and further complicating the cardiac arrest event. Even if clinicians suspect LAST, pregnant patients should be managed aggressively to prevent morbidity and mortality. (3)

As the obstetric demographic becomes older and more obese, new technologies and strategies can assist in controlling maternal death and major morbidity secondary to anaesthetic complications. Lipid resuscitation appears to be an effective treatment for toxicity and may be useful in treating systemic toxicity in the pregnant patient. Maternity care providers should be aware of lipid resuscitation during LAST. (4) `

Obstetric Emergency is any clinical situation involving a maternity patient where immediate medical/midwifery assistance is required.

Further readings

Local Anaesthetic Systemic Toxicity in Pregnancy - Oxford Medicine Online	
Author	Brian F. S. Allen
Link	https://bit.ly/3jrXl16

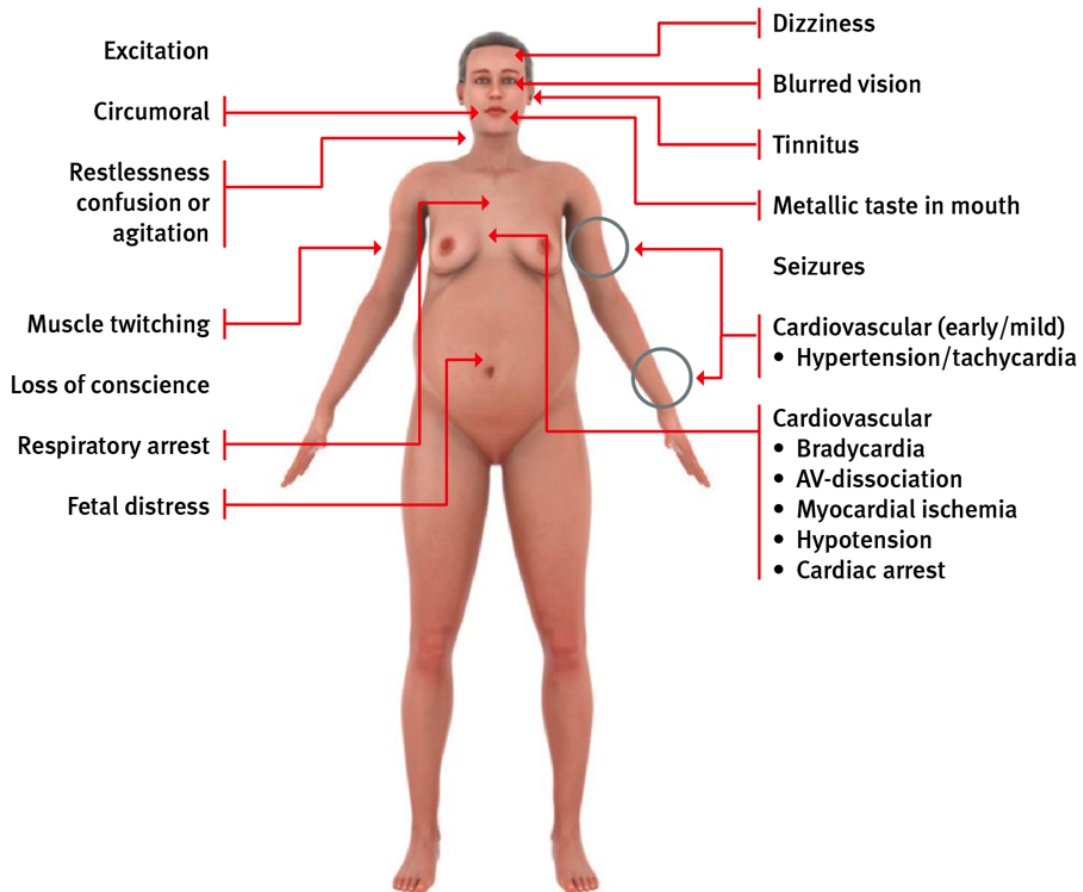
Local anaesthetic toxicity	
Author	South Australia Perinatal Practice Guideline
Link	https://bit.ly/3DY3CuW

Management of severe local anaesthetic toxicity	
Link	https://bit.ly/3Ktt5Py



Emergency Management

Local anaesthetic toxicity signs and symptoms



AAGBI Safety Guideline

Management of Severe Local Anaesthetic Toxicity

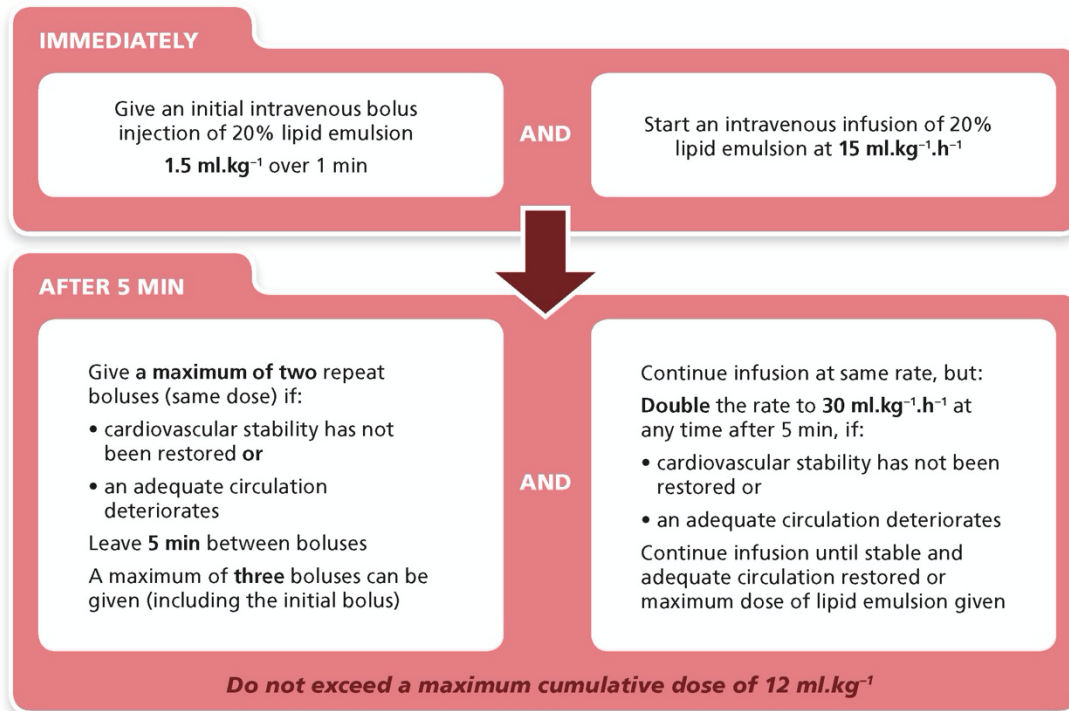


1 Recognition	Signs of severe toxicity: <ul style="list-style-type: none"> • Sudden alteration in mental status, severe agitation or loss of consciousness, with or without tonic-clonic convulsions • Cardiovascular collapse: sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias may all occur • Local anaesthetic (LA) toxicity may occur some time after an initial injection 	
2 Immediate management	<ul style="list-style-type: none"> • Stop injecting the LA • Call for help • Maintain the airway and, if necessary, secure it with a tracheal tube • Give 100% oxygen and ensure adequate lung ventilation (hyperventilation may help by increasing plasma pH in the presence of metabolic acidosis) • Confirm or establish intravenous access • Control seizures: give a benzodiazepine, thiopental or propofol in small incremental doses • Assess cardiovascular status throughout • Consider drawing blood for analysis, but do not delay definitive treatment to do this 	
3 Treatment	IN CIRCULATORY ARREST <ul style="list-style-type: none"> • Start cardiopulmonary resuscitation (CPR) using standard protocols • Manage arrhythmias using the same protocols, recognising that arrhythmias may be very refractory to treatment • Consider the use of cardiopulmonary bypass if available 	WITHOUT CIRCULATORY ARREST Use conventional therapies to treat: <ul style="list-style-type: none"> • hypotension, • bradycardia, • tachyarrhythmia
	GIVE INTRAVENOUS LIPID EMULSION (following the regimen overleaf) <ul style="list-style-type: none"> • Continue CPR throughout treatment with lipid emulsion • Recovery from LA-induced cardiac arrest may take >1 h • Propofol is not a suitable substitute for lipid emulsion • Lidocaine should not be used as an anti-arrhythmic therapy 	CONSIDER INTRAVENOUS LIPID EMULSION (following the regimen overleaf) <ul style="list-style-type: none"> • Propofol is not a suitable substitute for lipid emulsion • Lidocaine should not be used as an anti-arrhythmic therapy
4 Follow-up	<ul style="list-style-type: none"> • Arrange safe transfer to a clinical area with appropriate equipment and suitable staff until sustained recovery is achieved • Exclude pancreatitis by regular clinical review, including daily amylase or lipase assays for two days • Report cases as follows: <ul style="list-style-type: none"> in the United Kingdom to the National Patient Safety Agency (via www.npsa.nhs.uk) in the Republic of Ireland to the Irish Medicines Board (via www.imb.ie) If Lipid has been given, please also report its use to the international registry at www.lipidregistry.org . Details may also be posted at www.lipidrescue.org	

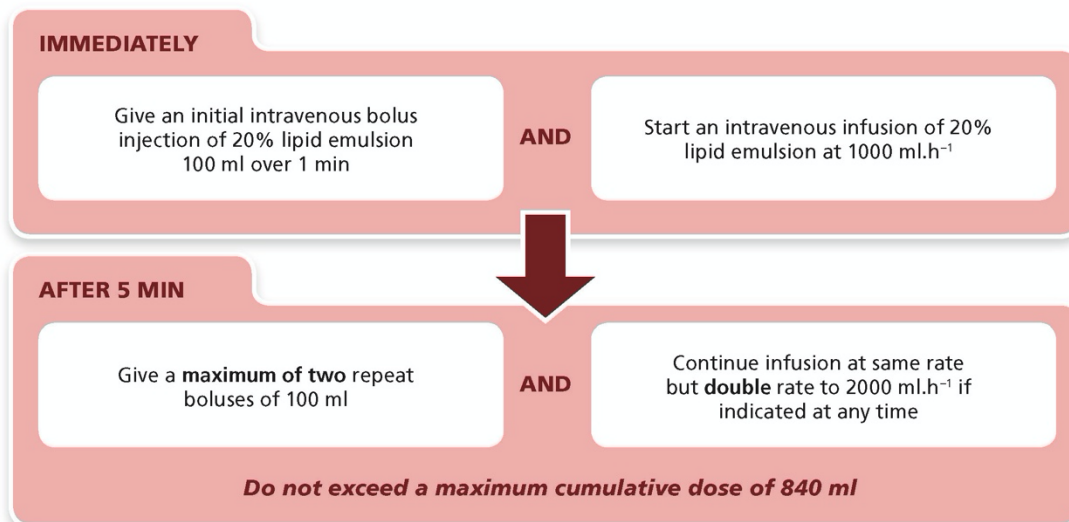
Your nearest bag of Lipid Emulsion is kept.....

This guideline is not a standard of medical care. The ultimate judgement with regard to a particular clinical procedure or treatment plan must be made by the clinician in the light of the clinical data presented and the diagnostic and treatment options available.

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An approximate dose regimen for a 70-kg patient would be as follows:

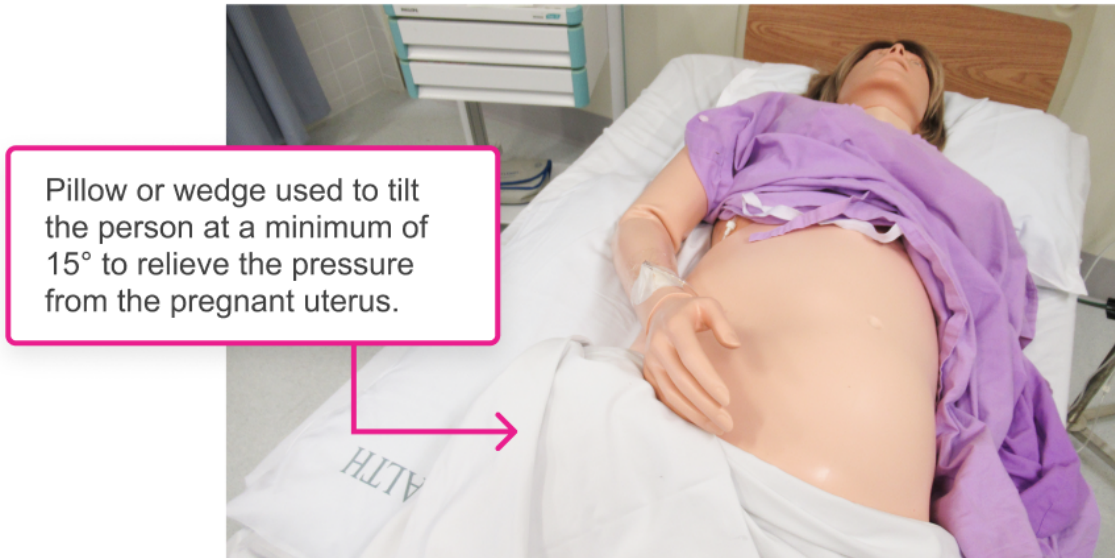


This AAGBI Safety Guideline was produced by a Working Party that comprised: Grant Cave, Will Harrop-Griffiths (Chair), Martyn Harvey, Tim Meek, John Picard, Tim Short and Guy Weinberg.

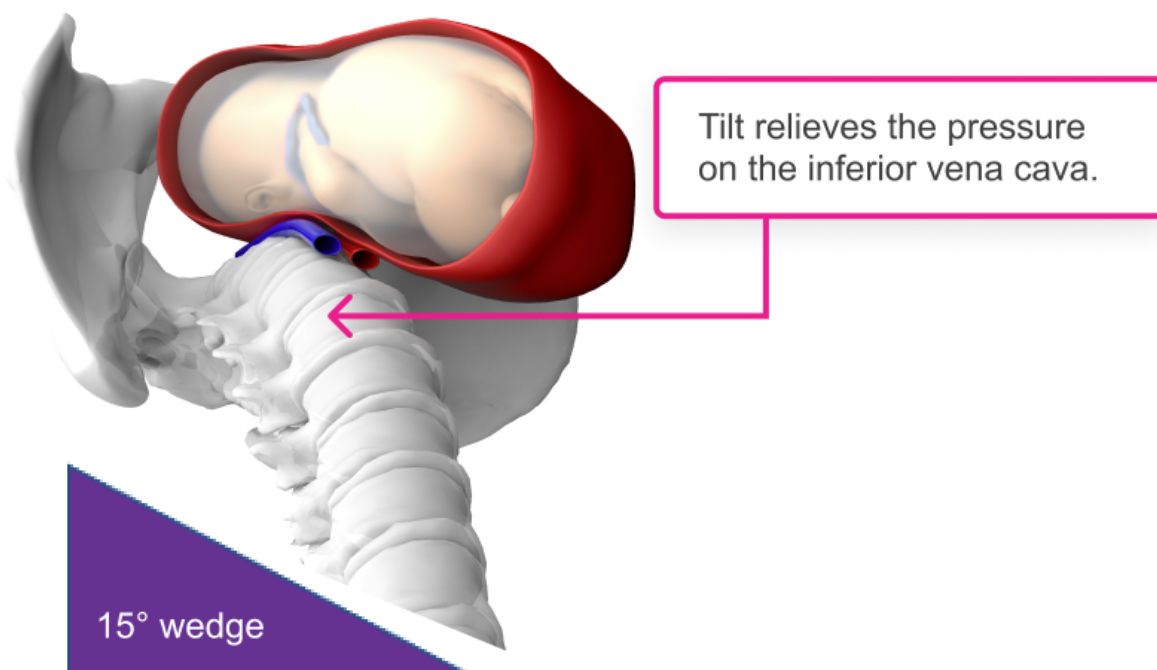
This Safety Guideline is endorsed by the Australian and New Zealand College of Anaesthetists (ANZCA).

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Left lateral 15° tilt



Internal view of 15° tilt



Manual uterine displacement

Manually displace the uterus to the left to reduce inferior vena cava compression during maternal resuscitation. The image below is an example.



References

This resource kit is inspired by the Optimus BONUS project of the Children’s Health Queensland’s “Simulation Training Optimising Resuscitation for Kids” service. To know more information about STORK and their Optimus project, visit their website at

<https://bit.ly/3km1wcZ>.

1. Maternal deaths in Australia 2000–2002 [Internet]. Australian Institute of Health and Welfare. 2006 [cited 2020 Dec 1]. p. Maternal Deaths Series no. 2. Cat. no. PER 32. Available from: <https://www.aihw.gov.au/reports/mothers-babies/maternal-deaths-in-australia/data>
2. Advanced Perioperative Crisis Management - Matthew D. McEvoy, Cory M. Furse - Oxford University Press [Internet]. [cited 2021 Jul 7]. Available from: <https://global.oup.com/academic/product/advanced-perioperative-crisis-management-9780190226459?cc=au&lang=en&>
3. Singh S, Lalin D, Verma VK. Management of local anaesthetic systemic toxicity by timely lipid resuscitation in a parturient - A case report. *Indian J Anaesth* [Internet]. 2019 Jan 1 [cited 2021 Jul 7];63(1):68. Available from: </pmc/articles/PMC6341876/>
4. S B, G W. Local anesthetic toxicity and lipid resuscitation in pregnancy. *Curr Opin Anaesthesiol* [Internet]. 2011 Jun [cited 2021 Jul 7];24(3):262–7. Available from: <https://pubmed.ncbi.nlm.nih.gov/21494132/>

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