AAGBI Safety Guideline

Management of Severe Local Anaesthetic Toxicity

1 Recognition

Signs of severe toxicity:

- 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

- 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

- 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

GIVE INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)

- 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

WITHOUT CIRCULATORY ARREST

Use conventional therapies to treat:

- hypotension,
- bradycardia,
- tachyarrhythmia

CONSIDER INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)

- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

4 Follow-up

- 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:
  - 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 .....

IMMEDIATELY

Give an initial intravenous bolus injection of 20% lipid emulsion

1.5 ml.kg^{-1} over 1 min

AND

Start an intravenous infusion of 20% lipid emulsion at **15 ml.kg^{-1}.h^{-1}**

AFTER 5 MIN

Give **a maximum of two** repeat boluses (same dose) if:

- cardiovascular stability has not been restored **or**
- an adequate circulation deteriorates

Leave **5 min** between boluses

A maximum of **three** boluses can be given (including the initial bolus)

AND

Continue infusion at same rate, but:

Double the rate to **30 ml.kg^{-1}.h^{-1}** at any time after 5 min, if:

- cardiovascular stability has not been restored or
- an adequate circulation deteriorates

Continue infusion until stable and adequate circulation restored or maximum dose of lipid emulsion given

Do not exceed a maximum cumulative dose of 12 ml.kg^{-1}

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

IMMEDIATELY

Give an initial intravenous bolus injection of 20% lipid emulsion 100 ml over 1 min

AND

Start an intravenous infusion of 20% lipid emulsion at 1000 ml.h^{-1}

AFTER 5 MIN

Give a **maximum of two** repeat boluses of 100 ml

AND

Continue infusion at same rate but **double** rate to 2000 ml.h^{-1} if indicated at any time

Do not exceed a maximum cumulative dose of 840 ml

This AAGBI Safety Guideline was produced by a Working Party that comprised:
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This Safety Guideline is endorsed by the Australian and New Zealand College of Anaesthetists (ANZCA).

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Management of Severe Local Anaesthetic Toxicity

ACCOMPANYING NOTES

1 Recognition

Local anaesthetic intoxication can present in many different ways, making it very difficult to recognise.

After injection of a bolus of local anaesthetic, toxicity may develop at any time in the following hour.

Techniques involving infusion of local anaesthetic through a catheter allow intoxication to develop at any time.

2 Immediate management

Some hospital laboratories have encountered difficulty analysing blood drawn during lipid emulsion therapy. If clinical circumstances allow, it may be prudent to draw blood for later analysis before lipid emulsion therapy begins.

3 Treatment

1000 ml of 20% lipid emulsion should be immediately available to all patients receiving potentially cardiotoxic doses of local anaesthetic.

20% lipid emulsion is readily available from most hospital pharmacies, which may also be able to help departments with timely replacement of bags nearing expiry.

Intralipid® 20% emulsion has been used in the majority of reported uses of lipid emulsion as an antidote. Alternative preparations have also been used in successful resuscitations.

Although some propofol preparations are provided in Intralipid®, e.g. Diprivan®, these are not a suitable alternative due to the significant cardiovascular depression caused by the propofol. This does not preclude the use of small, incremental doses of propofol to treat convulsions.

In extremely obese patients, doses of lipid emulsions should ideally be based on an estimate of lean body weight.

The interaction between lipid emulsion treatment and other cardioactive drugs used in resuscitation is unclear. Some evidence suggests high doses of vasopressors are harmful in resuscitation in local anaesthetic intoxication.

Conversely, some evidence suggests lipid emulsion therapy may be harmful in asphyxial cardiac arrest.

4 Follow-up

The immediate management of severe intoxication by LA is extremely demanding. In the aftermath, completion of forms on websites may seem unattractive. However, every case can help prevent another and improve treatment of the condition. Thus, reports to relevant registries are extremely important.

Pancreatitis has occasionally been associated with acute lipidaemia, and therefore should be excluded.

5 Education

Educational material and up-to-date lists of relevant publications are available at **www.lipidrescue.org**

This guideline will be updated regularly; the latest version can be found on **www.aagbi.org**

TREATMENT OF LOCAL ANAESTHETIC TOXICITY

PREVENTION:

- Do not exceed toxic dose limits
- Aspirate before injection.
- Inject slowly while watching/talking to patient

DETECTION:

- Numbness of tongue and mouth, tinnitus, oscillopsia, slurred speech, muscle twitching, irrational conversation, anxiety or feeling of impending doom
- Hypotension, dysrhythmias, convulsions (convulsions may not precede CVS toxicity, especially with bupivacaine).
- Cardiovascular collapse.

TREATMENT OF SEVERE CVS TOXICITY:

- Oxygenate and ventilate immediately (hypoxia & acidosis will develop extremely quickly; this will make the toxicity worse).
- External cardiac massage, uterine displacement, immediate Caesarean section if cardiovascular collapse persists.

Guidelines for the management of cardiac arrest secondary to local anaesthetic toxicity

COMMENCE STANDARD RESUSCITATION GUIDELINES.

If the patient does not respond to standard resuscitation, consider the use of 20% Intralipid®.
This can be found in:

- cardiac arrest trolley in CDS
- cardiac arrest trolley in Recovery, St Michael's
- bottom drawer of the epidural / spinal trolley in obstetric theatres.

The dosage regimen, which is attached to the Intralipid®, is as follows:

1. Give 1.5 ml.kg-1 over 1 min
2. Continue CPR
3. Start an infusion of Intralipid® at a rate of 0.25 ml.kg-1.min-1continuing until
4. Repeat the bolus injection twice at 5 min intervals if an adequate circulation has not been restored
5. After another 5 min, increase infusion rate to 0.5ml.kg-1.min-1 if an adequate circulation has not been restored
6. Continue the infusion until a stable and adequate circulation has been restored

Remember:

- Continue CPR throughout treatment with lipid emulsion
- Recovery from LA-induced cardiac arrest may take > 1h

Example doses required for adults are shown in the table below.

Patient weight (kg)	FIRST DOSE (ml), repeated twice, at 3-5 minute intervals, or less if stability is achieved	INFUSION (ml/min), commence when 3 boluses given or stability achieved	Increased INFUSION (ml/min) 5 min after 3rd bolus if required
50	75	12.5	25
60	90	15	30
70	100	17.5	35
80	120	20	40
90	130	22.5	45
100	150	25	50
110	160	27.5	55
120	180	30	60