**SOUTH AFRICAN PRIMARY HEALTHCARE LEVEL ESSENTIAL MEDICINES LIST**
**CHAPTER 21: EMERGENCIES AND INJURIES**
**NEMLC RECOMMENDATIONS FOR MEDICINE AMENDMENTS (2016 – 2018)**

**Medicine amendment recommendations are listed below. Kindly review the medicine amendments in the context of the complete emergencies and injuries chapter.**

## A: CHAPTER LAYOUT

Chapter layout amended to delineate 3 major sections:

1. Cardiopulmonary resuscitation
2. Medical emergencies
3. Trauma

21.1 Cardiopulmonary arrest– cardiopulmonary resuscitation
- 21.1.1 Cardiac arrest, adults
- 21.1.2 Cardiopulmonary arrest, children

21.1.3Bradycardia

21.1.4Tachydysrhythmias
- 21.1.5Management of suspected choking/foreign body aspiration in children

21.2 Medical emergencies
- 21.2.1 Paediatric emergencies
  - 21.2.1.1 Rapid triage of the child presenting with acute conditions in clinics and CHCs
- 21.2.2 Angina pectoris, unstable
- 21.2.3 Myocardial infarction, acute (AMI)
- 21.2.4 Delirium with acute confusion and aggression in adults
- 21.2.5 Hyperglycaemia and ketoacidosis
- 21.2.6 Hypoglycaemia and hypoglycaemic coma
- 21.2.7 Nose bleeds (epistaxis)
- 21.2.8 Pulmonary oedema, acute
- 21.2.9 Shock
- 21.2.10 Anaphylaxis
- 21.2.11 Status epilepticus

21.3 Trauma and injuries
- 21.3.1 Bites and stings
  - 21.3.1.1 Animal bites
  - 21.3.1.2 Human bites
  - 21.3.1.3 Insect stings and spider bites
  - 21.3.1.4 Snakebites
- 21.3.2 Burns
- 21.3.3 Exposure to poisonous substances
- 21.3.4 Eye injury, chemical burns
- 21.3.5 Eye injury, foreign body
- 21.3.6 HIV prophylaxis, post exposure (PEP)
  - 21.3.6.1Post exposure prophylaxis, occupational
  - 21.3.6.2 Post exposure prophylaxis, rape and sexual assault
  - 21.3.6.3 Post exposure prophylaxis, inadvertent (non-occupational)
- 21.3.7 Soft tissue injuries
- 21.3.8 Sprains and strains

**General:** Resuscitation algorithms were inserted, with permission from the Resuscitation Council of South Africa (RCSA) for adaptation, where applicable.

**B: NEW SECTION(S):**

| SECTION | CONDITION | MEDICINE MANAGEMENT | MEDICINE ADDED |
|---|---|---|---|
| 21.1.3 | Bradycardia | Yes | Adrenaline, IV |
| | | | Atropine, IV |
| 21.1.4 | Tachydysrhythmias | No | N/a |

## 21.1.3 BRADYCARDIA

Separate STG for the management of bradycardia developed, as management was removed from updated 2015 Basic Life Support for healthcare workers RCSA algorithm. Guidance was aligned to the Paediatric Hospital Level STGs and EML, 2017, Adult Hospital Level STGs and EML, 2015 and RCSA bradycardia algorithm, 2015.

**Refer to Adult Hospital Level and Paediatric Hospital Level STGs and EML for relevant guidance**.

**Description**
In adults, bradycardia refers to a pulse rate <50 beats/ minute.
In children, bradycardia refers to a pulse rate <60 beats/ minute despite effective oxygenation and ventilation.

**Emergency treatment**
Assess ABC:

- Airway: ensure airway is open and patent.
- Breathing: give oxygen to target pulse oximeter saturation of 94-98%.
- Circulation: assess peripheral perfusion, measure pulse and blood pressure.

Attach ECG monitor, pulse oximeter and blood pressure cuff.
Establish IV access.
Print rhythm strip to confirm bradycardia; if possible, do 12 lead ECG.

Assess for signs of instability:

- Hypotension
- Altered mental status
- Chest pain
- Acute heart failure
- Signs of shock: cold clammy peripheries and weak pulses

Adult
If unstable:

- Atropine, IV, 0.5 mg as a bolus.
  - Repeat every 3–5 minutes, if no response.
  - Maximum dose: 3 mg.

» Look for and treat contributory causes for bradycardia (see table below).
» If no response to atropine, discuss with referral centre or refer to Adult Hospital Level STG and EML for guidance.

If stable:
Look for and treat contributory causes for bradycardia (see table below)

| Table: Contributory causes for bradycardia and treatment | |
|---|---|
| Hypoxia | Give supplemental oxygen or ventilate. |
| Hypothermia | Warm the patient. |
| Head injury | Give oxygen, elevate head of bed. |
| Heart block | Look for cause of heart block. |
| Hydrogen ion (acidosis) | Look for cause of acidosis. |
| Hypotension | If no signs of heart failure: Sodium chloride 0.9%, IV, 200 mL. |
| Toxins and therapeutic agents | Treat as for specific overdose |

Children
If unstable:
Start CPR: 30 compressions: 2 breaths (1 rescuer) *or*
15 compressions: 2 breaths (2 rescuers)

- Adrenaline (epinephrine), IV, 0.1 mL/kg of 1:10 000 solution (Doctor prescribed).
  - To make an1:10 000 adrenaline (epinephrine) solution, (dilute 1mL ampoule of adrenaline (epinephrine) (1:1000) with 9 mL of sodium chloride 0.9% to give 10mL of 1:10000 solution).
  - Administer dose every 3–5 minutes, according to table below.

| **Weight** kg | **Dose** mg | **Volume of diluted solution** (1: 10 000 solution) | **Age** months/years |
|---|---|---|---|

| | | | |
|---|---|---|---|
| >2.5–7 kg | 0.05 mg | 0.5 mL | Birth–6 months |
| >7–11 kg | 0.1 mg | 1 mL | >6–18 months |
| >11–17.5 kg | 0.15 mg | 1.5 mL | >18 months–5 years |
| >17.5–25 kg | 0.2 mg | 2 mL | >5–7 years |
| >25–35 kg | 0.3 mg | 3 mL | >7–11 years |
| >35–55 kg | 0.5 mg | 5 mL | >11–15 years |

If heart block or increased vagal tone suspected:

- Atropine, IV, 0.02 mg/kg/dose as a single dose (Doctor prescribed).
  - Maximum single dose: 0.5 mg.
  - Repeat dose, if no response.

If stable:

Look for and treat contributory causes for bradycardia (see table above).

Close monitoring required.

Ensure adequate oxygenation and ventilation if necessary.

**Referral (urgent)**

Transfer all patients on supportive treatment and with an accompanying skilled worker until taken over by doctor at receiving institution.

## 21.1.4 TACHYDYSRHYTHMIAS

Following STG added to chapter to create healthcare worker awareness at primary level of care:

**Refer to Adult Hospital Level and Paediatric Hospital Level STGs and EML for relevant guidance**.

**Description**

In adults, tachydysrhythmias refer to a pulse rate >150 beats/minute.

In children, tachycardia refers to a pulse rate of more than normal range for age (see table).

**Emergency treatment**

Assess ABC:

» Airway: ensure airway is open and patent

» Breathing: give oxygen to target pulse oximeter saturation of 94-98%

» Circulation: assess peripheral perfusion, measure pulse and blood pressure.

**Table: Child heart rate ranges for age**

| Age | Heart rate range |
|---|---|
| Newborn to 3 months | 85-205 |
| 3 months to 2 years | 100-190 |
| 2 years to 10 years | 60-140 |
| >10 years | 60-100 |

» Supraventricular tachycardia is suspected in a child when the pulse rate >180 beats/ minute in a child and >220 beats/minute in an infant.

Attach ECG monitor, pulse oximeter and blood pressure cuff.

Establish IV access.

Print rhythm strip to confirm tachycardia, if possible do 12 lead ECG.

Assess for signs of instability:

- Hypotension
- Altered mental status
- Chest pain
- Acute heart failure
- Signs of shock: cold clammy peripheries and weak pulses

**Adult**

If unstable:

Synchronised cardioversion at 100J.

Consider analgesia and sedation if time permits.

If stable:

Assess QRS length on rhythm strip or 12 lead ECG:

» If QRS<0.12 = Narrow complex tachycardia (supraventricular tachycardia)

- Attempt vagal stimulation: Vasalvamaneavoure.
  Ice water applied to face.
  Cough, breath holding.
  Carotid sinus massage (not in elderly or cardiac disease).

» If QRS>0.12 = Wide complex tachycardia (ventricular tachycardia)

– Correct electrolyte disturbances.
– Consider toxins, overdoses.

**Child**
<u>If unstable:</u>
Synchronised cardioversion at 0.5-1J/kg initially (max 4J/kg).
Consider analgesia and sedation if time permits.
<u>If stable:</u>
Assess QRS length on rhythm strip or 12 lead ECG:
» If QRS<0.08 = Narrow complex tachycardia (supraventricular tachycardia)
– Attempt vagal stimulation: Ice water applied to face
» If QRS>0.08 = Wide complex tachycardia (ventricular tachycardia)
– Correct electrolyte disturbances

**Referral (urgent)**
Transfer all patients on supportive treatment and with an accompanying skilled worker until taken over by doctor at receiving institution.

## C: MEDICINE AMENDMENTS:

| SECTION | MEDICINE/ MANAGEMENT | ADDED/DELETED/AMENDED |
|---|---|---|
| ***21.1 CARDIOPULMONARY ARREST– CARDIOPULMONARY RESUSCITATION*** | | |
| **21.1.1 Cardiac arrest, adults** | Adrenaline (epinephrine) | Amended (intraosseous route added) |
| | Sodium chloride 0.9%, IV | Deleted |
| | Atropine, IV | Deleted |
| | Guidance regarding cricothyrotomy | Not added |
| **21.1.2 Cardiac arrest, children** | Dextrose 5%/10%, IV | Directions for use amended |
| **21.1.5 Management of suspected choking/foreign body aspiration in children** | Choking algorithm | Amended |
| ***21.2 MEDICAL EMERGENCIES*** | | |
| **21.2.4 Delirium with acute confusion and aggression in adults** | Ketamine, IM | Not added |
| | Midazolam, IM | Amended to first line treatment option |
| | Diazepam, IV | Amended to second line treatment option |
| | Thiamine, IV | Added, if alcoholic/Wernicke's encephalopathy suspected |
| **21.2.6 Hypoglycaemia and hypoglycaemic coma** | Dextrose 50%, IV | Concentration of solution amended from 50% to 10% (adult management) |
| | Dextrose 5%/10%, IV | Directions for use amended (management in children) |
| **21.2.8 Pulmonary oedema, acute** | Isosorbide dinitrate, oral | Directions for use not amended; dosing amended |
| | Furosemide, IV | Directions for use not amended |
| | Morphine, IV | Directions for use amended |
| **21.2.9 Shock** | Sodium chloride 0.9%, IV | Retained |
| | Ringer lactate, IV | Not added |
| | Oxygen | Directions for use amended |
| **21.2.10 Anaphylaxis** | Oxygen | Added |
| | Salbutamol, nebulisation | Added |
| | Ipratropium, nebulisation | Added |
| | Sodium chloride 0.9%, IV | Added |
| | Adrenaline (epinephrine), IM | Dose amended (in adults) |
| | Hydrocortisone, IM/IV | Doses amended |
| **21.2.11 Seizures and status epilepticus** | | |
| *-Children: Initial benzodiazepine treatment* | Midazolam, buccal | Directions for use amended (repeat dose added) |
| | Midazolam, IM | Added |
| *-Children: Second line treatment* | Phenobarbitone, oral via NGT | Retained |
| | Phenobarbitone, IV | Not added |
| *- Adults* | Midazolam, buccal | Added |
| | Midazolam, IM | Directions for use amended |

| | | |
|---|---|---|
| | Diazepam, IV | Directions for use amended |
| | Clonazepam, IM | Not added |
| | Benzodiazepines | Caution box amended |
| ***21.3 TRAUMA AND INJURIES*** | | |
| **21.3.1.1 Animal bites** | Guidance on tracing source rabid animal | Added |
| **21.3.1.2 Human bites** | Hepatitis B immune globulin | Not added |
| | Hepatitis B vaccine | Added |
| | Tetanus toxoid vaccine, IM | Added |
| | HIV PEP | Not added |
| **21.3.1.3 Insect stings and spider bites** | | |
| *- Spider bites and scorpion stings* | Tetanus toxoid vaccine, IM | Added |
| **21.3.1.4 Snakebites** | Sodium chloride, 0.9% irrigation | Added |
| | Information on polyvalent snake antivenom | Indications and criteria for administration amended |
| **21.3.2 Burns** | Ringers lactate, IV | Not added |
| | Sodium chloride 0.9%, IV | Retained |
| | Dextrose 50%, IV | Retained |
| | Povidone-iodine, topical | Retained |
| | Silver sulfadiazine, topical | Not added |
| **21.3.3 Exposure to poisonous substances** | | |
| *-Organophosphate and carbamate poisoning: Children* | Atropine, IV | Directions for use amended |
| *- Opioid overdose* | Naloxone, IV/IM | Directions for use amended – in adults |
| | Naloxone, IV | Route of administration and dosage amended – in children |
| **21.3.6.1 Post exposure prophylaxis, occupational** | Monitoring in occupational exposure | Amended |
| *- Hepatitis B prevention* | Hepatitis B vaccine | Added |
| | Hepatitis B immunoglobulin | Not added |
| **21.3.6.2 Post exposure prophylaxis, rape and sexual assault** *- Hepatitis B prevention* | Hepatitis B vaccine | Added with a cross referral to section 21.3.6.1 Post exposure prophylaxis, occupational for management |
| | Hepatitis B immunoglobulin | Not added, but cross referred to section 21.3.6.1 Post exposure prophylaxis, occupational for management |
| *- Emergency contraception (after pregnancy is excluded)* | Levonorgestrel, oral, 1.5 mg as a single dose | Caution amended |
| | Copper IUCD | Not added |
| **21.3.6.3 Post exposure prophylaxis, inadvertent (non-occupational)** *- Hepatitis B prevention* | Hepatitis B vaccine | Added with a cross referral to section 21.3.6.1 Post exposure prophylaxis, occupational for management |
| | Hepatitis B immunoglobulin | Not added, but cross referred to section 21.3.6.1 Post exposure prophylaxis, occupational for management |
| **21.3.7 Soft tissue injuries** | | |
| *- If sutures needed* | Lidocaine with adrenaline (epinephrine) 2% injection | Not added |
| | Lidocaine 2% injection | Added |

**CHAPTER PREAMBLE:**

NEMLC recommended (2 November 2017) that a preamble be developed for this chapter to assist the different levels of care (basic to advanced) provided at various PHC facilities (basic clinic to community healthcare centre) that would provide guidance on:

- Triage of patients (adult and paediatric) to screen patients for priority management at primary level of care to urgent referral to secondary level of care.

**PHC Committee Recommendation:**

The following was added as a preamble to the chapter:

The following conditions are emergencies and must be treated as such. Medicines used for treatment must be properly secured and recorded (time, dosage, route of administration) on the patient's notes and on the referral letter.
Determine the priority of patients' treatments based on the severity of their condition, using a triage system appropriate to your level of care, available resources and staff at your facility.

*Rationale:* Rapid triage of the child that is already included in the chapter considered to be adequate. Currently, a screening tool for adults for use at primary level of care is not available. The Adult SATS chart is not suitable for primary level. It was noted that the World Health Organisation is in the process of developing a tool, but there is no evidence base as yet.

### 21.1.1 CARDIAC ARREST, ADULTS

Adrenaline (epinephrine): *amended (intraosseous route added)*
Sodium chloride 0.9%, IV: *deleted*
Atropine, IV: *deleted*
Aligned with the South African Resuscitation Council algorithm, "Basic life support for healthcare providers".
**Level of Evidence: III Guidelines[1]**

NEMLC had recommended[2] that guidance be included regarding tracheostomy.
**Recommendation:** The term is cricothyrotomy; as tracheotomy is an ENT procedure. Guidance regarding cricothyrotomy not to be included in the PHC STG.
*Rationale:* This procedure would not be appropriate for primary level of care and is more suitable for hospital level.
**Level of Evidence: III Expert opinion**

### 21.1.2 CARDIAC ARREST, CHILDREN

**Treat hypoglycaemia**
**Children**
Dextrose, 5% or 10%, IV: *directions for use amended*
Dextrose infusion initiated regardless whether the second glucose reading is appropriate, as commonly practised, especially as glucose stores would be low.
And, the text was amended as follows:

- Dextrose 10%, solution, IV, 2–5 mL/kg.
- To make 20mL of 10% dextrose solution: draw 4 mL of 50% dextrose in to a 20mL syringe and add 16mL of sodium chloride 0.9%or water for injection.
- Do not give unless hypoglycaemic or hypoglycaemia strongly suspected.
- Do not give excessive volumes of fluid.
- If low blood sugar is treated:
  - ~~re-check blood glucose 10–15 minutes later;~~
  - ~~if still low, give further bolus of dextrose 10%, IV, 2 mL/kg.~~
- After dextrose bolus, commence dextrose 5–10% infusion, 3–5 mL/kg/hour to prevent blood glucose dropping again.
- Re-check the blood glucose after 15 minutes: if blood sugar is still low: give further bolus of dextrose 10%, IV, 2 mL/kg and continue dextrose infusion.
- Assess continuously until the patient shows signs of recovery.

**Level of Evidence: III Expert opinion**

### 21.1.5 MANAGEMENT OF SUSPECTED CHOKING/FOREIGN BODY ASPIRATION IN CHILDREN

Choking algorithm: *adapted with permission from the Resuscitation Council of South Africa (RCSA)*

[1]South African Resuscitation Guidelines, Basic life support for healthcare provider, 2015. www.resuscitationcouncil.co.za
[2] Minutes of the NEMLC meeting of 2 November 2017.

Updated algorithm aligned with the text of the STG and international practice[3] (whereby back blows are administered initially, followed by abdominal thrusts).
**Level of Evidence: III Standard of care, Expert opinion**

### 21.2.4 DELIRIUM WITH ACUTE CONFUSION AND AGGRESSION IN ADULTS

**Emergency treatment**
Ketamine, IM: *not added*
An external comment was received to consider intramuscular ketamine as it provides rapid and reliable sedation, which is achieved within 5 minutes and lasts for 40-60 minutes; as midazolam requires to be monitored using a schedule 5 register whilst supply of haloperidol is erratic.
**Recommendation:** Ketamine, IM not be added as a sedative for delirium.
*Rationale:* Although use of ketamine is common practice, the evidence for use in delirium is of low quality and similar to midazolam, it is also a schedule 5 medicine requiring a register.
**Level of Evidence: III Expert opinion**

**Benzodiazepines**
Midazolam, IM: *amended to first line treatment option*
Diazepam, IV: *amended to second line treatment option*

*Midazolam*
*Evidence:* Prospective double-blind RCT (n=111) [4] showed that despite midazolam (5 mg) having a significantly shorter time to onset of sedation and a more rapid time to arousal than lorazepam (2 mg) or haloperidol (5 mg); the three agents have similar efficacy in the management of violent and severely agitated adult patients in the emergency department.

- Mean time to sedation:
  - Midazolam: 18.3 minutes, SD ± 14 minutes
  - Haloperidol: 28.3 minutes, SD ± 25 minutes
  - Lorazepam: 32.2 minutes, SD ± 20 minutes
- Mean difference for time to sedation:
  - Midazolam vs lorazepam: 13.0 minutes, 95% CI 5.1 to 22.28
  - Midazolam vs haloperidol: 9.9 minutes, 95% CI0.5 to 19.3
- Time to arousal:
  - Midazolam: 81.9 minutes
  - Haloperidol: 126.5 minutes
  - Lorazepam: 217.2 minutes
- Mean difference for time to arousal:
  - Midazolam vs lorazepam: 135.3 minutes, 95% CI 89 to 182
  - Midazolam vs haloperidol: 44.6 minutes, 95% CI 9 to 80
- No significant difference over time by repeated-measures analysis of variance between groups in regard to changes in systolic and diastolic blood pressure (p = 0.8965, p = 0.9581), heart rate (p = 0.5517), respiratory rate (p = 0.8191), and oxygen saturation (p = 0.8991).

*Diazepam*
Pharmacologically it has a slower onset of action than midazolam and has many active metabolites[5].

**Recommendation:** Management of delirium with benzodiazepine recommendations to list midazolam, IM as first line and diazepam, IV as second line treatment option.

[3] Resuscitation Council (Uk). Guidelines on choking, 2015. https://www.resus.org.uk/resuscitation-guidelines/
[4] Nobay F, Simon BC, Levitt MA, Dresden GM. A prospective, double-blind, randomized trial of midazolam versus haloperidol versus lorazepam in the chemical restraint of violent and severely agitated patients. Acad Emerg Med. 2004 Jul;11(7):744-9. https://www.ncbi.nlm.nih.gov/pubmed/15231461
[5] SAMF, 2016.

*Rationale:* Midazolam, IM shown to be comparable to lorazepam and haloperidol in managing violent and severely agitated adult patients in the emergency department. Diazepam has a slower onset and longer duration of action.
**Level of Evidence: I RCT, Guidelines**

**If alcoholic/Wernicke's encephalopathy suspected**
Thiamine, IV/IM: *added*
Guidance moved from the mental health care chapter to the emergencies chapter as follows:

| |
|---|
| **If alcoholic/wernicke's encephalopathy suspected:**<br>• Thiamine, IV/IM, 100mg immediately. |

## 21.2.6 HYPOGLYCAEMIA AND HYPOGLYCAEMIC COMA

**Emergency treatment**
**Adult: Unconscious patient**
Dextrose 50%, IV: *concentration of solution amended from 50% to 10%*
A small RCT[6] (n= 51) showed that dextrose 10% delivered in 5 g/50 ml aliquots resulted in better post-treatment blood glucose concentrations than dextrose 50% delivered in 5 g/10 ml aliquots.

Results:
- No statistically significant differences in:
  - Median time to recovery (8 minutes)
  - Median post-treatment GCS
  - Number of subjects experiencing a further hypoglycaemic episode within 24 hours (four per group).
- The median total dose of dextrose administered was significantly less with the 10% concentration (10% = 10 g, 50% = 25 g, p,0.001)
- The median post treatment blood glucose concentrations were significantly lower (10% = 6.2 mmol/l and 50% = 9.4 mmol/l, p = 0.003).
- There were no reports of extravasation injuries in either group.

**Recommendation:** Dextrose 50%, IV delivered in smaller aliquots of 5 g/10 ml for treatment of adult hypoglycaemia.
*Rationale:* Small trial showed that dextrose 10%, resulted in better post-treatment blood glucose concentrations than dextrose 50%.
**Level of Evidence: III Disease oriented RCT**

| |
|---|
| **NEMLC Recommendation[7]:** As the concentration of dextrose solution administered has been amended from 50% to 10%, NEMLC recommended that a note be added to alert healthcare workers that the volume used has been changed. |

Text of the STG was updated to include the following statement:

| |
|---|
| **Note:** The volume of dextrose has been changed in the above-mentioned protocol. |

**Children: Unconscious patient**
Dextrose, 5% or 10%, IV: *directions for use amended*
Aligned with guidance provided to treat hypoglycaemia in section 21.1.2: Cardiopulmonary arrest, children.

[6] Moore C, Woollard M. Dextrose 10% or 50% in the treatment of hypoglycaemia out of hospital? A randomised controlled trial. Emerg Med J. 2005 Jul;22(7):512-5.
[7] Minutes of the NEMLC meeting of 2 November 2017.

Text of the STG was amended as follows:

Children

- Dextrose 10%, IV, 2–5 mL/kg.
  - 10% solution, e.g. add 1 part 50% dextrose water to 4 parts water for injection to make 10% solution.

~~IV administration of dextrose in children with hypoglycaemia:~~

- ~~Establish an IV line-do not give excessive volumes of fluid-usually can keep line open with 2 mL/kg/hour.~~
- Take a blood sample for emergency investigations and blood glucose.
- ~~Check blood glucose.~~
- ~~If low, i.e. < 2.5 mmol/L or if blood glucose testing strips are not available, administer 2 mL/kg of 10% dextrose solution IV rapidly.~~

~~In the majority of cases an immediate clinical response can be expected.~~

- After dextrose bolus, commence dextrose 5–10% infusion, 3–5 mL/kg/hour to prevent blood glucose dropping again.
- Recheck the blood glucose after ~~infusion.~~ 15 minutes. if blood sugar is still low: give further bolus of dextrose 10%, IV, 2 mL/kg and continue dextrose infusion.
- ~~If still low, repeat 2 mL/kg of 10% dextrose solution.~~
- ~~Continue maintenance at 3–5 mL/kg of 5% or 10% dextrose, IV.~~
- ~~After recovery, maintain with 5–10% dextrose solution until blood glucose is stabilised.~~
- Feed the child as soon as conscious.
- Investigate the cause e.g. infection.

**Level of Evidence: III Expert opinion**

## 21.2.8 PULMONARY OEDEMA, ACUTE

Isosorbide dinitrate, sublingual: *directions for use not amended, dosing amended*
Furosemide, IV: *directions for use not amended*

Nitrate dosing amended from "4 hourly" to "every 5-10 minutes". The theory behind guideline recommendation of nitrates followed by diuretics is that nitrates reduce preload primarily through dilatory effects on the venous system. Traditionally, diuretics have been considered the mainstay of pharmacologic therapy, but as most acutely ill patients are not volume overloaded, indiscriminate administration of diuretics could be harmful and adequate renal perfusion is required. Generally, diuretics should not be used until optimal preload and afterload reduction has been achieved.
However, international guidelines are based on patients that are not similar to the South African population that generally present with large oedema and immense fluid overload (The cited guidelines by Scott *et al*[8] provide recommendations for patients in Baltimore).

**NEMLC Recommendation[9]:** NEMLC recommended that furosemide be co-administered with nitrates or thatfurosemide be placed first in the treatment algorithm for pulmonary oedema.
*Rationale:* International guidelines are not generalisable to the South African population: South African generally present with immense fluid overload.
**Level of Evidence: III Expert opinion**

Morphine, IV: *directions for use amended*
Text updated as follows to align with Adult Hospital level STGs and EML, 2015.

- ~~Morphine 10 mg diluted with 10 mL of water for injection or sodium chloride~~
  - ~~0.9%, slow IV (Doctor initiated).~~
  - ~~Start with 5 mg; thereafter slowly increase by 1 mg/minute up to 10mg.~~
  - ~~Can be repeated after 4–6 hours if necessary, for pain relief.~~
  - ~~Beware of hypotension.~~
- Morphine, IV, to a total maximum dose of 10 mg.
  - Dilute 10 mg up to 10 mL with sodium chloride 0.9%.
  - Morphine, IV, 3–5 mg as a single dose then further boluses of 1–2 mg/minute and monitor closely.

[8] Scott MC, Winters ME. Congestive Heart Failure. Emergency Medicine Clinics of North America. 2015;33(3):553-62. https://www.ncbi.nlm.nih.gov/pubmed/26226866
[9] Minutes of the NEMLC meeting of 2 November 2017.

- Total maximum dose: 10 mg.
- Repeat after 4 hours if necessary.
- Monitor response to pain and effects on respiration and BP.

**Level of Evidence: III Guidelines**[10]

### 21.2.9 SHOCK

**Fluid replacement**

Sodium chloride 0.9%, IV: *retained*

Ringer lactate, IV: *not added*

Ringer lactate, 1 L is comparable in price to sodium chloride 0.9%, 1 L – current contract price is R8.68 vs R8.27[11], respectively. However, based on estimated consumption data for sodium chloride 0.9% 1L[12] for the period January to December 2017 of 3,400,872 units results in an incremental cost of R1,394,358.

*Rationale:* Based on the evidence reviewed in the previous Adult Hospital Level cycle (October 2015), the data was not sufficient to warrant a change in the recommendation from sodium chloride 0.9%, IV for resuscitation in patients with hypovolaemia. Author(s) of the review concluded that further large RCTs were required to measure clinical outcomes such as mortality in high-risk populations. The incremental budget impact of recommending the alternative, Ringer lactate, at primary level of care considered to be unaffordable.

**Level of Evidence: I[13] [14] Expert opinion**

*(Note: The Adult Hospital Level Committee (2017-2019) reviewed recently published evidence – refer to the medicine review: Ringer lactate for resuscitation in patients with hypovolaemia, June 2018 update).*

**NEMLC Recommendation[15]:** The NEMLC recommended that management should be simplified for primary care, and recommended that the table delineating the various types of shock be replaced with brief text description in the STG.

Medicine treatment to be rephrased to describe general treatment for all shock, except septic shock and cardiogenic shock where further fluid-overload should be avoided and fluid challenge is recommended.

Text pertaining to medicine treatment in the STG was subsequently updated as follows:

**Intravenous fluid therapy is important in the treatment of all types of shock, except for cardiogenic shock and septic shock (as fluid-overloaded patients do not need fluid replacement) – these patients should receive a fluid challenge as detailed below. Prompt diagnosis of the underlying cause is essential to ensure optimal treatment.**

**Fluid replacement (avoid in cardiogenic and septic shock):**

Adults

- Sodium chloride 0.9%, IV, 1 L as a rapid bolus.
  - Repeat bolus until haemodynamic status is improved.
  - Once stable, maintain IV fluids with careful monitoring of haemodynamic status; adjust infusion rate as needed to maintain stability pending transfer.

Children

- Sodium chloride 0.9%, IV, 20 mL/kg as a rapid bolus.
  - Repeat bolus if no adequate response.

**Note:** If patient develops respiratory distress, recheck airway and breathing and discontinue fluids.

**In adults with suspected cardiogenic or septic shock: give a fluid challenge:**

- Sodium chloride 0.9%, IV, 500 mL over 30 minutes.

[10] Adult Hospital Level STGs and EML, 2015.
[11] Contract circular RT299-2017
[12] Accessed from RSApharma database.
[13] NDoH, EDP: Adult Hospital Level medicine review: Ringer lactate for resuscitation in patients with hypovolaemia, October 2015. www.health.gov.za
[14] Krajewski ML, Raghunathan K, Paluszkiewicz SM Schermer CR, Shaw AD. Meta-analysis of high- versus low-chloride content in perioperative and critical care fluid resuscitation. BJS 2014; 102: 24–36.
[15] Minutes of the NEMLC meeting of 5 July 2018.

- Assess blood pressure and pulse rate response. Response is defined by improvements in blood pressure, pulse rate and mental status (adequate cerebral perfusion) in addition to a good urine output, rather than an absolute blood pressure value.
- If response is positive, then continue with intravenous fluid. Monitor the patient and stop fluids if patient is breathless. Avoid over hydrating as this could exacerbate hypoxia associated with adult respiratory distress syndrome.
- If no adequate response to fluid challenge (as described above), suspect septic shock and repeat fluid challenge.

Oxygen: *directions for use amended*

**NEMLC Recommendation[16]:**

*Oxygen:* Recent meta-analysis[17] shows that administering oxygen where saturation levels are greater than 94% increases the risk of death. Availability of oxygen monitor at every primary healthcare facility was queried.

Text of the STG was updated as follows:

» Administer face mask oxygen, if saturation < 94%.

## 21.2.10 ANAPHYLAXIS

Oxygen: *added*
Salbutamol, nebulisation: *added*
Ipratropium, nebulisation: *added*
Sodium chloride 0.9%, IV: *added*

Medicine treatment was delineated into priority (adrenaline/epinephrine) and second-line priority (for hypotension - sodium chloride 0.9%, IV; for wheeze – oxygen, ipratropium, salbutamol, hydrocortisone IM/IV, promethazine IM/IV) aligned with the South African Resuscitation Council anaphylaxis algorithm (as appropriate for primary level of care).
**Level III: Guidelines**

**First line priority:**
**Adults**
Adrenaline, IM: *dose amended*
Historic dose of 1 mg, IM is indicated for pulseless arrest and not anaphylaxis. Dose was amended to align with SAMF 2016 as follows:

- Adults: 1:1000, **IM**, 0.5~~1~~ mg (~~1~~0.5 mL) as a single dose, into the lateral thigh.

Hydrocortisone IM/slow IV: *doses amended*
Doses aligned with the Adult Hospital Level (2015) and Paediatric Hospital Level (2017) STGs and EML.
*Adults*: dose amended from "100 mg" to "200 mg".
*Children*: dose amended from "4-6 mg/kg" to "5 mg/kg".
**Level of Evidence: III Guidelines**

## 21.2.11 SEIZURES AND STATUS EPILEPTICUS

Heading of this section was amended from “Status epilepticus” to “Seizures and status epilepticus” to accommodate cross referral from section 15.3 Seizures (convulsions/fits) in chapter 15: Central nervous system conditions. Management of seizures at primary level of care was the same as for seizures associated with status epilepticus.

[16] Minutes of the NEMLC meeting of 5 July 2018.
[17] Chu DK, Kim LH, Young PJ, Zamiri N, Almenawer SA, Jaeschke R, Szczeklik W, Schünemann HJ, Neary JD, Alhazzani W. Mortality and morbidity in acutely ill adults treated with liberal versus conservative oxygen therapy (IOTA): a systematic review and meta-analysis. Lancet. 2018 Apr 28;391(10131):1693-1705. https://www.ncbi.nlm.nih.gov/pubmed/29726345

**CHILDREN**

**Initial benzodiazepine treatment**

Midazolam, buccal: *directions for use amended (repeat dose added)*

Midazolam, IM: *added*

*Midazolam, buccal:* Please refer to the updated 2017 medicine review for detailed information (initial review done in 2014).


Midazolam buccal-dosing_Statu


Midazolam vs diazepam_status epi


Midazolam buccal vs diazepam rectal -

STG recommends second dose of buccal midazolam for children with status epilepticus, if seizure control not achieved with first dose.

*Rationale:* Persistent status epilepticus reported to cause treatment resistance and neurological harm. No available evidence for second dose buccal midazolam, as in RCTs patients uncontrolled were administered IV benzodiazepines. Not pragmatic for primary level of care, where second line treatment is phenobarbitone tablet administered via nasogastrc tube. Facilities for management of respiratory depression available in the Ideal PHC clinic. Most guidelines recommend a second dose of buccal midazolam.

**Level of Evidence: III Guidelines[18] [19] [20], Expert opinion**

*Midazolam, IM:* Please refer to the medicine review, below, for detailed information:


Midazolam_IM_StatusEpilepticus in chil

Midazolam, IM as a single dose, as a first line alternative to rectal diazepam or buccal midazolam in the treatment of children < 12 years with status epilepticus in a primary health care setting.

*Rationale:* Limited available RCT evidence suggests that midazolam, IM is as effective as diazepam, IV and lorazepam, IV for the initial management of status epilepticus in children with regards to time to seizure cessation after presentation.

**Level of Evidence: II Systematic reveiw of low to moderate quality RCTs[21]**

*Order of preference of initial benzodiazepine treatment:* Preference for initial treatment for SE in children essentially guided by expertise, preference, pragmatic implications at primary level of care and availability. As evidence for head to head comparisons of different non-intravenous interventions is of 'low' to 'very low'quality, it is not possible to determine if there are clinically important differences between the various forms of non-intravenous antiepileptic medications for control of acute convulsive seizures[22].

The order of preference was recommended as follows in the text of the STG as:

- Midazolam, buccal;
- Midazolam, IM;
- Diazepam, rectal

**Level of Evidence: III Expert opinion**

[18] World Health Organisation. mhGAP Intervention Guide Mental Health Gap Action Programme for mental, neurological and substance use disorders in non-specialized health settings, version 2.0 Geneva: World Health Organization; 2016. http://www.who.int/mental_health/mhgap/mhGAP_intervention_guide_02/en/

[19] National Institute for Health and Care Excellence. Epilepsies: diagnosis and management Clinical guideline [CG137], 2012. https://www.nice.org.uk/guidance/cg137

[20] Smith R, Brown J. Midazolam for status epilepticus. AustPrescr. 2017 Feb;40(1):23-25. https://www.ncbi.nlm.nih.gov/pubmed/28246432

[21] Jain P, Sharma S, Dua T, Barbui C, Das RR, Aneja S. Efficacy and safety of anti-epileptic drugs in patients with active convulsive seizures when no IV access is available: Systematic review and meta-analysis. Epilepsy research. 2016;122:47-55.

*Switching between rectal diazepam and buccal midazolam:* The STG does not recommend a switch between rectal diazepam and buccal midazolam when a second benzodiazepine dose is required, as there is no available RCT evidence to support this.
**Level of Evidence: III Expert opinion**

**Second line treatment**
Phenobarbitone, oral administered via NGT: *retained*
Phenobarbitone, IV: *not added*
Accessing phenobarbitone injections through section 21 not considered feasible at primary level of care.
**Level of Evidence: III Expert opinion**

**ADULTS**
Midazolam, buccal: *added*
Midazolam, IM: *directions for use amended in adults – repeating dose once if still fitting*
Diazepam, IV: *directions for use amended*
Clonazepam, IM: *not added*
Benzodiazepines: *caution box amended*

*Midazolam, buccal*
Aligned with Adult Hospital Level STGs and EML, 2015 with recommendation for a second dose as needed for pragmatic purposes.
*Rationale:* Aligned with Adult Hospital Level STGs and EML, 2015
**Level of Evidence: III Guidelines, Expert opinion**

*Midazolam, IM*
One repeat dose of midazolam, IM recommended if seizure control not achieved after first dose.
*Rationale:* Aligned with NICE Guidelines[23] and Adult Hospital Level STG, currently under review.
**Level of Evidence: III Guidelines**

*Diazepam, IV*
The benefit of diazepam IV administered at a rate of 5 mg/minute to stop seizure activity in adults with status epilepticus outweighs the risk of respiratory depression, and maximum dose amended to align with SAMF, 2016 and Guidelines.
**Level of Evidence: III Guidelines[24] [25]**

*Clonazepam*
At the NEMLC meeting of 2 November 2017, NEMLC recommended that due diligence with regards to the use of clonazepam and diazepam in status epilepticus be done.

Generally, all benzodiazepines are effective for status epilepticus. Clonazepam reported to be slightly advantageous for less refractory status as suggested in an observational study[26]. However,

[23] NICE Clinical Guideline 137. The epilepsies: the diagnosis and management of the epilepsies in adults and children in primary and secondary care. Issued Jan2012; modified Jan 2015. http://guidance.nice.org.uk/cg137
[24] Brophy GM, Bell R, Claassen J, Alldredge B, Bleck TP, Glauser T, Laroche SM, Riviello JJ Jr, Shutter L, Sperling MR, Treiman DM, Vespa PM; Neurocritical Care Society Status Epilepticus Guideline Writing Committee. Guidelines for the evaluation and management of status epilepticus. Neurocrit Care. 2012 Aug;17(1):3-23. https://www.ncbi.nlm.nih.gov/pubmed/22528274
[25] Brophy GM, Bell R, Claassen J, Alldredge B, BleckTP, Glauser T, Laroche SM, RivielloJJ Jr, Shutter L, Sperling MR, Treiman DM, Vespa PM; Neurocritical Care Society Status Epilepticus Guideline Writing Committee. Guidelines for the evaluation and management of status epilepticus. Neurocrit Care. 2012 Aug;17(1):3-23.
[26] Alvarez V, Lee JW, Drislane FW, Westover MB, Novy J, Dworetzky BA, Rossetti AO. Practice variability and efficacy of clonazepam, lorazepam, and midazolam in status epilepticus: A multicenter comparison. Epilepsia. 2015 Aug;56(8):1275-85.

clonazepam is expensive. Lorazepam is preferred over midazolam and diazepam[27], but refrigeration requirements at primary health clinics may be a challenge. It was noted that buccal midazolam is underutilised in clinical practice.

**Recommendation:** Despite observational evidence suggesting that clonazepam may be a promising agent, it is the most expensive benzodiazepine. The PHC Committee recommends that this agent be reviewed in the next PHC cycle.

*Benzodiazepine caution*

Caution box was amended, aligned with the Adult Hospital STG, 2015:

| **CAUTION** |
| --- |
| Benzodiazepines can cause respiratory depression. |
| Monitor closely for respiratory depression. If this occurs, assist ventilation with bag-valve mask (1 breath every 3-5 seconds) and refer urgently. |
| **Avoid** diazepam IM since absorption is slow and erratic. |
| **Do not** mix diazepam with other medicines in same syringe. |

### 21.3.1.1 ANIMAL BITES *and* 21.3.1.2 HUMAN BITES

Separate STGs for animal and human bites was developed for clarity purposes as it was reported that nurse prescribers were probably administering Rabies vaccines to human bite victims.

### 21.3.1.1 ANIMAL BITES

NEMLC recommended[28] that text regarding tracing to determine if animal is rabid be included in the STG.

The text of the STG was editorially amended as follows:

| **Suspected rabid bite** |
| --- |
| Any mammal bite can transmit rabies. Rabies incubation period is at least 9–90 days, but could be much longer. In suspected rabies exposure of a person by a domestic animal, attempt to trace source animal to determine likelihood of rabies. |

### 21.3.1.2 HUMAN BITES

**Hepatitis B prophylaxis**

Hepatitis B vaccine: *added*

Hepatitis B immunoglobulin: *not added*

At the NEMLC meeting of 27 November 2017[29], NEMLC recommended that evidence for the effectiveness of hepatitis B vaccination be reviewed (i.e. proportion of patients that would benefit from this intervention).

Refer to the medicine review, below, for detailed information: Human Hepatitis B immunoglobulin for hepatitis exposure, March 2018.

HBIG_PHC_Review_ 29 March2018.pdf

**Recommendation:** Given the following:

- HBV is a potentially life threatening condition.
- HBV transmission risk, if exposed, is high (30% transmission risk).

[27] Treiman DM, Meyers PD, Walton NY, Collins JF, Colling C, Rowan AJ, Handforth A, Faught E, Calabrese VP, Uthman BM, Ramsay RE, Mamdani MB. A comparison of four treatments for generalized convulsive status epilepticus. Veterans Affairs Status Epilepticus Cooperative Study Group. N Engl J Med. 1998 Sep 17;339(12):792-8

[28] Minutes of the NEMLC meeting of 27 November 2017.

[29] Minutes of the NEMLC meeting of 27 November 2017.

- Variable pre-exposure vaccination coverage and adequate immune response is unknown (i.e. a serum post-vaccination anti-HBs ≥ 10 mIU/mL).
- Insufficient evidence to conclude that active immunisation alone is as effective as combination active-passive immunoprophylaxis.

The Primary Health Care committee recommends that given the high prevalence of hepatitis B and the high transmission risk associated with exposure to hepatitis B, equal access should be provided for all exposure types (irrespective of whether occupational, non-occupational or sexual exposures and human bite victims in whom skin has been broken), dependant on vaccination status and antibody status.

*Rationale:* There is limited RCT evidence, but the PHC Committee was of the opinion that equal access should be provided. Aligned with United States Centers for Disease Control and Prevention Guidelines[30].

**Level of Evidence: III Guidelines, Expert opinion**

**NEMLC Recommendation[31]: HBIG to be administered at secondary level of care for human bites and occupational PEP.**

*Rationale:* There is a need for equitable access of HBIG for human bites and occupational PEP at both primary and secondary level of care. However, limited availability of HBIG warrants cautious use of this agent for the more common indication that generally presents at secondary level of care – perinatal transmission of hepatitis B.

**Level of Evidence: III Expert opinion**

**Tetanus prophylaxis:**

Tetanus toxoid vaccine, IM: *added*

**Recommendation:** Victims of human bites to be provided tetanus prophylaxis.

*Rationale:* Guidelines recommend tetanus prophylaxis for human bites and there has been a single case report of tetanus death from a human bite.

**Level of Evidence: III Case report[32], Guidelines[33]**

**HIV prophylaxis**

HIV PEP: *not added*

Recent systematic review of 11 case reports and two case series[34] concluded that *"There is no risk of transmitting HIV through spitting, and the risk through biting is negligible. Post-exposure prophylaxis is not indicated after a bite in all but exceptional circumstances. Policies to protect emergency workers should be developed with this evidence in mind."*

**Recommendation:** HIV post exposure prophylaxis not be recommended for human bites.

*Rationale:* The risk of transmitting HIV through human bites is negligible.

**Level of Evidence: III Systematic review of case reports and case series**

The text of the STG was updated as follows:

The risk of HIV transmission risk through biting is negligible. Post-exposure prophylaxis is not indicated after a bite.

### 21.3.1.3 INSECT STINGS, SCORPION STINGS AND SPIDER BITES

[30] CDC Guidelines. Postexposure Prophylaxis to Prevent Hepatitis B Virus Infection. MMWR 2006,56(RR-16), Appendix B. https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5516a3.htm?s_cid=rr5516a3_e

[31] Minutes of the NEMLC meeting of 5 July 2018.

[32] Muguti GI, Dixon MS. Tetanus following human bite. Br J Plast Surg. 1992 Nov-Dec;45(8):614-5. https://www.ncbi.nlm.nih.gov/pubmed/1493537

[33] Patil PD, Panchabhai TS, Galwankar SC. Managing human bites. J Emerg Trauma Shock. 2009 Sep;2(3):186-90. https://www.ncbi.nlm.nih.gov/pubmed/20009309

[34] Cresswell FV, Ellis J, Hartley J, Sabin CA, Orkin C, Churchill DR. A systematic review of risk of HIV transmission through biting or spitting: implications for policy. HIV Med. 2018 Apr 23. doi: 10.1111/hiv.12625. [Epub ahead of print]. https://www.ncbi.nlm.nih.gov/pubmed/29687590

Heading of this section was amended from "**Insect stings and spider bites**" to "**Insect stings, scorpion bites and spider bites"**

Tetanus toxoid vaccine, IM: *added*
Aligned with Adult Hospital Level STGs and EML, 2015 that recommends tetanus prophylaxis for spider and scorpion envenomation.[35]
**Level of Evidence: III Guidelines**

Text of the STG was updated as follows:

**For spider bites and scorpion stings: Tetanus prophylaxis:**
If not immunised within the last 5 years:
- Tetanus toxoid vaccine (TT), IM, 0.5 mL.

### 21.3.1.4 SNAKEBITES

**Venom in the eyes:**
Sodium chloride, 0.9% irrigation: *added*
**Level of Evidence: III Expert opinion**

Information on polyvalent snake antivenom: *indications and criteria for administration amended*
Indications for polyvalent antivenom was editorially amended for correctness, aligned with SAMF, 2016.

» **The majority of patients do not need and should not be given antivenom**.
» ~~Patients with bites due to other species should receive antivenom onlyat the onset of any symptoms.~~
» The dose of antivenom is the same for adults and children.
» Polyvalent antivenom does NOT include antivenom for Berg adders or Stiletto snakes. Management for these is symptomatic and supportive only.

Criteria for antivenom administration updated as follows, aligned with expert opinion[36]:

Criteria for antivenom administration
All patients with systemic signs and symptoms or severe spreading local tissue damage should receive antivenom.
» Signs of systemic envenomation (see signs, above).
» Spreading local damage:
  - Swelling of entire hand/foot within 1 hour of bite (80% of bites are on hands/ feet).
  - Swelling extends to elbow or knee within 6 hours, or whole limb within 12 hours, of a bite.
  - Upper extremity bite with swelling extending to the chest.
  - Lower extremity bite with swelling extending to the groin.
  - Bite to chest with severe circumferential swelling resulting in difficulty breathing.
  - Significant swelling of head or neck threatening airway.

**Level of Evidence: III Guidelines, Expert opinion**

### 21.3.2 BURNS

Ringers lactate, IV: *not added*
Sodium chloride 0.9%, IV: *retained*
Dextrose 50%, IV: *retained*
Povidone-iodine, topical: *retained*
Silver sulfadiazine, topical: *not added*

*Maintenance and resuscitation fluids:* The PHC Committee accepted the rationale for the use of sodium chloride 0.9% and dextrose 50%, as previously recommended, based on pragmatic considerations for use at PHC.

[35] Adult Hospital Level STGs and EML, 2015.
[36] Wood D, Sartorius B and Hift R. Snakebite in north-eastern South Africa: clinical characteristics and risks for severity. S Afr Fam Pract 2016; 58(2):62–67.

The following note was added, emphasising fluid replacement in burns > 10%:

| |
|---|
| **Note:** IV fluid replacement is very important in large burns. However, if unable to obtain IV access, give fluids orally or via NGT and transfer urgently. |

*Protocol:* Management of burns is based on the South African Burn Society burn stabilisation protocol and the PHC Committee was of the opinion that this is adequate and is standard of care at primary care facilities.

*Weight-band table:* The table for replacement fluid for burns is based on the Parklands Formula, and the PHC Committee was of the opinion that it was not pragmatic to add the formula to the STG.

*Infected burns:* As management of burns at primary level of care is restricted to minor burns and patients requiring out-patient care; the PHC Committee was of the opinion that it would be inappropriate to consider dressings used in hospital inpatient care. All serious burns and septic burns are referred to higher levels of care for appropriate treatment.

**Level of Evidence: III Expert opinion**

### 21.3.3 EXPOSURE TO POISONOUS SUBSTANCES

**Organophosphate and carbamate poisoning: Children**

Atropine, IV: *directions for use amended*

Text updated to align with the Paediatric (2017) Hospital STGs and EML; but, dosing was limited to bolus doses and recommendation to infuse children in this clinical setting was removed for pragmatic purposes at primary level of care.

~~Children: 0.05 mg/kg/dose.~~

- Atropine, IV, 0.05 mg/kg/dose.
  - Reassess after 3 – 5 minutes and if necessary repeat atropine bolus.
    - If no response, give double the dose.
    - If some response, give the same or reduced dose.
  - Give a repeat bolus until adequate response achieved, i.e. reduced bronchial secretions, dry mouth, increasing heart rate and dilating pupils (Note: pupil reversal may be delayed).
    - Reassess frequently as additional doses may be required.

**Level of Evidence: III Guidelines**

**Opioid overdose: Adults**

Naloxone IV/IM: *directions for use amended*

The option for an initial IM dose was added. However, the IV route of administration is preferred. Recommended naloxone, IV dosing in adults was standard practice at the Poisons Centre.

**Level of Evidence: III Guidelines[37], Expert opinion**

**Opioid overdose: Children**

Naloxone, IV: *amended – route of administration and dosage*

*Route of administration:* The option for an initial IM dose was added. However, the IV route of administration is preferred.

**Level of Evidence: III Guidelines[38]**

*Dosage:* The following recommended dosing for children was included in the STG, aligned with the PALS[39] Guidelines.

[37] SAMF, 2016

[38] SAMF, 2016

[39] Naloxone, IV/IM (children): Kleinman ME, Chameides L, Schexnayder SM, Samson RA, Hazinski MF, Atkins DL, Berg MD, de Caen AR, Fink EL, Freid EB, Hickey RW, Marino BS, Nadkarni VM, Proctor LT, Qureshi FA, Sartorelli K, Topjian A, van der Jagt EW, Zaritsky AL. Part 14: pediatric advanced life support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care.Circulation. 2010 Nov 2;122(18 Suppl 3):S876-908. https://www.ncbi.nlm.nih.gov/pubmed/20956230

- Naloxone, IV (preferable) or IM

| Age and weight | Initial dose (IV/IM) | **Repeat dose:** Reassess every 2 minutes. If breathing still inadequate, give further naloxone every 2–3 minutes. |
|---|---|---|
| **Children:** | | |
| < 5 years<br>or<br>≤ 20 kg | • 0.1 mg/kg immediately (maximum 2 mg/dose) | Repeat 0.1mg/kg (maximum 2 mg/dose), up to total dose of 10 mg. |
| ≥ 5 years<br>or<br>> 20 kg | • 0.4–2mg immediately | Repeat 0.1mg/kg (maximum 2mg/dose), up to total dose of 10 mg |

**Level of Evidence: III Guidelines**

## 21.3.6.1 POST EXPOSURE PROPHYLAXIS, OCCUPATIONAL

**Monitoring in occupational exposure:** *amended*

*Hepatitis B:* Follow up hepatitis B surface antigen test was recommended if source patient was positive, aligned with guidelines[40], but at 4 months for pragmatic purposes.

*Hepatitis C:* Only recommended in occupational exposure if source patient was HCAb positive.

*Syphilis RPR testing:* Only recommended in sexual exposure if source patient was RPR/TPab positive.

The text of the STG was amended accordingly, as follows:

| Test | Source patient | Exposed ~~healthcare worker~~ person<br>*Only if source patient was positive | | | |
|---|---|---|---|---|---|
| | **Baseline** | **Baseline** | **2 weeks** | **6 weeks** | **4 months** |
| HIV | Rapid test<br>**PLUS**<br>HIV ELISA (NHLS test) | Rapid test<br>**PLUS**<br>HIV ELISA (NHLS test) | | HIV ELISA (NHLS test) | HIV ELISA (NHLS test) |
| Hepatitis B | Surface antigen | Surface antibody | | | Surface antigen |
| Hepatitis C** | HCV antibody | HCV antibody* | | HCV PCR* | |
| Syphilis*** | RPR/<br>TP antibody | RPR/TP antibody* | | | RPR/TP antibody* |
| Serum creatinine | | If TDF part of PEP | If TDF part of PEP | | |
| FBC | | If AZT part of PEP | If AZT part of PEP | | |

** If occupational exposure
*** If sexual exposure

**Hepatitis B prevention**

Hepatitis B vaccine: *added*

Aligned with the Adult Hospital Level STGs and EML, 2015.

**Level of Evidence: III Guidelines**

Hepatitis B immunoglobulin: *not added; guidance provided regarding directions for use*

Note added in the text of the STG recommending that hepatitis B immunoglobulin (HBIG) be used within 7-14 days of exposure, aligned with the British National Formulary, 2017[41]:

HBIG to be given as soon as possible, preferably within 24-72 hours after exposure (within 7 days).

*Rationale:* Guidelines suggest that efficacy of HBIG is reduced if administered more than 7-14 days after exposure.

**Level of Evidence: III Guidelines**

**NEMLC Recommendation[42]: HBIG to be administered at secondary level of care for human bites and occupational PEP.**

*Rationale:* There is a need for equitable access of HBIG for human bites and occupational PEP at both primary and secondary level of care. However, limited availability of HBIG warrants cautious

[40] Moorhouse M, Bekker LG, Black V, et al. Guideline on the management of occupational and non-occupational exposure to the human immunodeficiency virus and recommendations for post-exposure prophylaxis: 2015 Update.doi:10.4102/sajhivmed.v16i1.399

[41] BNF for Adults, 2018.

[42] Minutes of the NEMLC meeting of 5 July 2018.

use of this agent for the more common indication that generally presents at secondary level of care – perinatal transmission of hepatitis B.
**Level of Evidence: III Expert opinion**

The following was included in the text of the STG:

Refer to secondary level of care for HBIG, IM.

## 21.3.6.2 POST EXPOSURE PROPHYLAXIS, RAPE AND SEXUAL ASSAULT

**Hepatitis B prevention**

Hepatitis B vaccine: *added with a cross referral to section 21.3.6.1 Post exposure prophylaxis, occupational for management*

Hepatitis B immunoglobulin: *not added, but cross referred to section 21.3.6.1 Post exposure prophylaxis, occupational for management*

**Emergency contraception (after pregnancy is excluded)**

Levonorgestrel, oral, 1.5 mg as a single dose*: caution amended*

The following was amended, aligned with the Family planning chapter:

- Levonorgestrel oral, 1.5 mg as a single dose as soon as possible after unprotected intercourse.
  - o Repeat the dose, if woman vomits within 2 hours.

**CAUTION**

Emergency contraceptive tablets must be taken as soon as possible, preferably within 72 hours of unprotected intercourse, and not later than 5 days.

Women on enzyme inducers (including efavirenz, carbamazepine) cause a significant reduction in LNG concentrations. Women on these medicines should preferably have copper IUCD EC inserted or alternatively double the dose of levonorgestrel, because of significant reduction of LNG EC.

See Section 7.4: Contraception, emergency.

Copper IUCD: *not added*

Not considered as a method for emergency contraception.

*Rationale:* Not pragmatic for this clinical setting as medico-legal and psychological considerations need to considered.

**Level of Evidence: III Expert opinion**

## 21.3.6.3 POST EXPOSURE PROPHYLAXIS, INADVERTENT (NON-OCCUPATIONAL)

**Hepatitis B prevention**

Hepatitis B vaccine: *added with a cross referral to section 21.3.6.1 Post exposure prophylaxis, occupational for management*

Hepatitis B immunoglobulin: *not added, but cross referred to section 21.3.6.1 Post exposure prophylaxis, occupational for management*

The following text was editorially amended to include management of hepatitis B exposure for non-occupational exposure, aligned with CDC Guidelines[43].

Inadvertent (non-occupational) exposure to infectious material from HIV and hepatitis B sero-positive persons often requires clinical judgement and includes:

» human bites
» sharing of needles during recreational drug use
» consensual sexual exposure, burst condoms
» contact sports with blood exposure

[43] Centers for Disease Control and Prevention Guidelines: Postexposure Prophylaxis to Prevent Hepatitis B Virus Infection. MMWR 2006,56(RR-16), Appendix B. https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5516a3.htm?s_cid=rr5516a3_e

Management of inadvertent (non-occupational) HIV and hepatitis B exposure is the same as for occupational exposure. See Section: 21.3.6.1 Post exposure prophylaxis, occupational.

**Level of Evidence: III Guidelines**

### 21.3.7 SOFT TISSUE INJURIES

**Children: If sutures needed:**

Lidocaine 2% with adrenaline (epinephrine), injection: *not added*

Lidocaine 2% injection: *added*

Aligned with the Paediatric Hospital Level STG, 2017.

**Level of Evidence: III Guidelines**

**NEMLC Recommendation[44]:** The NEMLC recommended that guidance be aligned with the Paediatric Hospital Level STG, 2017 (i.e. lidocaine 2% injection) as the current evidence is inadequate to suggest that lidocaine 2% with adrenaline is not harmful.

[44] Minutes of the NEMCL meeting of 5 July 2018.