ANAPHYLAXIS AND GENERALISED ALLERGIC REACTION (GAR)

PRACTICE GUIDELINE ©

KEY POINTS

Anaphylaxis has been defined as:

- Any acute onset illness with typical skin features (urticarial rash or erythema/flushing, and/or angioedema) PLUS any one or more of the following involvement:
  - respiratory
  - cardiovascular
  - persistent severe gastrointestinal symptoms

OR

- Any acute onset of hypotension or bronchospasm or upper airway obstruction where anaphylaxis is considered possible, even if typical skin features are not present.

Generalised Allergic Reaction (GAR)

- A reaction characterized by one or more symptoms or signs of skin and/or gastrointestinal tract involvement without respiratory and/or cardiovascular involvement.

Management:

- Do not allow children with anaphylaxis to stand or walk
- Treatment of anaphylaxis is intra-muscular adrenaline 10 micrograms/kg or 0.01mL/kg of 1:1000 (maximum 0.5mL), into lateral thigh, which should be repeated after 5 minutes if the child is not improving (see anaphylaxis algorithm).
- An adrenaline autoinjector can be used if unable to calculate exact dose or to avoid delay, including in children <1 year old (Epipen 300microg for children ≥20kg and Epipen 150microg for children 7.5-20kg)
  - Senior medical advice may be required, call for assistance as needed.
  - Airway – give supplemental oxygen.
  - If airway threatened, call emergency number:
    - **Code Blue 2222** (SCH and CHW) or
    - **Triple Zero 000** (HITH)

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1st November 2019	**Review Period**: 3 years
Team Leader:	Fellow	**Area/Dept**: Allergy & Immunology

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- All patients who have had an anaphylactic reaction should be observed for a minimum of 4 hours post adrenaline. Only allow to mobilise under observation ≥ 1 hour after last dose of adrenaline and once all symptoms have resolved.
- For Hospital in the Home [HITH] (previously known as CAPAC), always contact the child's medical team once the child is stable.

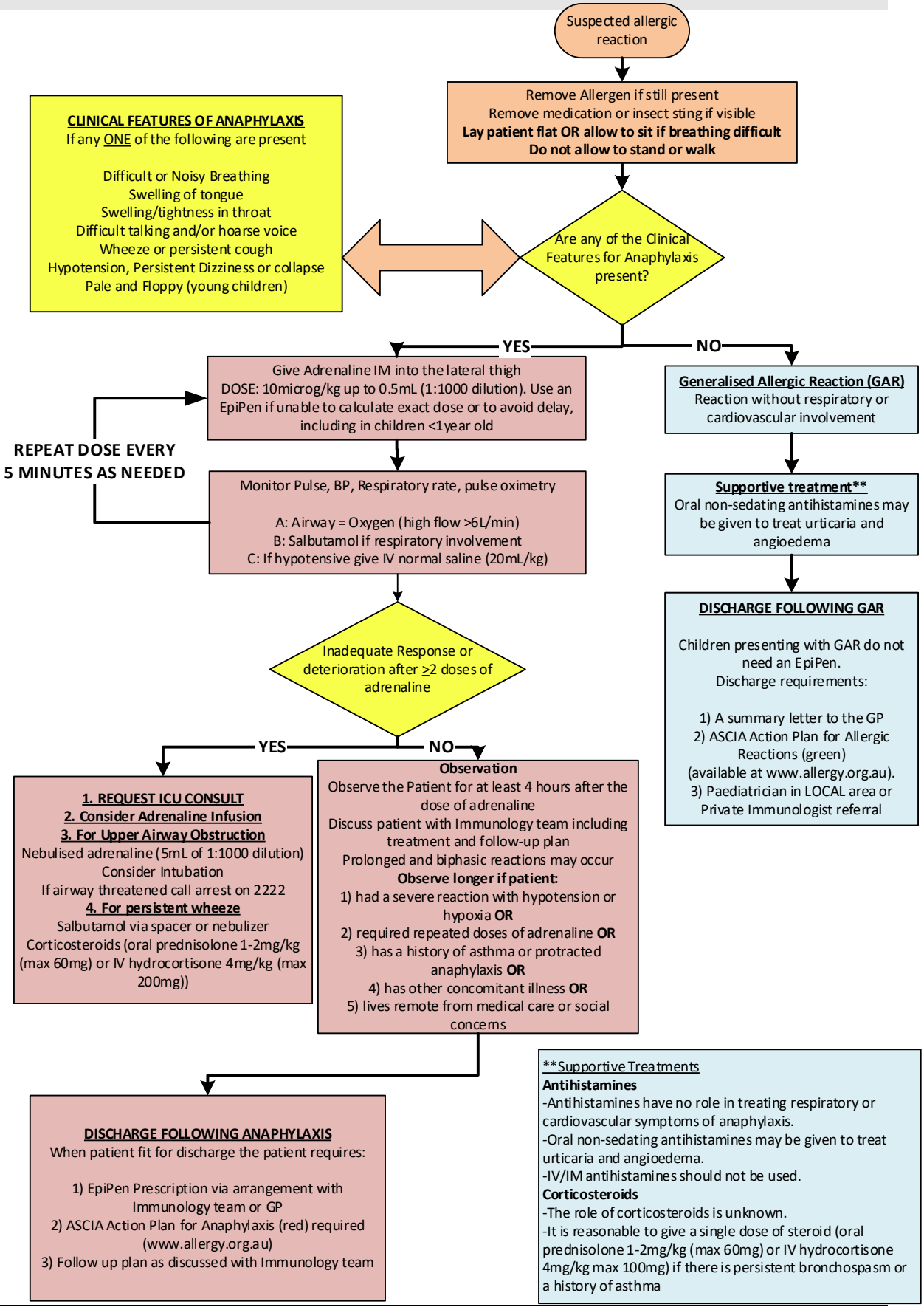
CHANGE SUMMARY

- Due for mandatory review
- Title change - replacing Anaphylaxis & Allergy Management (ED & At Home)
- 19/6/20: Minor review. Updated Loratadine dosing, in line with the AMH-CDC dosing recommendations.

READ ACKNOWLEDGEMENT

- **Emergency Department CHW and SCH**: Clinical staff: medical officers, nurses and pharmacists need to understand and acknowledge this document.
- **HITH**: Clinical nurses undertaking "Hospital In The Home" visiting need to understand and acknowledge this document and have appropriate training in EpiPen use.
- **Other Areas**: Discretionary: Manager to determine which staff need to read and acknowledge this document.

Algorithm



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Clinical Definitions

Definitions of anaphylaxis vary considerably. For the purpose of this guideline we will use the Australasian Society of Clinical Immunology and Allergy (ASCIA) definitions of Anaphylaxis and Generalised Allergic Reaction: [ASCIA]

Anaphylaxis

Anaphylaxis has been defined as:

- Any acute onset illness with typical skin features (urticarial rash or erythema/flushing, and/or angioedema) PLUS any one or more of the following
  - involvement of respiratory
  - cardiovascular
  - persistent severe gastrointestinal symptoms

OR

- Any acute onset of hypotension or bronchospasm or upper airway obstruction where anaphylaxis is considered possible, even if typical skin features are not present.

Symptoms/signs of respiratory/cardiovascular involvement are:

Respiratory:

- Difficulty/noisy breathing
- Swelling of tongue
- Swelling/tightness in throat or tightness in chest
- Difficulty talking and/or hoarse voice
- Dysphagia
- Wheeze or persistent cough
- Cyanosis

Cardiovascular:

- Loss of, or altered consciousness or collapse
- Dizziness
- Pallor and floppiness (in young children)
- Hypotension
- Cardiac arrest

Gastrointestinal:

These are signs of anaphylaxis if reaction is to insect stings or injected medications

- Severe and persistent vomiting
- Severe and persistent abdominal pain

Generalised Allergic Reaction (GAR)

A reaction characterized by one or more symptoms or signs of skin and/or gastrointestinal tract involvement without respiratory and/or cardiovascular involvement.

Skin:

- Generalised pruritus
- Urticaria / Angioedema
- Generalised erythema

Gastrointestinal*:

- Abdominal pain
- Vomiting
- Diarrhoea
- Nausea

**These are signs of anaphylaxis for reactions to insect stings or injected medications*

Diagnosis

- The diagnosis of anaphylaxis and GAR is clinical. Use the ASCIA definitions above as a guide.
- Investigations have little role in acute diagnosis and management.
- A serum mast cell tryptase level (3mL in a 'red top' clotted blood tube) may be ordered in consultation with senior staff within 4 hours of onset of symptoms. Tryptase level is often normal in food related anaphylaxis.
- While urticaria and angioedema are commonly associated with anaphylaxis, they may be absent in up to 20% of presentations. A differential diagnosis of anaphylaxis must be considered in any case of acute onset respiratory distress, bronchospasm, hypotension, or cardiac arrest. GARs involving generalised erythema, urticaria, periorbital oedema or angioedema without signs of respiratory or, cardiovascular involvement do not constitute anaphylaxis.

Pathophysiology

- Most reactions occur within 30 minutes of exposure to a trigger but can occur up to 4 hours later.
- Anaphylaxis is an acute, rapidly progressive, potentially life-threatening immediate hypersensitivity triggered by histamine and other chemical mediators released from mast cells due to surface bound specific-IgE.
- A non-IgE mediated anaphylactic reaction (previously called anaphylactoid reactions) may have similar symptoms; however mediator release occurs independent of IgE

binding to mast cells. There is no practical difference in the acute management of these conditions.

- Multiple organ systems are affected, and at its most severe, anaphylaxis is characterised by bronchospasm, airway angioedema, and hypotension.
- A careful history is most helpful in trying to identify a possible allergen.
- The commonest causes of anaphylaxis in children are:
  - foods (peanut, tree nuts, cow's milk, egg, soy, shellfish, fish, wheat),
  - medications (beta lactam antibiotics),
  - insect venom (bee, wasp, ant)

Treatment of Anaphylaxis

- Remove allergen if present
- Posture: do not allow child to stand or walk. Treat the child in the supine position, or the left lateral position for a vomiting child, or sitting upright if breathing is difficult, but monitor for hypotension.
- Immediate administration of IM adrenaline. Dose is 10micrograms/kg given as:
  - 0.01 mL/kg of 1:1000 (1mg/mL) adrenaline intramuscularly into the anterolateral thigh
  - Maximum dose = 0.5 mL of 1:1000 (1mg/mL)
- Use an EpiPen if unable to calculate exact dose or to avoid delay, including in children <1 year old (Epipen 300microg for children ≥20kg and Epipen 150microg for children 7.5-20kg)
- Further doses of IM adrenaline may be given every 5 minutes for persistent or recurring symptoms of anaphylaxis
- ICU consultation if ≥ 2 doses adrenaline with inadequate effect

Adrenaline Dosage Chart

Age (years)	Weight (kg)	Volume of adrenaline (1:1000) mL	Adrenaline Autoinjectors
<1	<10	0.05-0.1	7.5-20kg (~1-5 years) 150microg (green labelled) device
1-2	10	0.1	
2-3	15	0.15	
4-6	20	0.2	≥20kg (~>5 years) 300microg (yellow labelled) device
7-10	30	0.3	
10-11	40	0.4	
≥12 and adults	>50	0.5	

- Get senior medical advice as needed
- A safe option to avoid difficult small volume adrenaline administration, is to deliver a minimum dose of 0.15mL of 1:1000 adrenaline to all children < 15 kg in estimated weight, otherwise the dose is 0.01mL/kg of 1:1000 adrenaline to a maximum of 0.5mL of 1:1000. To facilitate this an 'anaphylaxis kit' containing 1mL syringes, ampoules of 1:1000 adrenaline and sterile antiseptic wipes should be considered.
- Airway – Supplemental Oxygen
  - Nebulised adrenaline may also be considered for stridor. Give 5mL of 1:1000 (1mg/mL) adrenaline [or 0.5mL/kg/dose of 1:1000 adrenaline if <10kg].
  - Do not delay endotracheal intubation if evolving airway obstruction
  - If airway threatened then call
    - **CODE BLUE (2222 at SCH and CHW)**
- Breathing – Salbutamol via spacer or nebuliser if wheeze (after giving IM adrenaline)
- Circulation – large bore IV access if hypotensive/poorly perfused, give 0.9% sodium chloride fluid bolus 20 mL/kg and repeat if needed.
- Only allow to mobilise under observation ≥ 1 hour after last dose of adrenaline *and* once all symptoms resolved

Additional therapy:

- Oral non-sedating antihistamine – once patient stable and able to tolerate
- Steroids – as indicated – see note below

- ICU consultation and adrenaline infusion if more than 2 doses of IM adrenaline are required and/or persistent hypotension.

Anti-Histamines

- In a child with anaphylaxis, antihistamines should only be given *after* the administration of adrenaline
- Oral antihistamines can be used to reduce cutaneous symptoms. Antihistamines do not treat or prevent anaphylaxis.

Age	Anti-histamine	Dose
6-12 months	Desloratadine	1mg once daily
1-2 years	Loratadine	2.5mg once daily
>2 years and <30kg	Loratadine	5mg once daily
>30kg	Loratadine	10mg once daily

- Sedating antihistamines should be avoided
- Parenteral (IVI or IMI) promethazine (Phenergan) should not be used in anaphylaxis as it may worsen vasodilation and hypotension and can cause muscle necrosis.

Steroids

- There is little evidence to support the use of corticosteroids including in the prevention of biphasic reactions, however, may be used at the discretion of the treating physician.
- Steroids have a theoretical place in severe anaphylactic reactions in children where bronchospasm is a major feature or where there is a background history of asthma.
- Corticosteroid can be given as oral prednisolone (1-2 mg/kg/dose up to 60mg) as per **Asthma Management Guidelines** or as intravenous hydrocortisone (4 mg/kg/dose up to 100mg) as stat doses.

Treatment of Generalised Allergic Reactions (GAR)

- GARs are mild to moderate allergic reactions without respiratory or cardiovascular involvement and are not life-threatening.
- If a child has gastrointestinal symptoms and the trigger is venom or an injected drug this constitutes anaphylaxis and requires treatment with adrenaline. If in doubt discuss the case with the patient's consultant (hospital inpatients including HITH), ED Consultant (ED patients) or Immunologist on-call (any patient).

- Allergens may be ingested, inhaled or come into contact with the skin. The mode of contact may influence the extent of the reaction.
- Urticaria persisting more than 24 hours is usually not due to an allergic reaction, unless repeated exposure to the allergen has occured.
- Angioedema is common; however, without signs of airway involvement (see definition of anaphylaxis above) does not equal anaphylaxis and can be managed as a GAR.
- GARs can be managed with a non-sedating antihistamine:

Age	Anti-histamine	Dose
6-12 months	Desloratadine	1mg once daily
1-2 years	Loratadine	2.5mg once daily
>2 years and <30kg	Loratadine	5mg once daily
>30kg	Loratadine	10mg once daily

- The patient must be monitored for the development of respiratory or cardiovascular involvement, as some patients with rapidly progressive symptoms will benefit from the early administration of adrenaline.
- Children with symptoms of a GAR do not need to be discussed with the immunology team unless there are specific management concerns.

Observation

- All patients who have had an anaphylactic reaction should be observed for a minimum of 4 hours post adrenaline.
- Only allow to mobilise under observation ≥ 1 hour after last dose of adrenaline and once all symptoms have resolved.
- All children who are treated for anaphylaxis should have their case discussed with the immunology team; the immunology fellow during the day and on-call immunologist after hours. If the patient is stable and there are no acute management concerns the immunologist may be contacted the following day to discuss ongoing management and follow up.

Admission

- Admissions should be discussed with the ED consultant or fellow.
- Indications for admission include:
  - Anaphylaxis requiring more than 1 dose of adrenaline or a fluid bolus
  - Anaphylaxis requiring 1 dose of adrenaline, but with residual features/symptoms of a GAR (other than isolated cutaneous symptoms) 4-6 hours post adrenaline

- Social concerns or senior ED staff concerns

- Admission may also be considered for children on regular beta blocker medication.
- Admissions can be:
  - Under the emergency team
    - To the Emergency Medicine Unit (EMU) **at CHW**
    - As a short stay admission **at SCH**
  - Under the immunology team to the ward

Consider ICU consultation for cases refractory to management.

Discharge from hospital

1. All children who are treated for anaphylaxis should have their case discussed with the immunology team as soon as practical regarding follow up.
2. a) For ED patients treated for anaphylaxis: If stable following 4 hours of observation after the last dose of adrenaline, a patient may be discharged from the ED.

   b) For inpatients treated for anaphylaxis: If stable following 4 hours of observation after the last dose of adrenaline, a patient may be discharged from hospital *after* discussion with the admitting staff specialist, if there are no other reasons to remain in hospital.
3. Before discharge all children who have presented with anaphylaxis should have a plan to obtain a prescription for an EpiPen, as soon as practically possible, which can be arranged after discussion with the immunology team. An Epipen prescription should be given with EpiPen training and an ASCIA Action Plan for Anaphylaxis (red plan, available at http://www.allergy.org.au/health-professionals/ascia-plans-action-and-treatment).
4. Children presenting with a GAR do not need an EpiPen and should be discharged home with an ASCIA Action Plan for Allergic Reactions (green plan, available at http://www.allergy.org.au/health-professionals/ascia-plans-action-and-treatment).
5. Parent information sheets about anaphylaxis in multiple languages can be found on the ASCIA website (https://allergy.org.au/hp/anaphylaxis/) and SCHN intranet (https://www.schn.health.nsw.gov.au/fact-sheets/category/#cat10)

Follow up

All patients need a clear plan regarding follow up when discharged from hospital and/or the ED.

All children presenting with anaphylaxis: A discharge letter for their GP & a referral letter for the Immunology clinic addressed to the Immunology consultant on call [ie: the person you spoke to].

All children presenting with a GAR: a discharge letter for their GP & a referral letter for a general paediatrician. Referrals to the allergy clinic at both SCH and CHW, for non-anaphylactic reactions can only be made by a paediatrician.

Any child may be seen by a private paediatrician or immunologist/allergist if their parents and GP wish to refer.

References

1. Australian Society for Clinical Immunology and Allergy, ASCIA Action Plans and Checklists. http://www.allergy.org.au/health-professionals/ascia-plans-action-and-treatment (accessed 19/05/2015)

2. Australian Department of Health, Pharmaceutical Benefits Scheme, Adrenaline, http://www.pbs.gov.au/medicine/item/3409K-8698T (accessed 19/05/2015)

Appendix 1: Hospital in the home (HITH) - Management of anaphylaxis

Patients Receiving Medication At Home

The nurses working for the hospital in the home (HITH) administer antibiotics and other medications in the home. This protocol is a guide to assist the HITH nurse in the administration of intramuscular adrenaline in the event of an anaphylactic reaction during or following administration of intravenous medications in accordance with this policy.

Children with the following conditions are excluded from receiving medications at home.

- History of mastocytosis
- Previous adverse reactions to the prescribed medication
- Currently taking beta-blocker medication (adrenaline may not be effective)

Preparing for home visit

- The HITH nurse responsible for direct patient care must have received training and is competent in recognition and treatment of anaphylaxis in paediatric patients.
- Every child transferred to HITH will receive the first dose of medication in the hospital setting.
- The HITH handover sheet to have contact details for treating team, in case of emergency.
- Ensure:
    - An **anaphylaxis kit** is taken on all visits where a child needs to be given medication (including all oral, IV, IM or subcutaneous medications).
    - An anaphylaxis kit can be obtained from pharmacy. Each HITH nurse will hold one kit per work bag. When you have used the kit it can be replaced by pharmacy.
    - An order for PRN IM adrenaline and oral anti-histamine is required, along with orders for the medication/s to be administered by HITH staff, on the child's medication administration record (MAR) *before* any home visit.

Each anaphylaxis kit contains:

- 2x Epipen 150micrograms (for patients 7.5-20kg)
- 2x Epipen 300micrograms (for patients ≥20kg)
- Loratadine 1mg/mL syrup
- Desloratadine syrup
- Salbutamol (Asmol) 100microgram/puff inhaler 200 dose
- Spacer device
- Oral syringes x 1 size 5mL and 10mL
- Disposable resuscitator

- Drug dose card
- 1 x general ASCIA Action Plan for anaphylaxis (see Appendix 2 below)

At the home visit

- Follow the procedure for administration of the prescribed medication.
- Check the five rights: - route, drug, dose, patient name and time.
- Watch for signs of adverse reactions

Anaphylaxis or GAR

- If you suspect an allergic reaction, follow the ASCIA action plan for anaphylaxis (appendix 2)
- If the child develops any one of the signs of anaphylaxis give adrenaline by administering the EpiPen
  - EpiPen Jr (150micrograms) if <20kg or
  - EpiPen (300micrograms) if ≥20kg
- In the event of immediate threat to life due to anaphylaxis consider EpiPen Junior for infants <10kg
- After giving adrenaline **ask the parent or a responsible adult to call an ambulance (000)**. All children who have received adrenaline should be transferred by ambulance to the ED for a minimum of 4 hours observation.
- As per the ASCIA Action Plan further doses of adrenaline may be given after 5 minutes if the symptoms of anaphylaxis have recurred or are persisting.
- Anti-histamines: In a child with anaphylaxis, antihistamines should only be given *after* the administration of adrenaline
- Oral antihistamines can be used to reduce cutaneous symptoms. They do not treat or prevent anaphylaxis. A non-sedating antihistamine may be given such as:

Age	Anti-histamine	Dose
6-12 months	Desloratadine	1mg once daily
1-2 years	Loratadine	2.5mg once daily
>2 years and <30kg	Loratadine	5mg once daily
>30kg	Loratadine	10mg once daily

- Always contact the child's medical team once the child is stable, complete IIMS and debrief with manager.

Appendix 2: ASCIA Action plan for Anaphylaxis

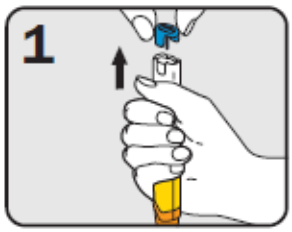
(for use by HITH nurses administering home IV medications)

ascia
www.allergy.org.au

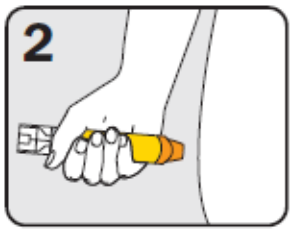
ACTION PLAN FOR Anaphylaxis

For use with adrenaline (epinephrine) autoinjectors

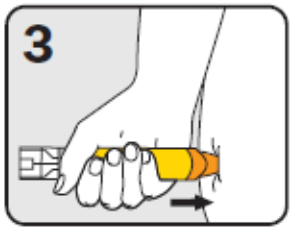
How to give EpiPen® adrenaline (epinephrine) autoinjectors



Form fist around EpiPen® and PULL OFF BLUE SAFETY RELEASE



Hold leg still and PLACE ORANGE END against outer mid-thigh (with or without clothing)



PUSH DOWN HARD until a click is heard or felt and hold in place for 3 seconds

REMOVE EpiPen®

EpiPen® is prescribed for children over 20kg and adults. EpiPen®Jr is prescribed for children 10-20kg

SIGNS OF MILD TO MODERATE ALLERGIC REACTION

- Swelling of lips, face, eyes
- Hives or welts
- Tingling mouth
- Abdominal pain, vomiting (these are signs of anaphylaxis for insect allergy)

ACTION FOR MILD TO MODERATE ALLERGIC REACTION

- For insect allergy - flick out sting if visible
- For tick allergy seek medical help or freeze tick and let it drop off
- Stay with person and call for help
- Locate adrenaline autoinjector
- Phone family/emergency contact

Mild to moderate allergic reactions (such as hives or swelling) may not always occur before anaphylaxis

WATCH FOR ANY ONE OF THE FOLLOWING SIGNS OF ANAPHYLAXIS (SEVERE ALLERGIC REACTION)

- **Difficult/noisy breathing**
- **Swelling of tongue**
- **Swelling/tightness in throat**
- **Wheeze or persistent cough**
- **Difficulty talking and/or hoarse voice**
- **Persistent dizziness or collapse**
- **Pale and floppy (young children)**

ACTION FOR ANAPHYLAXIS

1. **Lay person flat - do NOT allow them to stand or walk**
   - **If unconscious, place in recovery position**
   - **If breathing is difficult allow them to sit**

2. **Give adrenaline autoinjector**
3. **Phone ambulance - 000 (AU) or 111 (NZ)**
4. **Phone family/emergency contact**
5. **Further adrenaline doses may be given if no response after 5 minutes**
6. **Transfer person to hospital for at least 4 hours of observation**

If in doubt give adrenaline autoinjector

Commence CPR at any time if person is unresponsive and not breathing normally

ALWAYS give adrenaline autoinjector FIRST, and then asthma reliever puffer if someone with known asthma and allergy to food, insects or medication has **SUDDEN BREATHING DIFFICULTY** (including wheeze, persistent cough or hoarse voice) even if there are no skin symptoms

- *If adrenaline is accidentally injected (e.g. into a thumb) phone your local poisons information centre.*
- *Continue to follow this action plan for the person with the allergic reaction.*

Appendix 3

EpiPen®

An EpiPen is a form of self-injectable adrenaline and comes as:

- EpiPen® (for children 20 kg and over, 1:1000, 300micrograms, single dose – 2mL)
- EpiPen Jr® (for children under 20 kg, 1:2000, 150micrograms, single dose – 2mL)

EpiPens cannot be prescribed from the Emergency Department without involvement of the immunologist on-call or Allergy CNC (but GP can prescribe according to the criterion "Authority Required: Initial sole PBS-subsidised supply for anticipated emergency treatment of acute allergic reactions with anaphylaxis in a patient who has been discharged from hospital or an emergency department after treatment with adrenaline for acute allergic reaction with anaphylaxis").

EpiPen® prescription must be accompanied by a comprehensive Anaphylaxis Management Plan including:

- Referral to an Immunologist.
- Training in when and how to use the EpiPen®.
- Identification of triggers if possible, through a thorough history.
- Education on avoidance of triggers, especially for food allergies.
- Provision of an Anaphylaxis Action Plan.

In Australia, EpiPen® is listed on the Pharmaceutical Benefits Scheme (PBS) as an authority only script. PBS indications for EpiPen® prescription are:

- Anaphylaxis as defined above.
- Where the patient has received adrenaline in the ED.

EpiPen may be considered in the following circumstances. This should always be discussed with the Immunologist on-call before the EpiPen® is prescribed:

- GAR with one or more of the following:
  - Asthma, current or past history
  - Specific nut allergy
  - Specific insect bite allergy
  - Limited access to Emergency Medical Care (remote area).