BOTTOM LINE RECOMMENDATIONS

Anaphylaxis

Anaphylaxis is a serious systemic hypersensitivity reaction that is rapid in onset and can be fatal.[1] The highest incidence of anaphylaxis is in children and youth. The three principal triggers of anaphylaxis are foods, insect stings, and drugs. In Canada, there is an Emergency Department (ED) visit for food allergy approximately every 10 minutes,[2] and up to 80% of anaphylactic reactions in children are triggered by foods such as peanuts, tree nuts, and milk.[3]

Refer to TREKK's Anaphylaxis treatment algorithm for emergent management and drug dosing.

Establishing the diagnosis of anaphylaxis[1]

» Any acute onset of hypotension/signs of shock, or signs of upper or lower airway obstruction after exposure to known or highly probable allergen, even if typical skin features are not present; **OR**

» Any acute onset illness with typical skin features (diffuse urticarial rash or erythema/flushing, and/or angioedema), **AND at least ONE of the following:** respiratory signs, cardiovascular signs, or severe gastrointestinal symptoms (e.g. repetitive vomiting, persistent abdominal pain).

Risk factors for severe anaphylaxis

These factors may increase the risk for severe anaphylaxis and influence duration of monitoring in ED post-stabilization:[4]

» Concurrent medications: NSAIDs, ACE-inhibitors, β-blockers

» Comorbidities: Chronic respiratory conditions (uncontrolled asthma), cardiovascular diseases, psychiatric conditions, mast cell disorders

» Cofactors: Onset of anaphylaxis during physical exercise, menstruation, acute illness or infection, alcohol intake

Management of anaphylaxis

IMMEDIATE INTERVENTIONS

» Remove allergic trigger, if applicable.

» Place patient in supine position (unless precluded by vomiting or respiratory distress). Trendelenburg position is not recommended. Do NOT allow patient to stand or walk.

» Administer **Intramuscular (IM) Epinephrine** into outer mid-thigh (0.01 mg/kg, MIN 0.1 mg/dose, MAX 0.5 mg/dose).
  – Use epinephrine auto-injector or epinephrine 1 mg/mL injection.

» Assess and monitor airway, breathing, circulation, and mental status.
  – Prepare age-appropriate airway equipment.
  – Provide O_2 (10-15 L) by non-rebreather mask if signs of shock or respiratory distress.
  – Use basic airway management maneuvers to maximize oxygen delivery and call for help/assemble team. Upper airway obstruction should be managed by the most skilled clinician available.
  – Proceed with intubation if persistent stridor, signs of significant upper airway obstruction, and/or respiratory arrest.
  – If the child is hypotensive or signs of shock are not responding after 2 doses of IM epinephrine, establish vascular access and PUSH NS or Ringer's Lactate 20 mL/kg IV over 5-10 minutes, repeat x 2 if necessary.

FIRST LINE THERAPY: EPINEPHRINE

» **Immediate IM epinephrine administration is the most important therapy that prevents progression to refractory and biphasic anaphylaxis. There are NO absolute contraindications for IM epinephrine in anaphylaxis.**

» AVOID common medication administration errors:
  – Use the epinephrine 1 mg/mL preparation for IM dosing in anaphylaxis. Do **NOT** use epinephrine 0.1 mg/mL for this indication.
  – Do **NOT** give epinephrine as an IV/IO bolus dose for anaphylaxis as this may result in serious cardiac adverse events.

» Start **epinephrine IV infusion** if anaphylactic shock persists after THREE doses of IM epinephrine and fluid resuscitation – continue to give epinephrine IM every 10 min while preparing epinephrine infusion **(Refer to TREKK Anaphylaxis PedsPac for dosing).**

ADJUNCT THERAPIES

NEVER DELAY IM EPINEPHRINE TO GIVE ADJUNCT THERAPIES.
ADJUNCT THERAPIES NEVER REPLACE THE NEED FOR IM EPINEPHRINE.

Antihistamines

» Use second-generation H1 antihistamines (e.g. cetirizine PO or rupatadine PO) to relieve cutaneous symptoms. They may reduce the progression to severe anaphylaxis when used with IM epinephrine.[3]

» Do **NOT** use first-generation H1 antihistamines (e.g. diphenhydramine PO/IV/IM or hydroxyzine PO) due to risk of drowsiness/ somnolence, dizziness, orthostatic hypotension (that may mimic anaphylaxis) and fatal cardiac arrhythmias.[5]

Inhaled epinephrine

» Administer if stridor or signs of upper airway obstruction persist after IM epinephrine.

» Prepare for intubation and contact Pediatric Referral Centre if symptoms persist after two doses.

Inhaled bronchodilator

» Give inhaled salbutamol (Ventolin®) for wheezing or persistent signs of lower airway obstruction.

Corticosteroids

» Do **NOT** routinely use systemic corticosteroids. They do not reduce reaction severity, and in children, may increase the risk of biphasic anaphylaxis.[1,6,7] *Consider* use if persistent signs of upper/lower airway obstruction or shock.

Emergency department monitoring

» Up to 15% of children are at risk of biphasic reactions, which typically occur within 3-24 hours of initial anaphylaxis.

» The following risk factors increase the risk of biphasic reaction[6,7]:
  – Anaphylaxis due to drug or unknown trigger
  – Severe anaphylaxis defined as any of the following: cardiac signs (hypotension, wide pulse pressure), respiratory signs (hypoxia, persistent wheeze, or respiratory distress), or anaphylaxis requiring more than one dose of IM epinephrine
  – Delayed epinephrine administration (i.e. more than 60 minutes from the onset of the reaction)

» ED monitoring and disposition should be individualized according to the presence of risk factors for severe anaphylaxis (see page 1) and biphasic reactions. The following criteria can be used as a general guide:

Criteria	Disposition Plan
Mild anaphylaxis that resolved after one dose of timely epinephrine and remained asymptomatic for at least 1 hour after epinephrine administration	Monitor for 2 hours from the onset of the reaction
Any of the following: required two doses of epinephrine to treat the reaction, presented late in evening, lives alone or far from emergency care, has no immediate access to epinephrine auto-injector, history of severe or currently uncontrolled asthma	Monitor for 6 hours from the onset of the reaction or overnight
Any of the following: severe anaphylaxis (e.g. anaphylactic shock, severe respiratory distress), required > 2 doses of IM epinephrine, drug-induced anaphylaxis	Admit to hospital for at least 24 hours

STEPS FOR A SAFE DISCHARGE PLAN

1. Refer to an allergy specialist. Infants less than 1 year of age with potential food allergies should be referred **URGENTLY.**
2. Provide anaphylaxis emergency plan and counseling:
   » Provide the Canadian Anaphylaxis Action Plan for Kids (Kids' CAP)[8]
   » Counsel patient/caregiver on: recognition of symptoms and signs of anaphylaxis, management steps, and prevention strategies. Use the Kids' CAP teaching video for these discharge instructions.
3. Discharge prescription:
   » Provide an epinephrine auto-injector prescription and instruct patient/caregiver to fill the prescription immediately upon discharge.
     – epinephrine auto-injectors should be prescribed for any patient with, or at risk of, anaphylaxis
     – For children < 15 kg, prescribe the 0.15 mg epinephrine auto-injector[9] (given the lack of a suitable alternative in Canada)
   » Demonstrate the proper use of epinephrine auto-injector using a trainer device to allow patient/caregiver to practice.
   » A prescription for **two** epinephrine auto-injectors should be considered for patients with **ANY** of the following:
     – Co-existing mast cell disease, or asthma and a food allergy; **OR**
     – Lack of rapid access to medical care; **OR**
     – History of severe anaphylaxis or previous requirement of more than 1 dose of epinephrine; **OR**
     – Any patient/caregiver who requests two epinephrine auto-injectors
   » Second generation H1 antihistamine treatment (e.g. cetirizine or rupatadine) is rarely needed after discharge, but may be recommended/prescribed for ongoing, mild urticaria – it should **never** be used in place of epinephrine auto-injector for anaphylaxis.
   » **Never** recommend/prescribe a first-generation H1 antihistamine (e.g. diphenhydramine and hydroxyzine).

The purpose of this document is to provide healthcare professionals with key facts and recommendations for the diagnosis and treatment of anaphylaxis in children. This summary was produced by the anaphylaxis content advisor for the TREKK Network, Drs. Waleed Alqurashi of CHEO and Anne Ellis of Kingston General Hospital, and uses the best available knowledge at the time of publication. However, healthcare professionals should continue to use their own judgment and take into consideration context, resources and other relevant factors. The TREKK Network is not liable for any damages, claims, liabilities, costs or obligations arising from the use of this document including loss or damages arising from any claims made by a third party. The TREKK Network also assumes no responsibility or liability for changes made to this document without its consent. This summary is based on:

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