Practice Parameter: Algorithmic Management of Anaphylaxis

Indian Academy of Pediatrics – Allergy and Applied Immunology Chapter

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1. Introduction

Anaphylaxis is a severe, systemic hypersensitivity reaction that is rapid in onset and may be fatal. It typically involves multi-system manifestations including cutaneous, respiratory, cardiovascular and gastrointestinal systems. Prompt recognition and immediate intramuscular epinephrine are life-saving. This document outlines practical, evidence-informed guidance tailored to the Indian clinical and public health context, intended for general practitioners, emergency physicians, pediatricians, nurses, and community health workers.

2. Definition and Epidemiology in India

Definition: The National Institute of Allergy and Infectious Diseases (NIAID) and Food Allergy & Anaphylaxis Network (FAAN) guidelines 2006 outlined the criteria for diagnosing anaphylaxis (Table 1). These criteria have been widely adopted and were found to be 95% sensitive and 71% specific in a prospective validation study among emergency department (ED) patients. Knowledge deficits regarding anaphylaxis recognition and treatment continue to be revealed. In an effort to simplify anaphylaxis diagnostic criteria, in 2019 the WAO Anaphylaxis Committee proposed revisions to the definition for the clinical diagnostic criteria for anaphylaxis, which was subsequently largely adopted by the WAO 2020 guidelines. (Table 1).

Table 1: NIAID 2006 and WAO 2020

NIAID criteria (2006)	**WAO criteria 2020**
Anaphylaxis is highly likely when any one of the following 3 criteria are fulfilled: 1. Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue, or both (eg, generalized hives, pruritus or flushing, swollen lips – tongue – uvula) and at least one of the following: a. Respiratory compromise (eg, dyspnea, wheeze - bronchospasm, stridor, reduced PEF, hypoxemia) b. Reduced BP or associated symptoms of end – organ dysfunction (eg, hypotonia [collapse], syncope, incontinence) 2. Two or more of the following that occur rapidly after exposure to a likely allergen for that patient (minutes to several hours): a. Involvement of the skin mucosal tissue (eg, generalized hives, itch-flush, swollen lips-tongue-uvula) b. Respiratory compromise (eg, dyspnea, wheeze - bronchospasm, stridor, reduced PEF, hypoxemia) c. Reduced BP or associated symptoms of end – organ dysfunction (eg, hypotonia [collapse], syncope, incontinence) d. Persistent gastrointestinal symptoms (eg, crampy abdominal pain, vomiting) 3. Reduced blood pressure after exposure to known allergen for that patient (minutes to several hours): a. Infants and children: low systolic BP (age specific) or greater than 30% decrease in systolic BP b. Adults: systolic BP of less than 90 mm Hg or greater than 30% decrease from that person's baseline	Anaphylaxis is highly likely when any one of the following 2 criteria are fulfilled: 1. Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue, or both (eg, generalized hives, pruritus or flushing, swollen lips-tongue-uvula) and at least one of the following: a. Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia) b. Reduced BP or associated symptoms of end-organ dysfunction (eg, hypotonia [collapse], syncope, incontinence) c. Severe gastrointestinal symptoms (eg, severe crampy abdominal pain, repetitive vomiting), especially after exposure to non-food allergens 2. Acute onset of hypotension or bronchospasm or laryngeal involvement after exposure to a known or highly probable allergen for that patient (minutes to several hours), even in the absence of typical skin involvement.

Epidemiology: Robust nationwide data are limited. International estimates indicate lifetime prevalence around 1–2%. In India, case series and AEFI surveillance indicate low but real rates of vaccine and drug-associated anaphylaxis; food-, drug- and insect-related reactions are commonly reported in hospital series. Underreporting and lack of registry data remain challenges.

3. Pathophysiology:

Most anaphylaxis is IgE-mediated (type I hypersensitivity) – allergen-specific IgE binds to FcεRI receptors on mast cells and basophils, triggering rapid degranulation and release of mediators (histamine, tryptase, prostaglandins, leukotrienes) leading to vasodilation, capillary leak, bronchospasm and mucosal edema. Non-IgE mechanisms (direct mast cell activation or complement-mediated) can mimic anaphylaxis.

4. Clinical Presentation and Diagnostic Criteria

Presentation: Symptoms typically begin within minutes to hours of exposure.

Key features include:

- - Cutaneous: generalized urticaria, flushing, angioedema (lips, periorbital).
- - Respiratory: throat tightness, wheeze, stridor, cough, shortness of breath.
- - Cardiovascular: hypotension, syncope, dizziness, collapse.
- - Gastrointestinal: crampy abdominal pain, vomiting, diarrhea.

Diagnostic approach: Use clinical criteria (NIAID/FAAN 2006 and WAO 2020). If the criteria are met or if there is high clinical suspicion of airway compromise or shock after allergen exposure, treat immediately. Serum tryptase (30–120 minutes post-onset and baseline >24h later) may support the diagnosis but must not delay therapy.

5. Severity Classification and Differential Diagnosis

Severity classification (practical):

1. Mild: Cutaneous signs ± mild GI symptoms; no airway or circulatory compromise.
2. Moderate: Respiratory features (wheeze, stridor), persistent GI symptoms, but stable BP.

3. Severe: Hypotension/shock, respiratory arrest, hypoxia, loss of consciousness.

Differential diagnoses to consider: vasovagal syncope, acute severe asthma, cardiogenic shock, sepsis, panic attacks. Key distinguishing features: presence of urticaria/angioedema and recent allergen exposure favor anaphylaxis; vasovagal events often have pallor and bradycardia rather than urticaria and hypotension with tachycardia.

6. Immediate Management (Stepwise Algorithm)

Principles: Immediate airway protection, rapid intramuscular epinephrine, oxygen, intravenous fluids for circulatory support, and prompt transfer to higher-level care when needed.

Step 1 — Recognize and call for help

- Activate emergency services/assistant and call for advanced support.
- Do not delay treatment for diagnostics.

Step 2 — Positioning and airway

- Lay patient supine with legs elevated if hypotensive. If vomiting or airway compromise, place in lateral recovery position.
- Administer high-flow oxygen (10–15 L/min) if available.

Step 3 — Adrenaline (IM) — first-line intervention

- Use adrenaline (epinephrine) 1:1000 (1 mg/mL) intramuscularly into the anterolateral thigh. Dose: 0.01 mg/kg (0.01 mL/kg; maximum 0.5 mg per dose). Repeat every 5–10 minutes as necessary. Do not delay administration to establish IV access.

Table 2: Adrenaline dose

Age/Weight	Dose (1:1000 epinephrine IM) - undiluted	Volume (mL)
Infant <6 months / <7.5 kg	0.01 mg/kg (approx.)	≈0.1 mL
1–5 years / 7.5–20 kg	0.15 mg	0.15 mL
6–12 years / 20–30 kg	0.3 mg	0.3 mL
> 12 years / >30 kg	0.3 mg	0.3 mL
Overweight adult or Recurrent Anaphylaxis	0.5 mg	0.5 mL

Step 4 — Circulatory support

- Secure IV access. Give rapid IV crystalloid boluses (20 mL/kg in children; adults 1–2 L) for hypotension. Consider vasopressors in ICU if hypotension persists despite fluids and epinephrine.

Step 5 — Adjunctive treatments

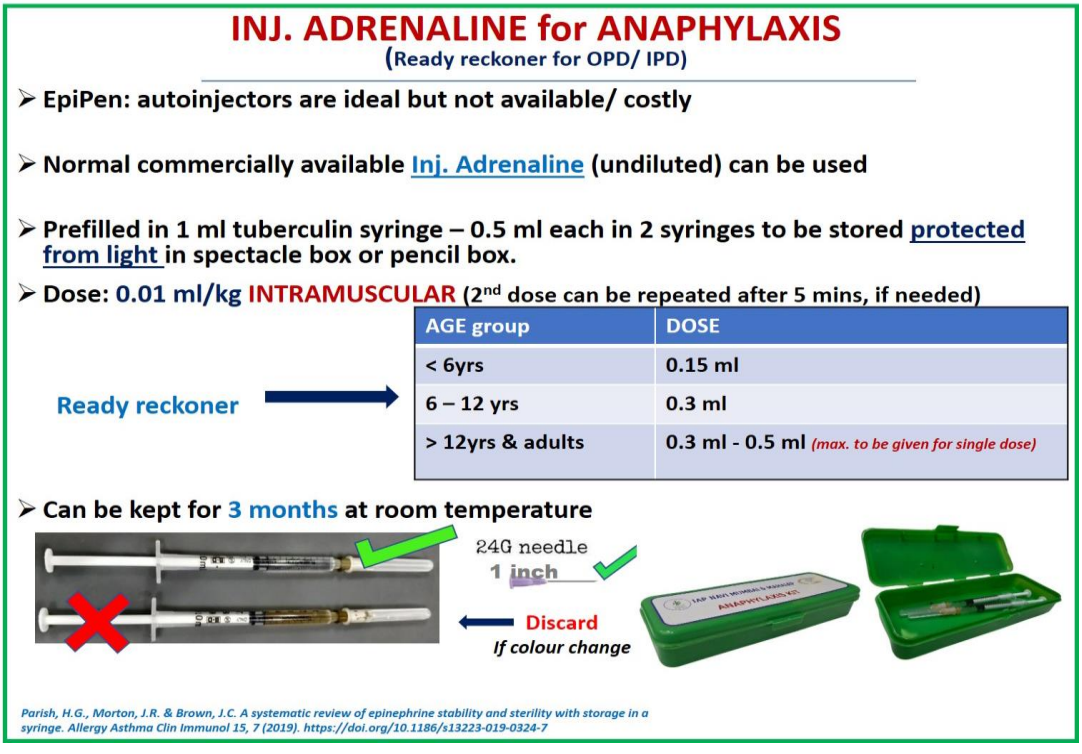
- Inhaled β2-agonists (salbutamol) for persistent bronchospasm after epinephrine.
- H1-antihistamines (e.g. chlorpheniramine IV or diphenhydramine) for urticaria (note: do not replace epinephrine).
- Corticosteroids (IV hydrocortisone or methylprednisolone) may reduce protracted/biphasic reactions though evidence is limited.
- Glucagon for patients on β-blockers who are refractory to epinephrine (IV bolus 1–2 mg adults; 20–30 mcg/kg children).

7. Use of Adrenaline in India: Practical Guidance

Epinephrine autoinjectors (EAIs) such as EpiPen have historically had limited availability and high cost in India. Therefore, frontline providers and caregivers often rely on ampoules of 1 mg/mL (1:1000) epinephrine with syringes. This creates unique opportunities and risks which must be addressed by training and system planning.

Recommendations:

- Every emergency tray, ambulance, immunization session site, and primary health centre should stock epinephrine ampoules (1 mg/mL) and syringes (1 mL and 5 mL).
- Create prefilled, labeled syringes for common weight bands in busy clinics (e.g., 0.15 mL, 0.3 mL, 0.5 mL). Rotate stock and mark expiry.
- Train staff (doctors, nurses, ANMs, school health staff) in rapid dose calculation and hands-on practice drawing and administering IM epinephrine.
- Where EAIs are available/affordable, prescribe them for community use; otherwise provide written guidance and demonstration for caregivers to administer IM epinephrine using ampoules and syringes.
- Maintain clear labeling and avoid confusion between 1:1000 (IM) and 1:10,000 (IV for arrest) concentrations.



8. Adjunctive Therapy and Supportive Measures

- Oxygen: high-flow oxygen for hypoxia or respiratory distress.
- Bronchodilators: Nebulized/salbutamol for wheeze; use after epinephrine.
- Antihistamines: Use for cutaneous symptoms (oral/IV) but remember onset is slower and they do not treat airway or CV compromise.
- Corticosteroids: May be used to reduce late-phase or biphasic reactions; they do not replace epinephrine.
- Monitoring: Continuous monitoring of vitals, oxygen saturation and urine output in hospitalized patients.

9. Observation, Disposition and Follow-up

Observation duration should take into account initial severity and response to treatment. Suggested observation times:
- Mild reaction responding to a single dose: observe 4–6 hours.
- Moderate-to-severe reaction or repeated epinephrine doses: observe 12–24 hours and consider admission.
- Biphasic reactions can occur within 1–72 hours (most within 4–12 hours); longer observation for severe initial presentation is recommended.

Discharge checklist:

- Patient clinically stable and symptom-free.
- Written anaphylaxis action plan given in patient's language.
- Prescription for adrenaline auto-injector if available; if not, provide prefilled syringe and teach caregiver IM administration.
- Referral to an allergist for identification of triggers, testing (skin prick or specific IgE) and long-term management.
- Documentation of the event and notification to local AEFI or pharmacovigilance program if drug/vaccine-related.

10. Prevention, Long-term Management and Immunotherapy

Key strategies:

- Avoidance: Strict avoidance of identified triggers (food labeling education, drug allergy alerts).
- Venom immunotherapy: Indicated and highly effective for insect venom allergy; refer to specialist centres.
- Oral immunotherapy (OIT): Emerging for foods (e.g., peanut) in specialized centres — discuss risks/benefits with patients.
- Drug desensitization: May be performed under controlled specialist settings where alternative medicines are limited.
- Medical identification: Encourage wearing ID bracelets/cards and provide emergency contact information.

11. Education, Training and Health-system Recommendations

At the system level, the following are recommended to improve outcomes in India:

- National policy to ensure epinephrine availability at all primary health centres and ambulances.
- Inclusion of anaphylaxis management modules in medical, nursing and community health worker curricula.
- Regular emergency drills in hospitals and vaccination sites (including prefilled syringe practice).
- Public education campaigns for schools and food services about allergy awareness and emergency response.
- Encourage domestic manufacture and affordable pricing of epinephrine autoinjectors, with regulatory facilitation and procurement support.

12. References

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