



## **Course: Key Competences**

### **Background:**

In 2007, the Royal College of Paediatrics and Child Health (RCPCH) published a new curriculum for postgraduate medical education, which has been approved by the Postgraduate Medical Education and Training Board<sup>1</sup>. In addition, the RCPCH has devised an assessment strategy that uses multisource feedback tools to map specifically to assessment standards.

By the completion of Level One training, all trainees are expected to be able to initiate therapy in a child presenting with Anaphylaxis. This scenario/ workshop has been designed to assess competence in management of this key condition of childhood.

### **Curriculum Elements Addressed:**

The management of anaphylaxis can be separated into five distinct phases:

- **Assessment**
- **Recognition of the condition**
- **Formulation of differential diagnoses**
- **Investigation**
- **Definitive therapy**

#### **Assessment (Expected)**

Thorough examination of the child

Key features of the examination:

- Tachypnoea 30 bpm
- Tachycardia 130 bpm
- Pruritis
- Urticarial rash over face and trunk
- Expiratory wheeze
- Rhinitis & conjunctival symptoms
- NIBP 73/35

#### **Recognition of condition & Formulation of differential diagnosis (Expected)**

Signs of anaphylaxis are clear and no differential is expected. The main distinction is between a moderate allergic reaction and anaphylactic shock. The low diastolic blood pressure indicates anaphylactic shock.

#### **Investigations (Expected)**

No investigations other than routine clinical observations (including SpO<sub>2</sub>, BP, RR & HR) are required. However, monitoring should be established and observations documented every 5 minutes.

<sup>1</sup> A Framework of Competences for Level 1 Training in Paediatrics.  
<http://www.rcpch.ac.uk/Training/Competency-Frameworks>



### Definitive Therapy (Expected)

1. Assess Airway, Breathing & Circulation
2. Give High Flow Oxygen
3. Give IM Adrenaline 300mcg (0.3ml 1:1000) or IV 1mcg/kg (20mcg 0.2ml 1:10000)
4. Give 20ml/kg N.Saline (Target Volume = 400ml)
5. Give nebulised Salbutamol 5mg over 10 min
6. Give Chlorphenamine 5mg IM, IV or PO
7. Give IM or IV Hydrocortisone 100mg or Prednisolone PO 30mg to prevent late phase reaction
8. Disposal
  - Observe the child for 2 hours. If he is well he can then be discharged.
  - Discharge home with appropriate emergency medication including Epipen, which the family must have been taught how to use using the Trainer Epipen (demonstration).
  - Give peanut allergy information sheet and advise family to avoid both peanut and tree nuts.
  - Give Medalert identity bracelet leaflet.
  - Arrange outpatient follow up. Suggest repeat skin prick testing in the young adult clinic after the age of 18.

### Assessment Domains:

RCPC Standards	Level of Achievement		
	Good	Adequate	Poor
Effective skills in paediatric assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge of common and serious paediatric conditions and their management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effective initial management of ill-health and clinical conditions in paediatrics, seeking additional advice and opinion as appropriate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safe practical skills in paediatrics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced Neonatal and Paediatric Life Support Skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effective communication and interpersonal skills with colleagues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



## Scenario: Anaphylaxis

**Learning Objectives:** At the end of the session candidates should be able to:

1. **Structured approach to ABCD assessment**
2. **Recognition of anaphylaxis**
3. **Prompt treatment as appropriate**
4. **Understand indications, dose and route of Adrenaline administration**
5. **Plan further observation, investigations and follow up**

### Faculty Script:

A 6 year old boy is admitted to the paediatric ward for a food challenge. He has had a positive skin prick test to peanut in clinic but has never eaten peanuts. His parents are keen to establish whether or not he is allergic. He has completed two stages of the peanut challenge and has consumed 2 grams of peanut in the past hour.

Child informs nurse confederate that his throat feels funny and he feels itchy. Nurse confederate notices urticarial rash over face and trunk.

Confederate nurse starts observations including blood pressure and calls SHO to assess child.

He has developed anaphylaxis and will progress to anaphylactic shock unless treatment instigated.

If not recognised or treatment suboptimal, pause scenario and reassess with candidate before asking them to instigate strategies.

### Patient Demographics:

**Name:** Peter May

**Gender:** M                      **Age:** 6years                      **Weight:** 20kg

### Candidate Brief:

#### Presenting History (Candidate Storyboard):

A 6 year old boy is admitted to the paediatric ward for a food challenge. He has had a positive skin prick test to peanut in clinic but has never eaten peanuts. His parents are keen to establish whether or not he is allergic. He has completed two stages of the peanut challenge and has consumed 2 grams of peanut in the past hour.

#### Previous Medical History:

Positive skin prick to peanut in respiratory clinic.

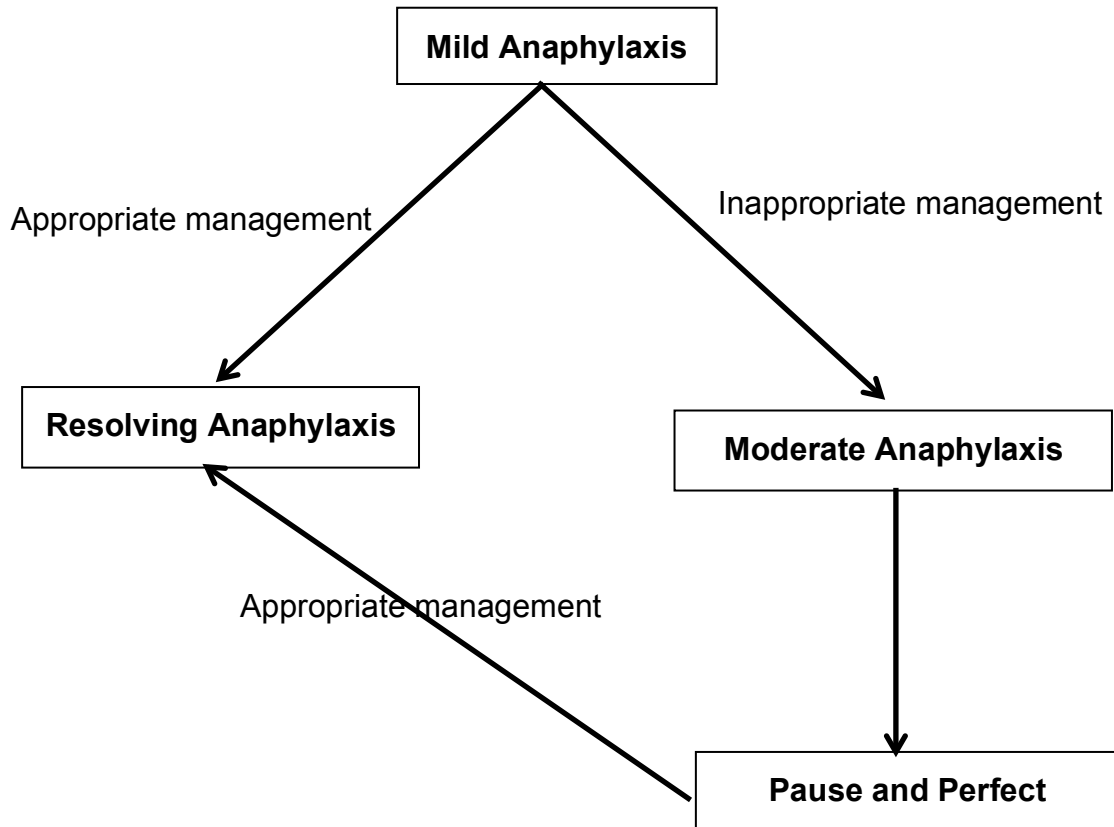
#### Family Medical History:

Nil of note





## Flowchart of Scenario Progression:



## Scenario setup and preparation:

**Faculty Recommended:** Director  **Control**   
 Actor/Confederate(s)   
 Roles: Parent  
 Nurse

If you have a multiprofessional group of candidate then you should have a multiprofessional faculty.

### Participants:

#### Medical Roles

Paediatric SHO

#### Nursing Roles

#### AHP Roles

**Location:** Children's Clinical Investigations Unit

**Simulator:** Meti Paed ECS, PaediaSim or SimJunior

**Monitor Setup:** 3 wave format

### Monitor Parameters Required:

ECG <input checked="" type="checkbox"/>	S <sub>a</sub> O <sub>2</sub> <input checked="" type="checkbox"/>	RR <input checked="" type="checkbox"/>	EtCO <sub>2</sub> <input type="checkbox"/>	NIBP <input checked="" type="checkbox"/>	ABP <input type="checkbox"/>
CVP <input type="checkbox"/>	PAP <input type="checkbox"/>	ICP <input type="checkbox"/>	CPP <input type="checkbox"/>	Temp (P) <input type="checkbox"/>	Temp (C) <input type="checkbox"/>
Other:					

## Equipment Checklist:

### Respiratory:

Nasal Cannula	<input type="checkbox"/>	O <sub>2</sub> Facemask	<input checked="" type="checkbox"/>	O <sub>2</sub> Reservoir Facemask	<input checked="" type="checkbox"/>
Headbox	<input type="checkbox"/>	Wafting O <sub>2</sub>	<input type="checkbox"/>	Nebuliser	<input checked="" type="checkbox"/>
Suction	<input checked="" type="checkbox"/>	Yankuer	<input type="checkbox"/>	Suction Catheter <input type="checkbox"/> size	FG
Self inflating Bag	<input checked="" type="checkbox"/>	Ayers T piece	<input checked="" type="checkbox"/>	Nasopharyngeal airway	<input type="checkbox"/>
Oropharyngeal Airway	<input type="checkbox"/>	LMA	<input type="checkbox"/>		
Intubated?	<input type="checkbox"/>	ETT position		length	0.00cm at
Respiratory Support		Non Invasive			
				➔ Settings:	
				Flow	l/min
				Insp O <sub>2</sub>	%
				PIP	
				PEEP	
		Invasive			
				➔ Settings:	
				iTime	sec
				Insp O <sub>2</sub>	%
				Rate	bpm
				PIP	
				PEEP	

### Vascular Access:

Line Type	Site
Peripheral (1)	R hand
Peripheral (2)	
Central Venous	
Arterial	
Intraosseous	

### Other Medical Equipment:

Drug Chart	<input checked="" type="checkbox"/>	Emergency Drug Sheet	<input checked="" type="checkbox"/>	Blood gas
Blood Results Sheet		X Rays		Imaging
Other Props:				
Medical notes				
Resuss Trolley				
Resuss drug box				

**IV Fluids:**

Setup	Fluid Type
Fluids Running	
Fluids Available (1)	0.9% Saline
Fluids Available (2)	
Fluids Available (3)	
Other Fluids	

**Medications: (route, dose/rate)**

Infusions (Running)	Dose	Running Rate (ml/hr)
Nil		

Infusions (Available)	Dose	Running Rate (ml/hr)
Adrenaline	300mg/50ml 5% Dextrose	1ml/h = 0.1mcg/kg/min

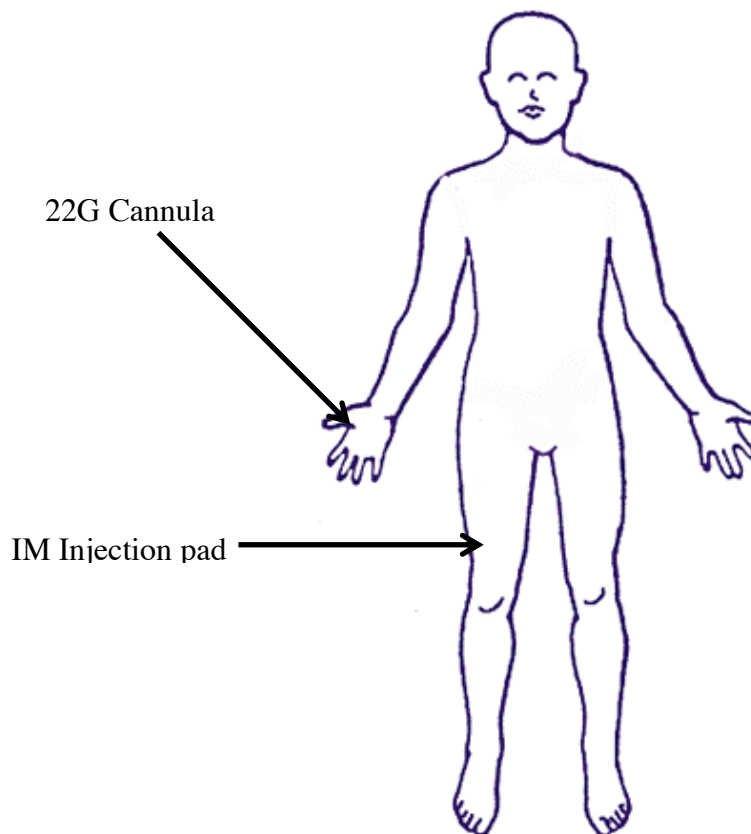
Bolus Drugs (Available)	Dose
Adrenaline 1:1 000	0.3ml
Adrenaline 1:10 000	
Chlorpheniramine	2.5 – 5mg
Hydrocortisone	50 – 100mg
Salbutamol neb	5mg



## Moulage:

Effect needed
Child in pyjamas with mother sat at his side
ID Bracelet
Urticaria on face and chest
IM Injection pad on R thigh

Draw relevant equipment needed on diagram e.g. cannula, wounds etc.







## Scenario States:

<b>Name of State</b>		<b>Mild Anaphylaxis</b>				<b>Duration</b>			
<b>Vital Signs</b>									
<b>Rhythm</b>	SR	<b>HR</b>	125	<b>SBP</b>	80	<b>DBP</b>	35	<b>CVP</b>	
<b>Resp Rate</b>	32	<b>SaO<sub>2</sub></b>	92	<b>ETCO<sub>2</sub></b>		<b>Temp</b>	36.5	<b>Other</b>	
<b>AVPU</b>	A	<b>GCS</b>	15	<b>Pupils</b>	3 ERL	<b>ICP</b>		<b>NIRS</b>	
<b>Assessment</b>									
<b>Periph Pulses</b>	normal	<b>Cap refill</b>	2 sec	<b>Skin</b>	urticaria				
<b>ECG/Heart</b>	normal heart sounds								
<b>Airway</b>	unobstructed			<b>Breathing</b>	normal				
<b>Air entry</b>	Normal			<b>Breath sounds</b>	mild wheeze				
<b>WOB</b>	normal			<b>Recession</b>	none				
<b>Neuro</b>	Alert			<b>Renal</b>		<b>Hepatic</b>			
<b>Other</b>									
<b>Results</b>									
<b>Hb</b>		<b>WCC</b>		<b>PLT</b>		<b>HCT</b>		<b>CRP</b>	
<b>PH/ H+</b>		<b>PaCO<sub>2</sub></b>		<b>PaO<sub>2</sub></b>		<b>HCO<sub>3</sub></b>		<b>BE</b>	<b>Lactate</b>
<b>Na<sup>2+</sup></b>		<b>K<sup>+</sup></b>		<b>Cl<sup>-</sup></b>		<b>Ur</b>		<b>Cr</b>	<b>Glucose</b>
<b>Ca<sup>2+</sup></b>		<b>Mg<sup>2+</sup></b>		<b>PO<sub>4</sub><sup>-</sup></b>					
<b>Expected Outcomes:</b>									
<b>Participants should:</b>	<ul style="list-style-type: none"> <li>Remove all peanuts</li> <li>100% O<sub>2</sub></li> <li>Clinical examination</li> <li>Should give I.M. adrenaline 300 mcg (repeat at 5 mins if no improvement)</li> <li>Could give chlorpheniramine 2.5-5.0 mg I.M.</li> <li>Could give hydrocortisone 50mg I.M. or slow I.V.</li> <li>If I.V. adrenaline delivered it should be given slowly: rapid push leads to tachyarrhythmia and subsequent deterioration after 2-3 minutes</li> </ul>								
<b>Facilitators should:</b>	<p>Emphasise wheeze and urticaria if not appreciated Encourage IM injection into IM pad attached to manekin</p> <p>If management appropriate move to <b>State Resolving Anaphylaxis</b></p> <p>If management suboptimal move to <b>State Moderate Anaphylaxis</b></p>								



<b>Name of State</b>		<b>Resolving Anaphylaxis</b>				<b>Duration</b>			
<b>Vital Signs</b>									
<b>Rhythm</b>	SR	<b>HR</b>	100	<b>SBP</b>	95	<b>DBP</b>	42	<b>CVP</b>	
<b>Resp Rate</b>	20	<b>SaO<sub>2</sub></b>	99	<b>ETCO<sub>2</sub></b>		<b>Temp</b>	36	<b>Other</b>	
<b>AVPU</b>	A	<b>GCS</b>	15	<b>Pupils</b>	3 ERL	<b>ICP</b>		<b>NIRS</b>	
<b>Assessment</b>									
<b>Periph Pulses</b>	normal		<b>Cap refill</b>	2		<b>Skin</b>			
<b>ECG/Heart</b>	normal heart sounds								
<b>Airway</b>	clear			<b>Breathing</b>	normal				
<b>Air entry</b>	good			<b>Breath sounds</b>	no wheeze				
<b>WOB</b>	normal			<b>Recession</b>	nil				
<b>Neuro</b>	Alert			<b>Renal</b>			<b>Hepatic</b>		
<b>Other</b>									
<b>Results</b>									
<b>Hb</b>		<b>WCC</b>		<b>PLT</b>		<b>HCT</b>		<b>CRP</b>	
<b>PH/ H+</b>		<b>PaCO<sub>2</sub></b>		<b>PaO<sub>2</sub></b>		<b>HCO<sub>3</sub></b>		<b>BE</b>	<b>Lactate</b>
<b>Na<sup>2+</sup></b>		<b>K<sup>+</sup></b>		<b>Cl<sup>-</sup></b>		<b>Ur</b>		<b>Cr</b>	<b>Glucose</b>
<b>Ca<sup>2+</sup></b>		<b>Mg<sup>2+</sup></b>		<b>PO<sub>4</sub><sup>-</sup></b>					
<b>Expected Outcomes:</b>									
<b>Participants should:</b>	<p>Discuss further management of the child:</p> <ul style="list-style-type: none"> <li>• Observe the child for 2 hours. If he is well he can then be discharged.</li> <li>• Discharge home with appropriate emergency medication including Epipen, which the family must have been taught how to use using the Trainer Epipen (demonstration).</li> <li>• Give peanut allergy information sheet and advise family to avoid both peanut and tree nuts.</li> <li>• Give Medalert identity bracelet leaflet.</li> <li>• Arrange outpatient follow up. Suggest repeat skin prick testing in the young adult clinic after the age of 18.</li> </ul>								
<b>Facilitators should:</b>	Ask candidate to make management plan and discuss elements not addressed.								





<b>Name of State</b>		Moderate Anaphylaxis				<b>Duration</b>			
<b>Vital Signs</b>									
<b>Rhythm</b>	SR	<b>HR</b>	140	<b>SBP</b>	70	<b>DBP</b>	30	<b>CVP</b>	
<b>Resp Rate</b>	30	<b>SaO<sub>2</sub></b>	90	<b>ETCO<sub>2</sub></b>		<b>Temp</b>	37	<b>Other</b>	
<b>AVPU</b>	A	<b>GCS</b>	15	<b>Pupils</b>	3 ERL	<b>ICP</b>		<b>NIRS</b>	
<b>Assessment</b>									
<b>Periph Pulses</b>	weak		<b>Cap refill</b>	3 - 4		<b>Skin</b>	cool peripheries		
<b>ECG/Heart</b>	Normal heart sounds								
<b>Airway</b>	clear			<b>Breathing</b>	prolonged expiration				
<b>Air entry</b>	good			<b>Breath sounds</b>	moderate wheeze				
<b>WOB</b>	increased			<b>Recession</b>	subcostal				
<b>Neuro</b>	alert			<b>Renal</b>			<b>Hepatic</b>		
<b>Other</b>									
<b>Results</b>									
<b>Hb</b>		<b>WCC</b>		<b>PLT</b>		<b>HCT</b>		<b>CRP</b>	
<b>PH/ H+</b>		<b>PaCO<sub>2</sub></b>		<b>PaO<sub>2</sub></b>		<b>HCO<sub>3</sub></b>		<b>BE</b>	
<b>Na<sup>2+</sup></b>		<b>K<sup>+</sup></b>		<b>Cl<sup>-</sup></b>		<b>Ur</b>		<b>Cr</b>	
<b>Ca<sup>2+</sup></b>		<b>Mg<sup>2+</sup></b>		<b>PO<sub>4</sub><sup>-</sup></b>					
<b>Expected Outcomes:</b>									
<b>Participants should:</b>	<ul style="list-style-type: none"> <li>• Continue O2</li> <li>• Senior &amp; Anaesthetic assistance</li> <li>• Should give I.M. adrenaline 300 mcg (if not given already).</li> <li>• 20 ml/kg I.V. preferred fluids</li> <li>• If I.V. adrenaline delivered it should be given slowly: rapid push leads to tachyarrhythmia <b>and subsequent deterioration after 2-3 minutes</b></li> </ul>								
<b>Facilitators should:</b>	<p>If management remains suboptimal then use pause scenario and use Pause and Perfect principle to help candidate understand current state and treatment required before restarting scenario and allowing them to instigate management.</p>								



## Educational Material:

Anaphylaxis is relatively rare but by its nature occurs suddenly and unpredictably. It may rapidly lead to death due to airway compromise or distributive shock. The commonest precipitants are foods, latex, hymenoptera (wasps and bees) and medically administered drugs. Antibiotics account for 8% of drug-induced anaphylactic reactions.

In terms of presentation the table below gives the incidences of the clinical findings (from Whittington T and Fisher MM. Anaphylactic and anaphylactoid reactions in Balliere's Clinical Anesthesiology 1998 Vol 12 2 301-321).

Feature	No. of Patients
No Pulse	153
Difficult to inflate lungs	140
Flush	107
Desaturation	63
Cough	40
Rash	25
ECG abnormal	13
Urticaria	11
Subjective	9
Swelling	7
No bleeding	2
Other	19
<b>Total</b>	<b>589</b>

### Management

There are several anaphylaxis treatment guidelines available. Parenteral adrenaline is the cornerstone of treatment. The Resuscitation Council UK has recently revised their guidelines (Emergency Medical Treatment of Anaphylactic Reactions. Available at <http://www.resus.org.uk/pages/reaction.htm>)

More information for families and healthcare professionals is also available at: <http://www.anaphylaxis.org.uk>