

ANAPHYLAXIS

MODULE: INFECTION, IMMUNOLOGY AND ALLERGY

TARGET: ALL PAEDIATRIC TRAINEES, NURSING STAFF3

BACKGROUND:

Anaphylaxis is a medical emergency, but trainees may not encounter patients with true anaphylaxis before they are the senior paediatric doctor in a department. It is therefore vital that they gain experience through simulation training in how to safely manage these patients.

Recognition of anaphylaxis not usually challenging, but it is important to give the correct treatment in a timely fashion to prevent further deterioration.

INFORMATION FOR FACULTY

LEARNING OBJECTIVES

At the end of the session participants 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

SCENE SETTING

Location:	Children's Daycare Ward		
Expected duration of scenario:	15 mins	Expected duration of debriefing:	30 mins

EQUIPMENT AND CONSUMABLES

Mannequin (child)
 IV cannula and sticker fixation
 (in place on mannequin on R hand)
 Monitoring
 Resuscitation trolley
 O₂ facemask
 Bag and mask
 Drug chart
 Obs chart
 0.9% saline bag
 0.9% saline ampoule for nebulisation
 Adrenaline 1:1000, 0.3ml
 Chlorpheniramine 2.5-5mg
 Salbutamol neb 5mg
 SORT Emergency drug chart
 (if requested – see Appendix 1)

PERSONNEL-IN-SCENARIO

1 x ST1-3 trainee *or* 1 x ST4-8 trainee
 1 x Nurse (faculty or participant)
 1 x Mother (faculty)

ADDITIONAL INFORMATION

Callum is a 6 year old boy is admitted to the paediatric daycare 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.

Callum has developed anaphylaxis and will progress to anaphylactic shock unless treatment instigated. If not recognised or treatment suboptimal, pause scenario and reassess with participant before asking them to instigate strategies.

PARTICIPANT BRIEFING

Callum is a 6-year-old boy and was admitted to the paediatric daycare 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. His nurse has called you to assess him because she is worried about him.

FACULTY BRIEFING**'VOICE OF THE MANIKIN' BRIEFING**

If questioned, you are worried because your throat feels prickly and your skin is itching. You have mild wheeze (which progresses if treatment not timely/appropriate).

IN-SCENARIO PERSONNEL BRIEFING (CALLUM'S MOTHER)

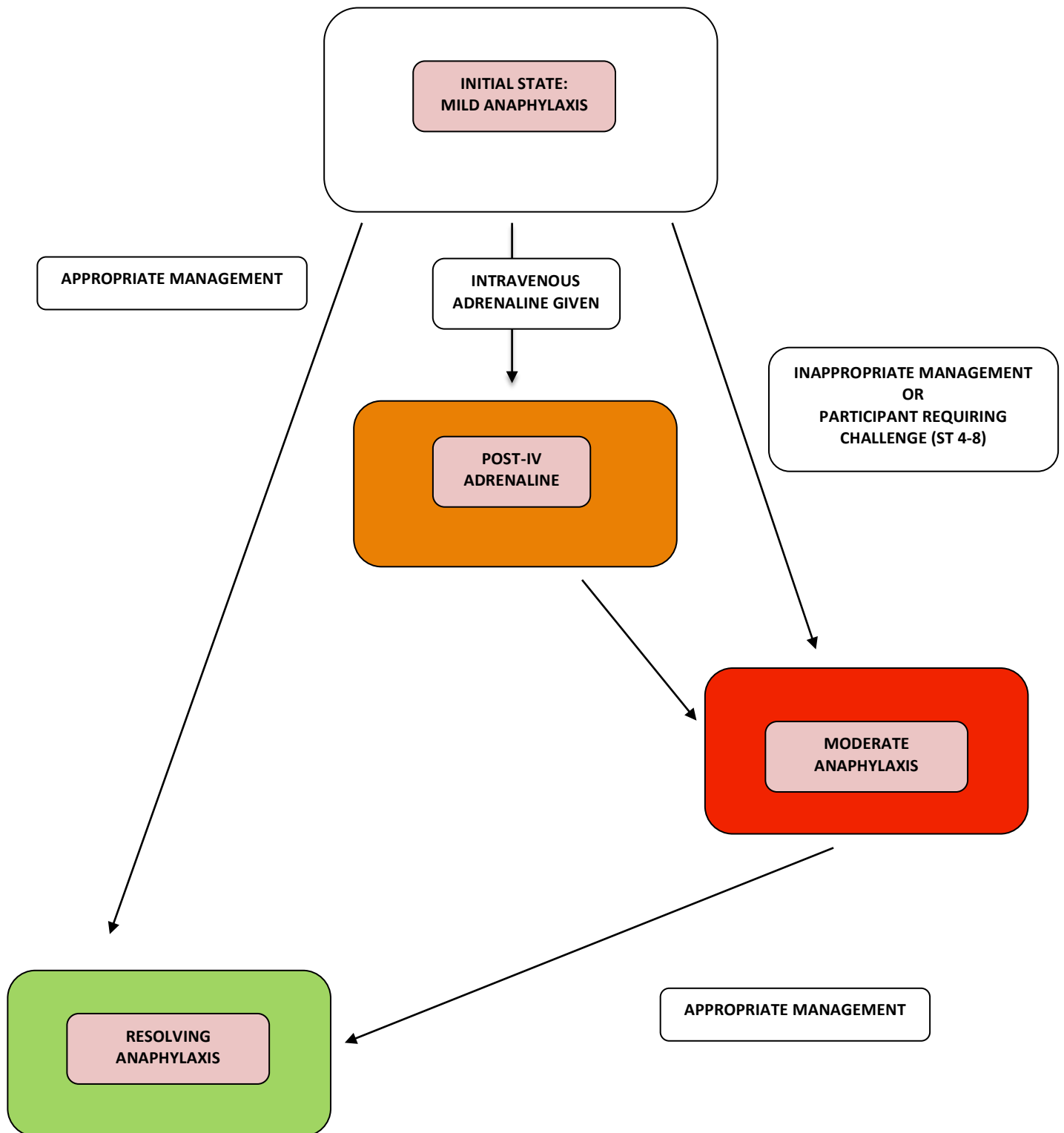
You have brought 6-year-old Callum to the paediatric daycare ward for a peanut challenge. After eating the peanuts he has told you that his throat feels funny and you have noticed a rash on his skin. You are worried he is having an allergic reaction to the peanuts.

If participant treats anaphylaxis correctly, prompt them by asking questions about what will happen next – can you go home tonight? Does he need an epipen? Can he eat other nuts?

IN-SCENARIO PERSONNEL BRIEFING (IF FACULTY AS NURSE)

6-year-old Callum has informed you that his throat feels funny and he feels itchy. You have noticed urticarial rash over face and trunk. You have started observations including blood pressure and called SHO to assess Callum. Callum weighs 20kg.

CONDUCT OF SCENARIO



BASELINE STATE: MILD ANAPHYLAXIS

VITAL SIGNS					
Rhythm	SR	HR	125	BP	80/35
Resp rate	32	SaO ₂	92%	ETCO ₂	
Temp	36.5	AVPU	A	Pupils	ERL
Other					
ASSESSMENT					
Pulses	Normal	Cap refill	2 sec	Skin	Urticaria
Airway	Maintained	Breathing	Normal	Breath sounds	Mild wheeze
Work of breathing	Normal	Recession	None	Neuro	Alert
Other	Mannequin wearing pyjamas; ID bracelet with weight 20kg Urticaria on face and chest IM injection pad on R thigh (if available)				
EXPECTED OUTCOMES					
Participants should:	<ol style="list-style-type: none"> 1. Remove all peanuts 2. 100% O₂ 3. Full clinical examination (expose skin) 4. Give IM adrenaline 300mcg (repeat at 5 mins if no improvement) 5. Give chlorphenamine 2.5-5mg IM 6. Could give salbutamol neb 5mg 7. Could give hydrocortisone 50mg IM or slow IV 				
Facilitators should:	<p><u>Provide further information if requested:</u></p> <ul style="list-style-type: none"> - Wheeze and urticaria over face and chest - No facial/tongue swelling - If IM pad attached, encourage participant that they can use this <p><u>Progression:</u></p> <ul style="list-style-type: none"> - If managed well patient does not deteriorate. Progress to 'Resolving Anaphylaxis' - If IV adrenaline give, patient has transient tachycardia and then subsequent deterioration Progress to 'Post-IV Adrenaline' - If suboptimal management (or if ST4-8 requiring increased difficulty to challenge participant), patient deteriorates. Progress to 'Moderate Anaphylaxis' 				

STATE: RESOLVING ANAPHYLAXIS

VITAL SIGNS					
Rhythm	SR	HR	100	BP	95/42
Resp rate	20	SaO ₂	99%	ETCO ₂	
Temp	36	AVPU	A	Pupils	ERL
Other					
ASSESSMENT					
Pulses	Normal	Cap refill	2 sec	Skin	Resolving urticaria
Airway	Maintained	Breathing	Normal	Breath sounds	No wheeze
Work of breathing	Normal	Recession	None	Neuro	Alert
Other					
EXPECTED OUTCOMES					
Participants should:	Recognise improvement in Callum Discuss further management (see debrief) Prudent to give chlorpheniramine and steroid to prevent subsequent deterioration.				
Facilitators should:	Ask participant to make management plan and address elements not addressed (see debrief)				

STATE: POST-IV ADRENALINE

VITAL SIGNS					
Rhythm	SR	HR	180	BP	88/55
Resp rate	34	SaO ₂	98%	ETCO ₂	
Temp	36.5	AVPU	A	Pupils	ERL
Other					
ASSESSMENT					
Pulses	Normal	Cap refill	2 sec	Skin	Urticaria
Airway	Maintained	Breathing	Normal	Breath sounds	No wheeze
Work of breathing	Normal	Recession	None	Neuro	Anxious++
Other	Wheeze improved, but after 2-3 minutes deteriorates into moderate anaphylaxis. Patient feeling anxious++, tachycardic				
EXPECTED OUTCOMES					
Participants should:	<ol style="list-style-type: none"> 1. Recognise transient improvement in O₂ sats and wheeze, but note tachycardia secondary to intravenous adrenaline 2. Be aware that intravenous adrenaline has short duration of action and patient can be expected to deteriorate later 				
Facilitators should:	<p><u>Provide further information if requested:</u></p> <ul style="list-style-type: none"> - Wheeze improved temporarily <p><u>Progression:</u></p> <ul style="list-style-type: none"> - After 2-3 minutes patient begins to deteriorate. Progress to 'Moderate Anaphylaxis' - If participant continues to give fast pushes of IV adrenaline, use 'pause and perfect' principle to help participant understand current state and treatment options, before restarting scenario and allowing them to instigate appropriate management. 				

STATE: MODERATE ANAPHYLAXIS

VITAL SIGNS					
Rhythm	SR	HR	140	BP	70/30
Resp rate	30	SaO ₂	90%	ETCO ₂	
Temp	36.5	AVPU	A	Pupils	ERL
Other					
ASSESSMENT					
Pulses	Weaker	Cap refill	3-4 seconds	Skin	Urticaria Cool skin
Airway	Maintained	Breathing	Prolonged expiration	Breath sounds	Moderate wheeze
Work of breathing	Increased	Recession	Subcostal	Neuro	Alert
Other					
EXPECTED OUTCOMES					
Participants should:	<ol style="list-style-type: none"> 1. Recognise deterioration in sats and cap refill 2. Request senior +/- anaesthetic assistance 3. Give IM adrenaline 300mcg 4. 20ml/kg IV 0.9% saline as poor perfusion 				
Facilitators should:	<p><u>Provide further information if requested:</u></p> <ul style="list-style-type: none"> - Capillary refill 3-4 seconds - Cool peripheries with weaker peripheral pulses - Moderate wheeze with prolonged expiration <p><u>Progression:</u></p> <ul style="list-style-type: none"> - If appropriate management, patient improves. Progress to 'Resolving Anaphylaxis'. - If IV adrenaline given it should be given slowly; rapid push leads to tachyarrhythmia and subsequent deterioration after 2-3 minutes. Progress to 'Post-IV Adrenaline' then back to 'Moderate Anaphylaxis' - If any other suboptimal management, use 'pause and perfect' principle to help participant understand current state and treatment options, before restarting scenario and allowing them to instigate appropriate management. 				

APPENDIX 1 – EMERGENCY DRUG CALCULATOR

Date Jan 9, 2013

**Southampton
Oxford
Retrieval
Team**

DRUG CALCULATOR

WEIGHT 20 Kg

Enter weight and click calculate

Calculate
Print

<p>Emergency</p> <p>Adrenaline 1:10,000 2 ml (0.1 ml/kg)</p> <p>Atropine 600mcg/ml 0.67 ml (20mcg/kg, min 100mcg)</p> <p>Atropine 100mcg/ml 4 ml (20mcg/kg min 100mcg)</p> <p>Sodium Bicarbonate 8.4% 20 ml (1 ml/kg)</p> <p>Calcium Gluconate 10% 10 ml (0.5 ml/kg)</p> <p>Cardiac</p> <p>Cardioversion (sync) 20 Joules (1J/kg) (use 2J/kg if fails)</p> <p>Shockable rhythm (async) 80 Joules (4J/kg)</p> <p>Adenosine 2000 mcg (100 mcg/kg)</p> <p>Amlodarone Load 100 mg (5 mg/kg over 30 minutes to 4hrs)</p> <p>Neuro</p> <p>Lorazepam 2 mg (0.1 mg/kg)</p> <p>Midazolam Buccal 2 mg (0.1 mg/kg)</p> <p>Phenytoin 400 mg (20 mg/kg over 20 minutes)</p> <p>Phenobarbitone 400 mg (20 mg/kg)</p> <p>Paraldehyde PR 8 ml (0.4 ml/kg, mix 1:1 with oil)</p> <p>3% Saline 60 ml (3ml/kg)</p> <p>Mannitol 10% 100 ml (5ml/kg, eqvalent to 0.5g/kg)</p>	<p>Respiratory</p> <p>Magnesium Sulphate 800 mg (40 mg/kg over 20 minutes)</p> <p>Salbutamol load 250 mcg (15 mcg/kg over 10 minutes)</p> <p>Hydrocortisone 80 mg (4 mg/kg, max 100mg)</p> <p>Aminophylline load 100 mg (5 mg/kg over 20 minutes)</p> <p>Adrenaline 1:1000 Nebulised 5 ml (0.5 ml/kg, max 5 mls) Make up to 5 ml with saline</p> <p>Anaesthesia</p> <p>Ketamine 40 mg (2mg/kg)</p> <p>Thiopentone 20 to 100 mg (1-5mg/kg)</p> <p>Fentanyl 40 to 100 mcg (2-5mcg/kg)</p> <p>Morphine 2 mg (0.1 mg/kg)</p> <p>Rocuronium 20 mg (1mg/kg)</p> <p>Atracurium 10 mg (0.5mg/kg)</p> <p>Vecuronium 2 mg (0.1mg/kg)</p> <p>Suxamethonium 30 mg (1.5mg/kg)</p> <p>Anaphylaxis</p> <p>Adrenaline IM 0.3 ml of 1:1000</p>
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Infusions	Calculations based on Southampton PICU infusions guidelines (2011)		
Dopamine (central)	200 mg in 50ml of 0.9% Saline or 5% Glucose	3 ml / hr =	10 mcg/kg/min
Dopamine (peripheral)	20 mg in 50ml of 0.9% Saline or 5% Glucose	3 ml / hr =	1 mcg/kg/min
Adrenaline	4 mg in 50ml of 0.9% Saline or 5% Glucose	1.5 ml / hr =	0.1 mcg/kg/min
Noradrenaline	4 mg in 50ml of 0.9% Saline or 5% Glucose	1.5 ml / hr =	0.1 mcg/kg/min
Milrinone	10 mg in 50ml of 0.9% Saline or 5% Glucose	3 ml / hr =	0.5 mcg/kg/min
Dinoprostone (Prostin E2)	0 mcg in 50ml of 0.9% Saline or 5% Glucose	0 ml / hr =	0 ng/kg/min
Morphine	20 mg in 50ml of 0.9% Saline or 5% Glucose	1 ml / hr =	20 mcg/kg/hr
Midazolam	20 mg in 50ml of 0.9% Saline or 5% Glucose	1 ml / hr =	20 mcg/kg/hr
Salbutamol	10 mg in 50ml of 0.9% Saline or 5% Glucose	6 ml / hr =	1 mcg/kg/min
Aminophylline	250 mg in 250ml of 0.9% Saline or 5% Glucose	20 ml / hr =	1 mg/kg/hr

It is the prescribers responsibility to ensure the correct dose is prescribed Compiled by Tom Bennett - May 2012



DEBRIEFING

POINTS FOR FURTHER DISCUSSION

- After appropriate treatment of anaphylaxis, what are the next steps for discharge and the future?
 1. Observe the child for minimum 2 hours. If he is well, can be discharged home
 2. Needs to have emergency medication at home including Epipen with instruction for mother and child on how to use
 3. Give information sheet on peanut allergy and on Medalert identity bracelet
 4. Advise to avoid peanuts and tree nuts
 5. Arrange outpatient clinic

- Resuscitation Council UK suggest age-based doses:

Age	Adrenaline	Chlorphenamine	Hydrocortisone
Adult or child >12 years	500 micrograms IM (0.5ml)	10mg	200mg
Child 6-12 years	500 micrograms IM (0.5ml)	5mg	100mg
Child 6 months – 6 years	300 micrograms IM (0.3ml)	2.5mg	50mg
Baby <6 months	150 micrograms IM (0.15ml)	250 mcg/kg	25mg

DEBRIEFING RESOURCES

The Resuscitation Council UK's guidelines are available with useful background information:

<http://www.resus.org.uk/pages/reaction.pdf>

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

ANAPHYLAXIS - HANDOUT

INFORMATION FOR PARTICIPANTS

KEY POINTS

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 findings¹ (WhittingtonT 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
Total	589

Management

There are several anaphylaxis treatment guidelines available. Parenteral adrenaline (preferably IM) is the cornerstone of treatment.

FURTHER RESOURCES

The Resuscitation Council UK's guidelines are available with useful background information:

<http://www.resus.org.uk/pages/reaction.pdf>

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

RELEVANT AREAS OF THE CURRICULUM
Level One

L1_GEN_STA_02	Effective responses to challenge, complexity and stress in paediatrics
L1_GEN_STA_03	Advanced neonatal and paediatric life support skills
L1_GEN_STA_05	Effective skills in paediatric assessment
L1_GEN_STA_06	Skills in formulating an appropriate differential diagnosis in paediatrics
L1_GEN_STA_07	Effective initial management of ill-health and clinical conditions in paediatrics seeking additional advice and opinion as appropriate
L1_GEN_STA_09	Safe practical skills in paediatrics
L1_GEN_STA_15	Knowledge of common and serious paediatric conditions and their management
L1_GEN_STA_29	Effective communication and interpersonal skills with colleagues
L1_GEN_STA_30	Professional respect for the contribution of colleagues in a range of roles in paediatric practice
L1_GEN_STA_32	Effective handover, referral and discharge procedures in paediatrics
L1_GEN_STA_34	Ethical personal and professional practice in providing safe clinical care
L1_GEN_STA_35	Reliability and responsibility in ensuring their accessibility to colleagues and patients and their families
PAED_L1_IMMUNO_ACU_ANA_01	Know the management of anaphylaxis guidelines
PAED_L1_IMMUNO_ACU_ANA_02	Be able to lead the team when initiating resuscitation and treatment
PAED_L1_IMMUNO_ACU_ANA_03	Be able to liaise with anaesthetic and PICU staff

Level Two (as above plus):

L2_GEN_STA_02	Increasing credibility and independence in response to challenge and stress in paediatrics
L2_GEN_STA_03	Leadership skills in advanced neonatal and paediatric life support
L2_GEN_STA_04	Responsibility for conducting effective paediatric assessments and interpreting findings appropriately
L2_GEN_STA_06	Improving skills in formulating an appropriate differential diagnosis in paediatrics
L2_GEN_STA_09	Effective skills in performing and supervising practical procedures in paediatrics ensuring patient safety
L2_GEN_STA_15	Extended knowledge of common and serious paediatric conditions and their management
L2_GEN_STA_29	Skills in ensuring effective relationships between colleagues
L2_GEN_STA_32	Effective skills in ensuring handover, referral and discharge procedures in paediatrics
L2_GEN_STA_34	Sound ethical/personal/professional practice in providing safe care
L2_GEN_STA_35	Continued responsibility and accessibility to colleagues, patients and

	their families
PAED_L2_IMMUNO_ACU_ANA_01	Be able to lead the team to provide advanced life support in anaphylaxis

Level Three (as above plus):

L3_GEN_STA_02	Responsibility for an effective response to complex challenges and stress in paediatrics
L2_GEN_STA_03	Leadership skills in advanced neonatal and paediatric life support
L3_GEN_STA_04	Commitment to focussed and analytic assessments of common and complex clinical problems in paediatrics
L3_GEN_STA_06	Effective skills in making safe decisions about the most likely diagnoses in paediatrics
L3_GEN_STA_07	Leadership skills in the management of common and complex conditions in general paediatrics and paediatric subspecialties seeking additional advice and opinion as appropriate
L3_GEN_STA_09	Expertise in a range of practical procedures in paediatrics specific to general and sub-specialist training
L3_GEN_STA_15	Detailed knowledge of common and serious paediatric conditions and their management in General Paediatrics or in a paediatric sub-specialty
L3_GEN_STA_29	Positive and constructive relationships form a wide range of professional contexts
L3_GEN_STA_32	Effective leadership skills in the organisation of paediatric team-working and effective handover
L3_GEN_STA_34	Exemplary professional conduct so as to act as a role model to others in providing safe clinical care
L3_GEN_STA_35	Responsibility for ensuring their own reliability and accessibility and that of others in their team

PARTICIPANT REFLECTION

What have you learned from this experience? (Please try and list 3 things)

How will your practice now change?

What other actions will you now take to meet any identified learning needs?

PARTICIPANT FEEDBACK

Date of training session:.....

Profession and grade:.....
.....

What role(s) did you play in the scenario? (Please tick)

Primary/Initial Participant	<input type="checkbox"/>
Secondary Participant (e.g. 'Call for Help' responder)	<input type="checkbox"/>
Other health care professional (e.g. nurse/ODP)	<input type="checkbox"/>
Other role (please specify):	<input type="checkbox"/>
Observer	<input type="checkbox"/>

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
I found this scenario useful					
I understand more about the scenario subject					
I have more confidence to deal with this scenario					
The material covered was relevant to me					

Please write down one thing you have learned today, and that you will use in your clinical practice.

How could this scenario be improved for future participants? This is especially important if you have ticked anything in the disagree/strongly disagree box.

FACULTY DEBRIEF – TO BE COMPLETED BY FACULTY TEAM

What went particularly well during this scenario?

What did not go well, or as well as planned?

Why didn't it go well?

How could the scenario be improved for future participants?