Paediatric 6 year old sepsis management scenario

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Description

6 year old presenting generally unwell to ED brought in by parent. Has been back and forward to GP and Walk in Centre over the last week. Now tachycardic and hypovolaemic with pyrexia of 39 and is obviously septic. The patient will continue to deteriorate, needing advanced airway management and intubation due to reducing GCS and fluid requirements. Patient has fluid resistant shock, so will need inotropic support following initial fluid resuscitation.
The Emergency department team should escalate treatment early, both within the hospital to anaesthetics/ITU and to their local PICU/paediatric retrieval service.

Learner Group Needs and Assessment

Learner Group	Learner Needs
Triage nurse	Ato E triage assessment Recognition of septic child Appropriate escalation and triage score Knowledge of paediatric sepsis 6 screening tool
Nurse in charge/ shift coordinator	Recognition of sick child Appropriate allocation to area (resus) Escalation and handover
Paediatric team	Assessment and management of septic child Stabilisation Arranging transfer to PICU
Senior ED medic	Initial assessment and management Referral to Paeds Referral to anaesthetics Referral to PICU
Resuscitation nurses	Sepsis 6 Observations Fluids Antibiotic preparation

Learning Objectives and Delivery Methods

Objective Type	Description	Delivery Method(s)
Nursing	See learner needs As stand alone sim not needing elearning and classroom but for transport course development lectures/pre reading	E-Learning; Classroom; Simulation; Point of Care
Medical	See learning needs above	E-Learning; Classroom; Simulation; Point of Care

Faculty Script

Oliver Smith, a 6 year old boy presents to ED referred by GP with 1/52 history of generally unwell, now drowsy, febrile, vomiting ?Gastroeneteritis. Accompanied by mum

PMH NKDA, imms UTD

Now tachycardic and hypovolaemic with pyrexia of 39 and is obviously septic. The patient will continue to deteriorate, needing advanced airway management and intubation due to reducing GCS and fluid requirements. Patient has fluid resistant shock, so will need inotropic support following initial fluid resuscitation.

The Emergency department team should escalate treatment early, both within the hospital to anaesthetics/ITU and to their local PICU/paediatric retrieval service.

When rash is found, confirm type

Patient Demographics and Candidate Brief

Oliver Smith, Male, 20kg

Presenting History (Candidate Storyboard)

Oliver is a 6 year old boy, youngest of 3 siblings. bought to ED by mum via GP. Previously fit and well up to date with all immunisations.

Over the last 24 hours he has been generally unwell and been back to GP twice as he had not been improving, GP felt that it was probably viral. This morning he is drowsy and mum is now very concerned.

Previous Medical History

No previous medical history

Scenario Setup

Recommended Faculty

Director √	Control √	Other √
Other:	Facilitator in simultior to assist with fidelity	
Actor Roles:	Actor to play role of parent. Concerned and slightly irritated that GP kept sending them away. Is quite vocal but not disruptive, is on phone texting. Rest of the family are well, no coughs and colds. Dad / mother works away only back at weekends. Older children Jenny aged 10, Milo aged 8, currently at school.	

Scenario Setup: Participants

Medical Roles	A/E Registrar, A/E Consultant, Anaesethetic Registrar, Paediatric Registrar
Nursing Roles	Triage nurse, resus nurse, paediatric nurse, A/E charge nurse
AHP Roles	Radiographer for x-ray (?mobile)
Other Roles	health care assistant or support worker

Other Details

This scenario is NOT based on a real case	Location	Emergency Department (local, may not be paeds department)
	Simulator	paediatric mannequin (i.e. Sim Junior, Paeds HAL, other)
	Monitor Setup	initially no monitoring, sats probe, 3 lead ECG, cuff BP, respiratory rate added quickly

Monitor Parameters Required

√ ECG	√ SaO2	√ RR	√ EtCO2	√ NIBP	√ ABP
√ CVP	√ Temp(P)	√ Temp(C)			

Equipment Checklists

Respiratory

√ Nasal Cannula	√ Suction	√ O2 Facemask	√ Yankeur	√ Ayers T Piece
√ Suction Catheter				

√ Self-inflating bag	√ Oropharyngeal Airway	√ O2 Reservoir Facemask

ETT Position : Nasal

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Equipment Checklist: Vascular Access

Line Type	Guage Type	Site	Other Comments
Central Venous		yes	
Arterial		yes	
Intraosseous		yes	
Peripheral		yes - cannula	

Other Medical Equipment

Drug Chart: √	Emergency Drug Sheet: √	Blood Results Sheet: √

IV Fluids

Fluids Running	Fluids Available 1	Fluids Available 2	Fluids Available 3	Other Fluids
0.9% Saline	Fresh Frozen Plasma	Packcells	Gelofusin	Dextrose

Medications

Infusions	Dose	Running Rate
Available Continuous Infusion	Dopamine (15mg/kg)	1ml/hr = 5mcg/kg/min
Available Continuous Infusion	Adrenaline (0.3mg/kg)	1ml/hr = 0.1mcg/kg/min
Available Continuous Infusion	Morphine (1mg/kg)	1ml/hr = 20mcg/kg/hr
Available Continuous Infusion	Midazolam (5mg/kg)	1ml = 100mcg/kg/hr
Available Continuous Infusion	Rocuronium (neat)	1ml/hr = 400mcg/kg/hr
Available Continuous Infusion	Noradrenaline	0.1-1mcg/kg/min
Available Loading Dose	10% Dextrose	2mls/kg

Bolus Drugs	Dose
Ceftriaxone	1.6g
Paracetamol	350mg
Adrenaline (1:10000)	2ml
Atropine	400mcg (20mcg/kg)
Fentanyl	100mcg (5mcg/kg)
Rocuronium	12mg (600mcg/kg)

Moulage

Effect Needed

purpuric non-blanching rash on upper thigh

(can use: lipstick, stained liquid such as pink-stained chlorhexidine, moulage makeup or fake blood - sponge or gauze to create "scratchy" look)

*ideally use non-staining materials, alternatively clean mannequin quickly!

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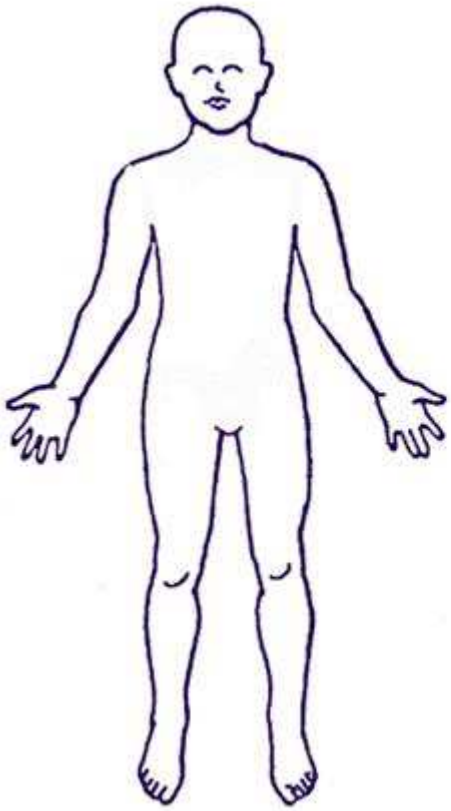
Diagram



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Scenario State 1

Initial presentation
(Transition=Fluid boluses given)

Vital Signs

Rhythm: sinus	HR: 174	SBP: 85	DBP: 54
Resp Rate: 42	SaO2: 92	Temp: 39.2	AVPU: V
GCS: 12	Pupils: Equal and reactive		

Assessment

Periph Pulses: weak	Cap Refil(s): 4
Skin: cold, mottled	ECG/Heart: sinus tachycardia

Airway: Patent	Breathing: tachypnoea
Air Entry: Equal	Breath Sounds: Clear
WOB: Normal	Recession: None

Neuro: Drowsy

Results

Hb: 100	WCC: 26.4	PLT: 89	HCT: 48	CRP: 187
PH: 7.28	$PaCo_2$(mmHg/Kpa): 3.2	PaO_2(mmHg/Kpa): 5.8	HCO_3: 18	BE: -12
Lactate: 4.2	Na_{2+}: 138	K+: 4.2	Cl-: 110	Ur: 5.6
Cr: 24	Glucose: 2.4	Other: Lactate 4.2		

Physiological Trends

As O2 given, increase O2 sats to 94 If IV fluid bolus given, transient improvement in BP before progression state

Expected Outcomes

Participants should	Facilitators should
Recognise acute deterioration and consider differential diagnoses including Sepsis 6 Recognise signs of shock – hypotension, tachycardia, altered level of consciousness Administer high flow oxygen by non-breathe mask Obtain intravenous access and if not successful progress to io insertion Request bloods including venous blood gas, FBC, U&Es, CRP, LFTS, Blood culture	Once fluid bolus given, move to prgression state; if fluid boluses not given, or inadequate fluid given, prgress to deterioration.

Administer a fluid bolus 20mls/kg 0.9% saline and repeat as needed Administer IV antibiotics Consider the use of early inotropes Consider early escalation of care and retrieval	

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Scenario State 2

Progression - Fluid Boluses Given
(Transition=inotropic support initiated)

Vital Signs

Rhythm: sinus	HR: 163	SBP: 88	DBP: 48
Resp Rate: 48	SaO2: 94	Temp: 38.7	AVPU: P
GCS: 10	Pupils: Equal		

Assessment

Periph Pulses: Weak	Cap Refil(s): 3
Skin: Cold peripherally	ECG/Heart: Sinus Tachycardia

Airway: Patent	Breathing: Normal
Air Entry: Equal	Breath Sounds: Clear
WOB: Tachypnoea	Recession: None

Neuro: Reducing GCS

Results

Hb: 98	WCC: 26	PLT: 42	HCT: 48	CRP: 182
PH: 7.30	$PaCo_2$(mmHg/Kpa): 3.8	PaO_2(mmHg/Kpa): 5.2	HCO_3: 18	BE: -10
Lactate: 3.8	Na_{2+}: 136	K+: 4.3	Cl-: 108	Ur: 5.1
Cr: 24	Glucose: 1.8	Other: Deranged clotting PT Ratio 2.4 Fibrinogen 0.5		

Physiological Trends

Transient increases in BP (systolic) but fluid-refractory shock is present Inotropic support is required to stabilise patient remains stable throughout intubation if appropriate oxygenation and fluid resuscitation have been given

Expected Outcomes

Participants should	Facilitators should
• Identify fluid resistant shock and the need for further fluid resuscitation with 0.9% saline, 4.5% albumin or packed red blood cells • Identify the need for inotropic support and initiate dopamine centrally via the interosseous access route • Insert a second interosseous line or establish central access and continue fluid resuscitation	Observe candidates' management and choose further progression state.

• Recognise the need for intubation • Prepare and plan for intubation including the consideration of the risks of hypotension on induction of anaesthesia • Avoid the use of propofol and ensure inotropic support prior to intubation to prevent hypotension and decompensation • Continue aggressive fluid resuscitation • Recognise DIC, hypoglycaemia and development of multiorgan failure • Correct hypoglycaemia with dextrose bolus • Request urgent blood products including packed red cells, fresh frozen plasma and cryoprecipitate • Recognise the need for transfer to PICU and coordinate this by contacting the retrieval team.	

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Scenario State 3

Progression - Post inotropic support and intubation (Transition=Discussion with the retrieval team)

Vital Signs

Rhythm: SR	HR: 142	SBP: 100	DBP: 72
Resp Rate: 25	SaO2: 100	ETCO2: 4.4	Temp: 37.8
AVPU: U - intubated	GCS: intubated	Pupils: equal and reactive	

Assessment

Periph Pulses: warm	Cap Refil(s): 2
Skin: meningococcal rash	ECG/Heart: Sinus Rhythm

Airway: intubated	Breathing: ventilated
Air Entry: equal	Breath Sounds: Normal

Results

Hb: 124	WCC: 26	PLT: 88	HCT: 48	CRP: 188
PH: 7.31	$PaCo_2$(mmHg/Kpa): 4.4	PaO_2(mmHg/Kpa): 8.6	HCO_3: 16	BE: -8
Lactate: 2.6	Na_{2+}: 142	K+: 4.8	Cl-: 108	Ur: 8.6
Cr: 76	Glucose: 3.8			

Physiological Trends

oxygenation post-intubation remains stable with safe management of ETT titration of inotropes should be considered along with additional fluid boluses

Expected Outcomes

Participants should	Facilitators should
• Arrange a retrieval to PICU • Consider post stabilisation care including normocapnoea, normoglycaemia, haemodynamic support with inotropes to maintain blood pressure, thermoregulation, correct of coagulopathy with blood products. • Consider meningococcal prophylaxis for contacts including healthcare professionals and family members • Prepare for sudden deterioration and possible cardiac arrest	Prepare to finish scenario and transition to the debrief.

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Scenario State 4

Deterioration - if fluid boluses not given > 40mls/kg or inotropes not commenced
(Transition=)

Vital Signs

Rhythm: SR	HR: 188	SBP: 76	DBP: 48
Resp Rate: 42	SaO2: 92	Temp: 38.7	AVPU: U
GCS: 8	Pupils: equal		

Assessment

Periph Pulses: cold	Cap Refil(s): 5
Skin: meningococcal rash	ECG/Heart: Sinus Tachycardia

Airway: patent	Breathing: shallow, fast
Air Entry: equal	Breath Sounds: normal
WOB: normal	Recession: none

Results

Hb: 98	WCC: 26	PLT: 42	HCT: 48	CRP: 187
PH: 7.24	$PaCo_2$(mmHg/Kpa): 3.2	PaO_2(mmHg/Kpa): 6.2	HCO_3: 14	BE: -18
Lactate: 6.2	Na_{2+}: 142	K+: 4.6	Cl-: 109	Ur: 10.6
Cr: 72	Glucose: 1.8			

Physiological Trends

progressive tachycardia and hypotension further desaturation

Expected Outcomes

Participants should	Facilitators should
• Recognise peri-arrest state and prepare cardiac arrest medication • Recognise the need to commence aggressive fluid resuscitation and commence inotropic support • Escalate for more help	Facilitators may stop/pause the scenario if they feel the candidates are struggling/have misdiagnosed to ensure the learning outcomes are covered

Resources/Materials

Trainer Multi-Media Scenario Support Materials

Item	Description	Link
Blood Gasses	Blood gas for initial state	Blood gas template.doc
Other	Sepsis guidelines	ED-5-11-NICE-Final-1107-1.pdf
Other	initial GP referral letter	GP Practice Referral Letter.docx
Blood Gasses	1 - ABG initial presentation	Blood gas initial presentation.docx
Blood Gasses	2- Blood Gas progression after bolus	Blood gas progression with bolus .docx
Blood Gasses	3 - Blood gas after inotropes	Blood gas after inotropes.docx
Blood Gasses	4 - Blood gas deterioration	Blood gas deterioration.docx
Other	1st ECG rate 150 ish	First ECG-better resolution.png
Radiology Results	nomal chest	Normal chest xray 6 yr old.JPG

Trainer Educational Support Materials

Item	Description	Link
Sim - Other	OSAD tool for a guide to debrieifing and peer review of debriefing	OSAD Assessment Template.doc
Sim - Other	A tool for documenting and categorising latent errors identifed through simulation	Latent Risk Identification Form .docx
Sim - Other	Paediatric intubation checklist	Intubation checklist .pdf
Sim - Director's Template	Facilitator / Directors script	Directors_Script (2).docx
Sim - Scenario Template	Set-up and Run Sheet / Script	ScenarioStateScript-8.docx