

Paediatric 6 year old sepsis management scenario

Created By: Jo Dursley and Caroline Cocking, Kirsty Brown, Kate OLoughlin, Lydia Lofton, Sharon Dempsey

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 ?Gastroenteritis. 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. brought 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 simulator 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, Anaesthetic 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 paed 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 | ✓ SaO ₂ | ✓ RR | ✓ EtCO ₂ | ✓ NIBP | ✓ ABP |
| ✓ CVP | ✓ Temp(P) | ✓ Temp(C) | | | |

Equipment Checklists

Respiratory

| | | | | |
|--------------------|-----------|---------------------------|-----------|-----------------|
| ✓ Nasal Cannula | ✓ Suction | ✓ O ₂ Facemask | ✓ Yankeur | ✓ Ayers T Piece |
| ✓ Suction Catheter | | | | |

| | | |
|----------------------|------------------------|-------------------------------------|
| ✓ Self-inflating bag | ✓ Oropharyngeal Airway | ✓ O ₂ Reservoir Facemask |
|----------------------|------------------------|-------------------------------------|

| |
|----------------------|
| ETT Position : Nasal |
|----------------------|

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

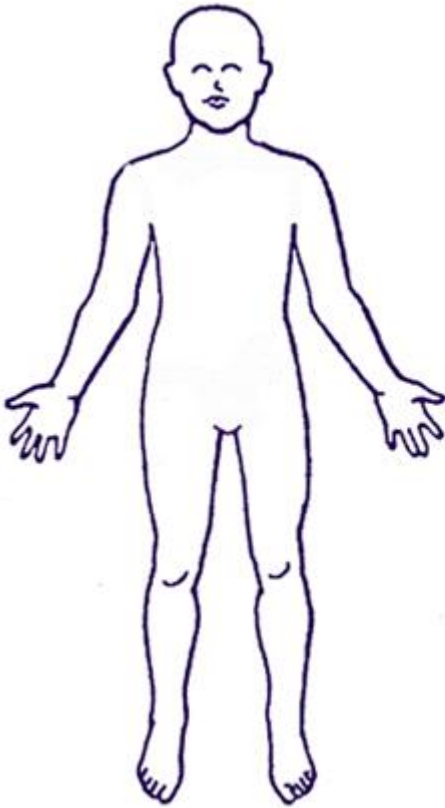
Effect Needed

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!

Diagram



Scenario State 1

Initial presentation

(Transition=Fluid boluses given)

Vital Signs

| | | | |
|---------------|----------------------------|------------|---------|
| Rhythm: sinus | HR: 174 | SBP: 85 | DBP: 54 |
| Resp Rate: 42 | SaO ₂ : 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 | |
|---|--|

Scenario State 2

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

Vital Signs

| | | | |
|---------------|-----------------------|------------|---------|
| Rhythm: sinus | HR: 163 | SBP: 88 | DBP: 48 |
| Resp Rate: 48 | SaO ₂ : 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 |
|---|--|
| <ul style="list-style-type: none"> 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. |

| | |
|--|--|
| <ul style="list-style-type: none"> • 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. | |
|--|--|

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 | SaO ₂ : 100 | ETCO ₂ : 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 |
|---|---|
| <ul style="list-style-type: none"> 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. |

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 | SaO ₂ : 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 |
|---|---|
| <ul style="list-style-type: none"> 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 debriefing and peer review of debriefing | OSAD Assessment Template.doc |
| Sim - Other | A tool for documenting and categorising latent errors identified 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 |