

CARDIAC SIMULATION 6

Simulation focus - PEA following sepsis (BLS Infant – skill)

Expected outcomes

Team Leader - Perform initial ABCDE assessment, direct team and lead care – taking over skills as and when appropriate. Identify the infant is in PEA, initiate BLS and appropriate initial therapies (adrenaline and identify/treat reversible causes – specifically sepsis). Identify need for and summon cardiac arrest team.

Team/More experienced candidate - Identify ongoing need for treatment after ROSC including inotropic support. Discuss with team or in the de-brief. (If no candidate familiar with this issue, then management to be undertaken as group discussion in the debrief).

Assessment

This simulation allows for practise and assessment of infant BLS.

History

Emergency staff

Pre-alert from the paramedics:
Ibrahim is a 9-month-old boy who is being brought in with 48 hours of fever and reduced consciousness.

Ward staff

Ibrahim is a 9-month-old boy who was admitted to hospital for observation after presenting with 48 hours of fever and generally unwell. He has had bloods sent but they are not back. He does not have any IV access. His mother says he is not responding to her.

Immediately apparent

Please ensure the prompt card with global overview is placed on the manikin for the start of the sim.

The infant looks pale, grey and cyanosed. They appear lifeless.

Clinical course (to be given as the simulation progresses)

Assess	Features	Action	Key treatment points
Basic Life Support phase			
A	No response to stimuli Apnoeic (U on AVPU)	Assess, airway opening manoeuvres, gives oxygen	Asks for help/arrest team (ED) Open airway
B	Apnoeic , no sats trace or respiratory effort	Assess – look, listen, feel (and signs of life check)	Recognises arrest and ensures 2222 call put out 5 rescue breaths via BMV
C	No pulse palpable Pale, grey, cyanosed and has cool peripheries.	Starts CPR	Commences CPR in 15:2 ratio
Advanced Life Support – 1st cycle, nurse arrives with arrest trolley and help			
Assess rhythm	PEA – HR 60 once defib pads applied	Apply defib pads	Recognises non-shockable path of algorithm
Basic life support	No signs of life	Ongoing CPR in 15:2 ratio Advanced airways may be considered	Ensures ongoing adequate CPR and ventilation.

		<i>The leader should move away from performing interventions and delegate as appropriate</i>	
Delivers drugs	No IV access	Obtains access Takes gas and bloods	Obtains IV/IO access Ensures adrenaline administered 1ml 1:10,000 Administers fluid bolus
Checks 4 Hs and 4 Ts			
Advanced Life Support – 2nd cycle			
Assess rhythm	PEA – HR 60 no pulse on check		Recognises non-shockable path of algorithm
Basic life support	No signs of life	Ongoing CPR in 15:2 ratio Advanced airways may be considered	Ensures ongoing adequate CPR and ventilation.
Delivers drugs	Single IV/IO access	Considers further access	Administers fluid bolus
Checks 4 Hs and 4 Ts			
Advanced Life Support – 3rd cycle			
Assess rhythm	PEA – HR 60 no pulse on check		Recognises non-shockable path of algorithm
Basic life support	No signs of life	Ongoing CPR in 15:2 ratio Advanced airways may be considered	Ensures ongoing adequate CPR and ventilation.
Delivers drugs	IV access		Ensures adrenaline administered 1ml 1:10,000 Administers fluid bolus
Checks 4 Hs and 4 Ts			
<i>Providing at least one fluid bolus has been given, at the next pulse check the patient will have a sinus rhythm HR of 170 with a pulse present on palpation. This should prompt re-assessment</i>			

Reassessment

Requires 3 cycles of CPR to gain ROSC. Poor blood pressure requiring further fluid resuscitation. Needs inotropic support to maintain circulation. Requires intubation and ventilation.

Candidates should work their way down the list of reversible causes of arrest	
Hyperkalaemia/Hypoglycaemia etc	Gas requested: K 5.1, Na 129, Ca 1.01 Glucose 4.5 81mg/dl
Hypoxia	Ensures adequacy of ventilation on high flow oxygen
Hypothermia	Temp 39.8 on presentation, falling if rechecked as arrest goes on
Hypovolaemia	Must give at least one fluid bolus prior to ROSC
Tamponade Thrombus Toxins	No history suggestive of these
Tension pneumothorax	Good bilateral air entry

Assess	Features	Action	Key treatment points
A	Requires ongoing airway support	Assess Consider oral airway initially, moving on to intubation if not I&V during arrest	Airway adjuncts acceptable initially but needs ETT
B	Apnoeic requiring ventilation. On ROSC , has poor trace and difficult to get saturations until at least 20 ml/kg given, then SpO₂ 90% in 100% O ₂	Assess including auscultation and SpO ₂	High flow oxygen, ventilate via BMV
C	Pulse present but weak, HR 170, CRT 5, BP 52/27	Takes bloods and blood cultures if not already performed. May repeat gas	IV fluid bolus Recognises possible need for inotropic support if not fluid responsive
D	U on AVPU, Blood glucose 2.4 Pupils size 3 43 mg/dl	Assess Blood glucose	Request senior/PICU review IV 10% glucose bolus 3 ml/kg
E	Temp 38.1	Antibiotics	IV antibiotics

NB	<ul style="list-style-type: none"> • Discussion about fluid support and post ROSC care • Discussion on sepsis management
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Debrief

Using the learning conversation, discuss the technical and non-technical elements of the simulation

Assessment

This station makes up part of the continuous assessment process. Candidates must be informed whether they have met the standard, or whether they are not quite meeting the standard in this area. If the latter is the case, the candidate must be given clear instructions on how they can develop to reach the standards required. This should preferably be done prior to the candidates leaving the room.

At the end give the opportunity for candidates to ask questions, answer these and then summarise the key points.

Cardiaal 6 - Globaal overzicht (op oefenpop plaatsen)

Het kind is bleek, grijs en cyanotisch.

Het vertoont geen tekenen van leven.

Cardiaal 6 - Resultaten tijdens arrest (pas bekend na ROSC).

PATIENT REPORT	Sample type: Venous	
Blood gas values	Patient	Ref ranges
pH	6.97	[7.33 – 7.44]
pCO ₂	7.9 kPa 59mmHg	[5.0 – 6.4]
pO ₂	6.3 kPa 47mmHg	[5.0 – 6.0]
HCO ₃	13	[22 – 28]
BE	-16	[-2 – +2]
Lactate	9.8	[< 2.0]
Glucose	2.4 43 mg/dl	[3.9 – 5.8]
Na	143	[133 – 145]
K	5.1	[3.5 – 5.5]
Ca (ionised)	1.01	[1.1 – 1.3]

If a candidate does a separate 'point of care' blood glucose before the blood gas returns post ROSC then the faculty helper should tell them the blood glucose result is 2.4 if this is before a glucose bolus has been given.
43 mg/dl

Faculty helper information – Cardiac 6

When candidate requests information regarding observations please give the following in “real-time” (e.g., wait for blood pressure to cycle, saturation trace to be achieved). If key treatment points are not undertaken, consider a “prompt” that would be visible in a child.

Cardiac 1 – initial assessment

Assess	Observation	Example prompt
A	Apnoeic (U on AVPU)	“Do you need any help?”
B	Apnoeic , no sats trace or respiratory effort	If doesn’t open airway and look, listen feel then prompt that child looks pale and lifeless. “do you want us to start BLS?”
C	No pulse palpable Pale, grey, cyanosed and has cool peripheries.	“do you want the crash trolley/crash call?” “do you want us to start BLS?” “do you need the algorithm?” “shall we check his pulse?”

Assess	Observation	Example prompt
Assess rhythm	PEA – 60 once pads applied	If they ask you to defibrillate, “I don’t think it’s shockable?” If mistaken for Sinus Rhythm – “but there wasn’t a pulse?”
Basic life support	No signs of life	“do you need the algorithm?”
Delivers drugs	No IV access	“we don’t have any access” If asked to give adrenaline prior to securing. “are there any drugs you need?”
“are there any tests you want?” if not asked for a gas “should we think about reversible causes” if no fluid given “he was very hot when he came in”		

Candidates should work their way down the list of reversible causes of arrest

Hyperkalaemia/Hypoglycaemia etc	Gas requested: K 5.1, Na 129, Ca 1.01 Glucose 4.5 81mg/dl
Hypoxia	Ensures adequacy of ventilation on high flow oxygen
Hypothermia	Temp 39.8 on presentation, falling if rechecked later
Hypovolaemia	Must give at least one fluid bolus prior to ROSC
Tamponade Thrombus Toxins	No history suggestive of these
Tension pneumothorax	Good bilateral air entry

Cardiac 1- Reassessment

Assess	Observation	Example prompt
A	Requires ongoing airway support	“Do you think you want any more support for the air-way?”
B	Apnoeic requiring ventilation. On ROSC , has poor trace and difficult to get saturations until at least 20 ml/kg given, then SpO₂ 90% in 100% O ₂	“It’s not a very good trace” “It doesn’t look like he’s breathing for himself” if not being ventilated post ROSC
C	Pulse present but weak, HR 170, CRT 5, BP 52/27	“Do you want to continue with CPR?” If ask for bloods prompt “which ones” If tachycardia and hypotension not noted post ROSC, prompt with observations and “Do you want anything else?” “do you want any drugs preparing or fluids”
D	U on AVPU, Blood glucose 2.4 Pupils size 3 43mg/dl	“Do you want me to recheck his glucose” “Do you want any treatment for that?”
E	Temp 38.1	If antibiotics not given, “I wonder why he arrested?” “have you seen his temperature”

Algorithms:

Asystole and pulseless electrical activity algorithm
Sepsis pathway

SEPSIS SCREENING TOOL ACUTE ASSESSMENT
UNDER 5

PATIENT DETAILS:

DATE: _____ **TIME:** _____

NAME: _____ **HOSPITAL:** _____

DESIGNATION: _____

SIGNATURE: _____

01

START IF CHILD LOOKS UNWELL, IF PARENT IS CONCERNED OR PHYSIOLOGY IS ABNORMAL e.g. PEWS

RISK FACTORS FOR SEPSIS INCLUDE:

Recent trauma / surgery / invasive procedure
 Impaired immunity (e.g. diabetes, steroids, chemotherapy)

Indwelling lines / broken skin

02

COULD THIS BE DUE TO AN INFECTION?

LIKELY SOURCE:

Respiratory
 Brain

Urine
 Surgical

Skin / joint / wound
 Other

Indwelling device

SEPSIS UNLIKELY, CONSIDER OTHER DIAGNOSIS

03

ANY RED FLAG PRESENT?

- Doesn't wake when roused / won't stay awake
- Looks very unwell to healthcare professional
- Weak, high-pitched or continuous cry
- SpO₂ < 90% on air or increased O₂ requirements
- Severe tachypnoea (see chart)
- Severe tachycardia (see chart)
- Bradycardia (<60 bpm)
- Non-blanching rash / mottled / ashen / cyanotic
- Temperature <36°C
- If under 3 months, temperature 38°+

RED FLAG SEPSIS

START PAEDIATRIC SEPSIS SIX (PTO)

04

ANY AMBER FLAG PRESENT?

- Not responding normally / no smile
- Reduced activity / very sleepy
- Parental or carer concern
- Moderate tachypnoea (see chart)
- Moderate tachycardia (see chart)
- SpO₂ < 92% or increased O₂ requirement
- Nasal flaring
- Capillary refill time ≥ 3 seconds
- Reduced urine output (<1 ml/kg/h if catheterised)
- Leg pain/ cold extremities/ very pale
- Immunocompromised
- If 3-6 months, temperature 39°+

SEND FULL SET OF BLOODS INCLUDING YBC IMMEDIATE REVIEW BYSTJDR ABOVE

IF ANTIMICROBIALS ARE NEEDED, ADMINISTERAS SOON AS DECISION MADE BUT ALWAYS WITHIN 3HOURS

I have prescribed antimicrobials

This patient does not require antimicrobials as:

- I don't think this patient has an infection
- Patient already on appropriate antimicrobials
- Other _____

NAME: _____ **GRADE:** _____

DATE: _____ **TIME:** : :

NO AMBER FLAGS = ROUTINE CARE / CONSIDER OTHER DIAGNOSIS

ALWAYS REASSESS IF PATIENT DETERIORATES

Age	Tachypnoea (breaths per minute)		Tachycardia (beats per minute)	
	Severe	Moderate	Severe	Moderate
<1	≥40	50-59	≥160	150-159
1-2	≥50	40-49	≥150	140-149
3-4	≥40	35-39	≥140	130-139

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SEPSIS SCREENING TOOL - THE PAEDIATRIC SEPSIS SIX

UNDER 5

PATIENT DETAILS:

DATE:

TIME:

NAME:

DESIGNATION:

SIGNATURE:

COMPLETE ALL ACTIONS WITHIN ONE HOUR

01 ENSURE ST4+ ATTENDS, CALL CONSULTANT

NOT ALL PATIENTS WITH RED FLAGS WILL NEED THE 'SEPSIS 6' URGENTLY. A SENIOR DECISION MAKER MAY SEEK ALTERNATIVE DIAGNOSES/ DE-ESCALATE CARE.

NAME:

GRADE:

TIME

 :

02 OXYGEN IF REQUIRED

START IF O₂ SATURATIONS LESS THAN 92% OR EVIDENCE OF SHOCK

TIME

 :

03 OBTAIN IV/IO ACCESS, TAKE BLOODS

BLOOD CULTURES, YBG, BLOOD GLUCOSE, LACTATE, FBC, U&Es, LFTs, CRP AND CLOTTING LUMBAR PUNCTURE IF INDICATED. CONSIDER RAPID PATHOGEN ID

TIME

 :

04 GIVE IV/IO ANTIBIOTICS

MAXIMUM DOSE BROAD SPECTRUM THERAPY (CONSIDER ESCALATION IF ALREADY ON ANTIBIOTICS)

CONSIDER: LOCAL POLICY / ALLERGY STATUS / ANTIVIRALS

EVALUATE NEED FOR IMAGING/ SPECIALIST REVIEW TO HELP IDENTIFY SOURCE

IF SOURCE AMENABLE TO DRAINAGE ENSURE ACHIEVED AS SOON AS POSSIBLE BUT ALWAYS WITHIN 12H

TIME

 :

05 CONSIDER IV / IO FLUIDS

IF LACTATE IS ABOVE 2 mmol/L GIVE FLUID BOLUS 10 ml/kg WITHOUT DELAY

IF LACTATE IS ABOVE 4 mmol/L GIVE FLUID BOLUS AND CALL PICU.

REPEAT FLUID BOLUS IF REQUIRED

TIME

 :

06 CONSIDER INOTROPIC SUPPORT

CONSIDER INOTROPIC SUPPORT IF NORMAL PHYSIOLOGY IS NOT RESTORED AFTER ≥ 20 mL/kg FLUID (10 mL/kg IN NEONATES), CALL PICU OR A REGIONAL CENTRE URGENTLY

TIME

 :

RED FLAGS AFTER ONE HOUR - ESCALATE TO CONSULTANT NOW

Monitor at least every 30 mins using early warning score e.g. PEWS

RECORD ADDITIONAL NOTES HERE:

e.g. allergy status, arrival of specialist teams, de-escalation of care, delayed antimicrobial decision making, variance from Sepsis Six



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