

APLS – Recognition and assessment of the sick child

Key Document code:	WAHT-TP-054	
Key Documents Owner:	Dr Shinwari	Consultant Paediatrician
Approved by:	Paediatric Quality Improvement meeting	
Date of Approval:	9 th February 2024	
Date of review: This is the most current document and should be used until a revised version is in place	9 th February 2027	

Key Amendments

Date	Amendment	Approved by
9 th February	No changes	Paediatric QIM

The following guidance is taken from the Partners In Paediatrics (PIP)

APLS Recognition and assessment 2018–20

APLS – RECOGNITION AND ASSESSMENT OF THE SICK CHILD

RAPID CLINICAL ASSESSMENT

Airway (A) and Breathing (B)

- Effort of breathing
- respiratory rate
- recession
- use of accessory muscles
- additional sounds: stridor, wheeze, grunting
- flaring of nostrils
- Efficacy of breathing
- chest movement and symmetry
- breath sounds
- SpO2 in air

Circulation (C)

- Heart rate
- Pulse volume
- peripheral
- central (carotid/femoral)
- Blood pressure
- Capillary refill time
- Skin colour and temperature

Disability (D)

- Conscious level
- Posture
- Pupils

Exposure (E)

- Fever
- Skin rashes, bruising

Don't Ever Forget Glucose (DEFG)

- [BM sticks](#)

Actions

- Complete assessment should take <1 min
- Treat as problems are found
- Once airway (A), breathing (B) and circulation (C) are clearly recognised as being stable or have been stabilised, definitive management of underlying condition can proceed
- Reassessment of ABCDE at frequent intervals necessary to assess progress and detect deterioration
- Hypoglycaemia: glucose 10% 2 mL/kg followed by IV glucose infusion

CHILD AND PARENTS

- Give clear explanations to parents and child
- Allow and encourage parents to remain with child at all times

STRUCTURED APPROACH TO THE SERIOUSLY ILL CHILD

Airway

Primary assessment of airway

- Vocalisations (e.g. crying or talking) indicate ventilation and some degree of airway patency
- Assess patency by:
 - looking for chest and/or abdominal movement
 - listening for breath sounds
 - feeling for expired air

Re-assess after any airway opening manoeuvres

- Infants: a neutral head position; other children: 'sniffing the morning air'
- Other signs that may suggest upper airway obstruction:
 - stridor
 - intercostal/subcostal/sternal recession

Breathing

Primary assessment of breathing

- Assess
 - effort of breathing
 - efficacy of breathing
 - effects of respiratory failure

Effort of breathing

Respiratory rates 'at rest' at different ages (see [Aide memoire: boys/girls](#))

- Respiratory rate:
 - tachypnoea: from either lung or airway disease or metabolic acidosis
 - bradypnoea: due to fatigue, raised intracranial pressure, or pre-terminal
- Recession:
 - intercostal, subcostal or sternal recession shows increased effort of breathing
 - degree of recession indicates severity of respiratory difficulty
 - in child with exhaustion, chest movement and recession will decrease
- Inspiratory or expiratory noises:
 - stridor, usually inspiratory, indicates laryngeal or tracheal obstruction
 - wheeze, predominantly expiratory, indicates lower airway obstruction
 - volume of noise is not an indicator of severity
- Grunting:
 - a sign of severe respiratory distress
 - can also occur in intracranial and intra-abdominal emergencies
- Accessory muscle use
- Gasping (a sign of severe hypoxaemia and can be pre-terminal)
- Flaring of nostrils

Exceptions

- **Increased effort of breathing DOES NOT occur in 3 circumstances:**
 - **exhaustion**
 - **central respiratory depression** (e.g. from raised intracranial depression, poisoning or encephalopathy)
 - **neuromuscular disease** (e.g. spinal muscular atrophy, muscular dystrophy or poliomyelitis)

Efficacy of breathing

- Breath sounds on auscultation:
 - reduced or absent
 - bronchial
 - symmetrical or asymmetric
- Chest expansion
- Pulse oximetry

Please note that clinical key documents are not designed to be printed, but to be viewed on-line. This is to ensure that the correct and most up to date version is being used. If, in exceptional circumstances, you need to print a copy, please note that the information will only be valid for 24 hours

Effects of respiratory failure on other physiology

- Heart rate:
 - increased by hypoxia, fever or stress
 - bradycardia **is** a pre-terminal sign
- Skin colour:
 - hypoxia first causes vasoconstriction and pallor (via catecholamine release)
 - cyanosis is a late and pre-terminal sign
 - some children with congenital heart disease may be permanently cyanosed and oxygen may have little effect
- Mental status:
 - hypoxic child will be agitated first, then drowsy and unconscious
 - pulse oximetry can be difficult to achieve in agitated child owing to movement artefact

Circulation

- Heart rates 'at rest' at different ages (see Aide memoire: boys/girls)

Pulse volume

- Absent peripheral pulses or reduced central pulses indicate shock

Capillary refill

- Pressure on centre of sternum or a digit for 5 sec should be followed by return of circulation in skin within 2–3 sec
- can be prolonged by shock or cold environmental temperatures
- not a specific or sensitive sign of shock
- should not be used alone as a guide to response to treatment

BP

- See Aide memoire: boys/girls below
- Cuff should cover >80% of length of upper arm
- Hypotension is a late and pre-terminal sign of circulatory failure

Effects of circulatory inadequacy on other organs/physiology

- Respiratory system:
 - tachypnoea and hyperventilation occur with acidosis
- Skin:
 - pale or mottled skin colour indicates poor perfusion
- Mental status:
 - agitation, then drowsiness leading to unconsciousness
- Urinary output:
 - <1 mL/kg/hr (<2 mL/kg/hr in infants) indicates inadequate renal perfusion

Features suggesting cardiac cause of respiratory inadequacy

- Cyanosis, not relieved by oxygen therapy
- Tachycardia out of proportion to respiratory difficulty
- Raised JVP
- Gallop rhythm/murmur
- Enlarged liver
- Absent femoral pulses

Disability

Primary assessment of disability

- Always assess and treat airway, breathing and circulatory problems before undertaking neurological assessment:
 - respiratory and circulatory failure have central neurological effects
 - central neurological conditions (e.g. meningitis, raised intracranial pressure, status epilepticus) have both respiratory and circulatory consequences

Neurological function

- Conscious level: **AVPU**; a painful central stimulus may be applied by sternal pressure, squeezing trapezius muscle or Achilles tendon, or supra-orbital ridge pressure
- **Alert**
- **Voice**
- **Pain** (equivalent to GCS <8)
- **Unresponsive**
- **Posture:**
 - hypotonic
 - decorticate or decerebrate postures may only be elicited by a painful stimulus
- **Pupils, look for:**
 - pupil size, reactivity and symmetry
 - dilated, unreactive or unequal pupils indicate serious brain disorders

Signs of raised intracranial pressure (Cushing's Triad)

- **Respiratory:**
 - hyperventilation
 - Cheyne-Stokes breathing
 - slow, sighing respiration
 - apnoea
- **Systemic hypertension**
- **Sinus bradycardia**

APLS aide-memoire: boys

Age	Guide Weight (kg)	A ET tube		C Joules	C Fluids	C Adrenaline	D Lorazepam	D Glucose	RR At rest Breaths/ min 5 th –95 th centile	HR Beats/min 5 th –95 th centile	BP Systolic		
		Int diameter (mm)	Length (cm)	4 J/kg	20 mL/kg (mL)	0.1 mL/kg of 1:10,000 (mL)	0.1 mg/kg Max 4 mg (mg)	2 mL/kg of glucose 10% (mL)			5 th centile	50 th centile	95 th centile
Birth	3.5	3.0/3.5	9	20	70	0.4	0.4	7	25–50	120–170	65–75	80–90	105
1 month	4.5	3.5	9	20	90	0.5	0.5	9	25–50	120–170	65–75	80–90	105
3 months	6.5	3.5	10	30	130	0.7	0.7	13	25–45	115–160	65–75	80–90	105
6 months	8	4	12	30	160	0.8	0.8	16	20–40	110–160	65–75	80–90	105
12 months	9.5	4.5	13	40	200	1.0	1.0	19	20–40	110–160	70–75	85–95	105
18 months	11	4.5	13	40	220	1.1	1.1	22	20–35	100–155	70–75	85–95	105
2 yr	12	4.5	13	50	240	1.2	1.2	24	20–30	100–150	70–80	85–100	110
3 yr	14	5	14	60	280	1.4	1.4	28	20–30	90–140	70–80	85–100	110
4 yr	16	5	14	60	320	1.6	1.6	32	20–30	80–135	70–80	85–100	110
5 yr	18	5.5	14	80	360	1.8	1.8	36	20–30	80–135	80–90	90–110	110–120
6 yr	21	5.5	15	80	420	2.1	2.1	42	20–30	80–130	80–90	90–110	110–120
7 yr	23	6	15	100	460	2.3	2.3	46	20–30	80–130	80–90	90–110	110–120
8 yr	25	6	16	100	500	2.5	2.5	50	15–25	70–120	80–90	90–110	110–120
9 yr	28	6.5	16	120	500	2.8	2.8	56	15–25	70–120	80–90	90–110	110–120
10 yr	31	6.5	17	130	500	3.1	3.1	62	15–25	70–120	80–90	90–110	110–120
11 yr	35	6.5	17	140	500	3.5	3.5	70	15–25	70–120	80–90	90–110	110–120
12 yr	43	7.5	18	150	500	4.3	4.0	86	12–24	65–115	90–105	100–120	125–140
14 yr	50	8	21	150	500	5.0	4.0	100	12–24	60–110	90–105	100–120	125–140
Adult	70	8	24	120–150 Joules biphasic	500	10 mL (i.e. 1 mg)	4 mg	100 mL	12–24	60–110	90–105	100–120	125–140

TIP: if a child is particularly big go up 1 or 2 yr; particularly small go down 1 or 2 yr
The final responsibility for delivery of the correct dose remains that of the physician prescribing and administering the drug

APLS aide-memoire: girls

Age	Guide Weight (kg)	A ET tube		C Joules	C Fluids	C Adrenaline	D Lorazepam	D Glucose	RR At rest Breaths/min 5 th –95 th centile	HR Beat/min 5 th –95 th centile	BP Systolic		
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3 months	6	3.5	10	30	120	0.6	0.6	12	25–45	115–160	65–75	80–90	105
6 months	7	4	12	30	140	0.7	0.7	14	20–40	110–160	65–75	80–90	105
12 months	9	4.5	13	40	180	0.9	0.9	18	20–40	110–160	70–75	85–95	105
18 months	10	4.5	13	40	200	1.0	1.0	20	20–35	100–155	70–75	85–95	105
2 yr	12	4.5	13	50	240	1.2	1.2	24	20–30	100–150	70–80	85–100	110
3 yr	14	5	14	60	280	1.4	1.4	28	20–30	90–140	70–80	85–100	110
4 yr	16	5	14	60	320	1.6	1.6	32	20–30	80–135	70–80	85–100	110
5 yr	18	5.5	14	80	360	1.8	1.8	36	20–30	80–135	80–90	90–110	110–120
6 yr	20	5.5	15	80	400	2.0	2.0	40	20–30	80–130	80–90	90–110	110–120
7 yr	22	6	15	90	440	2.2	2.2	44	20–30	80–130	80–90	90–110	110–120
8 yr	25	6	16	100	500	2.5	2.5	50	15–25	70–120	80–90	90–110	110–120
9 yr	28	6.5	16	120	500	2.8	2.8	56	15–25	70–120	80–90	90–110	110–120
10 yr	32	6.5	17	130	500	3.2	3.2	64	15–25	70–120	80–90	90–110	110–120
11 yr	35	6.5	17	140	500	3.5	3.5	70	15–25	70–120	80–90	90–110	110–120
12 yr	43	7.5	18	150	500	4.3	4.0	86	12–24	65–115	90–105	100–120	125–140
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