

APPROVED

The First Pro-Rector for Scientific and Pedagogical Affairs
Danylo Halytsky Lviv National Medical University

Assoc. Prof. Iryna SOLONYNKO

APPROVED

by the joint meeting of the Academic Councils of the Medical Faculties No. 1 and No. 2 and the Faculty of Foreign Students of Danylo Halytsky Lviv National Medical University, Protocol No. 1/03-2024 of 13.03.2024.

Dean of Medical Faculty No 1 _____ Prof. Marta KOLYSHETSKA

Dean of Medical Faculty No 2 _____ Assoc. Prof. Oleg KAPUSTINSKYI

Dean of Foreign Students _____ Assoc. Prof. Eugene VARYVODA

APPROVED

At the meeting of the specialized methodical committee on pediatric disciplines Protocol No. 2 of "15" February 2024

The Chairman of the specialized

methodical commission _____ Prof. Lesya BESH

ALGORITHMS
of the examination station OSP(C)E
Cardiopulmonary resuscitation in children of different ages
Specialty 222 Medicine
discipline "Pediatric diseases with pediatric infectious diseases"

Performance Algorithm No. 1

STUDENT		EXAMINER
1. To introduce yourself		
"Receives" a baby in blanket from a midwife		
2. INITIAL STEPS OF CARE		
1	To provide the correct position on the resuscitation table, suction mouth and nose, if necessary (<i>asks examiner if the baby has any respiratory disorders or a significant amount of oral content</i>) ¹ , dry with towel or blanket, remove wet linen, stimulate by rubbing back or extremities, provide the correct position of the head	«The baby does not breath»
3. ASSESSMENT OF THE NEED FOR RESUSCITATION		
2	To check breathing: <i>asks examiner if the infant breaths or has gasping respirations</i>	«The baby does not breath»
4-5. PROVIDING EFFECTIVE POSITIVE-PRESSURE VENTILATION (PPV)		
3	To begin PPV not later than in 1 min after receiving the baby	PO probe is attached «15 seconds passed» «HR is bradycardic and not increasing» Examiner confirms the presence or absence of chest movements in the infant
4	To call for help	
5	To ask assistant to attach a pulseoximeter (PO) probe to the right infant's wrist and connect to monitor	
6	Within 15 seconds of beginning PPV, <u>without its interruption</u> , to request check to assess if HR is rising	
7	To evaluate chest movements (<i>asks examiner</i>)	
7.1	If chest movements observed, to continue PPV x 15 sec	
7.2	If NO chest movement observed, to proceed through corrective steps until chest movement: 1) mask adjustment, 2) reposition of the head, 3) to suction mouth and nose, 4) to open mouth, 5) to increase pressure, 6) to indicate the need for alternative airway – endotracheal tube or laryngeal mask To notice and announce the time of appearance of chest movements	
8	To administer effective PPV (with chest movements) x 30 seconds	
6. DETERMINING THE NEED FOR CHEST COMPRESSIONS		
9	To stop PPV, remove the mask from infant's face, and check HR with a stethoscope To indicate the need for chest compressions and endotracheal intubation To indicate the need to assess the first Apgar score	«HR is about 40 bpm»
7. CHEST COMPRESSIONS		
10	To ask assistant to increase oxygen concentration to 100% (<i>to attach an oxygen tube and oxygen reservoir</i>) and ventilate the baby's lungs	Examiner confirms ventilation of baby's lungs
11	To start chest compressions (<u>thumbs technique</u>) with coordinated ventilation, counting " <i>one-and-two-and-three-and-bag-and</i> " (rate – 90 per minute; thumbs positioned just below the line between the nipples; compressions one-third of the AP diameter of the chest;	

¹ - information about infant's condition will be provided by examiner.

STUDENT		EXAMINER
	thumbs stay in touch with the surface; 3 compressions to 1 ventilation every 2 s)	«60 seconds passed»
8. DETERMINING THE NEED FOR MEDICATIONS		
12	To ask if the pulse oximeter detects heart rate and saturation To discontinue chest compressions and ask the assistant to stop ventilation and remove the mask from the face of the infant To check heart rate with auscultation of the heart beats for 6 s (to multiply the result by 10)	“Pulsoximeter is not detecting a signal” “HR is about 30 bpm”
9. ADMINISTRATION OF MEDICATIONS		
13	To indicate the need to insert a catheter into umbilical vein and promptly infuse intravenously 0.1-0.3 ml/kg of epinephrine (0.01% solution) (<i>another assistant is needed</i>)	Confirms performance
14	To continue chest compressions using <u>two fingers technique</u> for 60 s (provides the ability to simultaneously insert the catheter in the umbilical vein and administer medication)	«60 seconds passed»
15	To ask the examiner if the pulse oximeter provides readings for heart rate and hemoglobin oxygen saturation (SpO ₂)	«HR 100 bpm. SpO ₂ 75%»
10. FINAL STEPS		
16	To discontinue chest compressions and evaluate spontaneous breathing (<i>asks examiner</i>)	«No spontaneous respirations»
17	To continue PPV with higher ventilation rate (40-60 breaths/min), reducing the oxygen concentration (<i>to disconnect the oxygen reservoir</i>) To confirm the presence of chest movements	«30 seconds passed»
18	To assess HR, spontaneous breathing, and SpO ₂ (<i>asks examiner</i>)	«HR 120 bpm, spontaneously breathing. SpO ₂ – 85%»
19	To gradually discontinue PPV (<i>after several ventilations with lower frequency and pressure, remove the mask from the infant's face</i>). To assess HR, spontaneous respirations and SpO ₂ after the final cessation of ventilation (<i>asks examiner</i>)	«HR 140 bpm, spontaneously breathing, SpO ₂ – 90%»
20	Specify the need: - for follow-up of the infant's condition (pulsoximetry plus clinical monitoring) - to assess the Apgar score @ 5 minute - to inform the parents about the results of resuscitation - to transfer the infant to the neonatal intensive care unit (ward)	

Performance Algorithm No. 2

STUDENT		EXAMINER
1. To introduce yourself		
"Receives" a baby in blanket from a midwife		
2. INITIAL STEPS OF CARE		
1	To provide the correct position on the resuscitation table, suction mouth and nose, if necessary (<i>asks examiner if the baby has any respiratory disorders or a significant amount of oral content</i>) ² , dry with towel or blanket, remove wet linen, stimulate by rubbing back or extremities, provide the correct position of the head	«The baby does not breath»
3. ASSESSMENT OF THE NEED FOR RESUSCITATION		
2	To check breathing: <i>asks examiner if the infant breaths or has gasping respirations</i>	«The baby is breathing, no gasping»
3	To check the heart rate with a stethoscope, counting the number of heart beats for 6 seconds and multiply by 10	«HR is 90 bpm»
4-5. PROVIDING EFFECTIVE POSITIVE-PRESSURE VENTILATION (PPV)		
4	To begin PPV not later than in 1 min after receiving the baby	PO probe is attached «15 seconds passed» «HR is bradycardic but increasing»
5	To call for help	
6	To ask assistant to attach a pulse oximeter (PO) probe to the right infant's wrist and connect to the monitor	
7	Within 15 seconds of beginning PPV, <u>without its interruption</u> , to request check to assess if HR is rising	
8	Continue PPV for another 15 seconds, providing a total of effective ventilation for 30 seconds	«30 seconds passed»
6. DETERMINING THE NEED FOR CHEST COMPRESSIONS		
9	To stop PPV, remove the mask from infant's face, and check HR with a stethoscope To indicate the need for chest compressions and endotracheal intubation To indicate the need to assess the first Apgar score	«HR is about 50 bpm»
7. CHEST COMPRESSIONS		
10	To ask assistant to increase oxygen concentration to 100% (to attach an oxygen tube and oxygen reservoir) and ventilate the baby's lungs	Examiner confirms ventilation of baby's lungs
11	To start chest compressions (<u>thumbs technique</u>) with coordinated ventilation counting " <i>one-and-two-and-three-and-bag-and</i> " (rate – 90 per minute; thumbs positioned just below the line between the nipples; compressions one-third of the AP diameter of the chest; thumbs stay in touch with the surface; 3 compressions to 1 ventilation every 2 s)	«60 seconds passed»
8. DETERMINING THE NEED FOR MEDICATIONS		
12	To ask if the pulse oximeter detects heart rate and saturation To discontinue chest compressions and ask the assistant to stop ventilation and remove the mask from the face of the infant	"Pulse oximeter is not detecting a signal"

² - information about infant's condition will be provided by examiner.

STUDENT		EXAMINER
	To check heart rate with auscultation of the heart beats for 6 s (to multiply the result by 10)	“HR is about 30 bpm”
9. ADMINISTRATION OF MEDICATIONS		
13	To indicate the need to insert a catheter into umbilical vein and promptly infuse intravenously 0.1-0.3 ml/kg of epinephrine (0.01% solution) (<i>another assistant is needed</i>)	Confirms performance
14	To continue chest compressions using <u>two fingers technique</u> for 60 s (provides the ability to simultaneously catheterize the umbilical vein and administer medication)	«60 seconds passed»
15	To ask the examiner if the pulse oximeter provides readings for heart rate and hemoglobin oxygen saturation (SpO ₂)	«HR 100 bpm. SpO ₂ 75%»
10. FINAL STEPS		
16	To discontinue chest compressions and evaluate spontaneous breathing (<i>asks examiner</i>)	«No spontaneous respirations»
17	To continue PPV with higher ventilation rate (40-60 breaths/min), reducing the oxygen concentration (<i>to disconnect the oxygen reservoir</i>) To confirm the presence of chest movements	«30 seconds passed»
18	To assess HR, spontaneous breathing, and SpO ₂ (<i>asks examiner</i>)	«HR 120 bpm, spontaneously breathing. SpO ₂ – 85%»
19	To gradually discontinue PPV (<i>after several ventilations with lower frequency and pressure, remove the mask from the infant's face</i>). To assess HR, spontaneous respirations and SpO ₂ after the final cessation of ventilation (<i>asks examiner</i>)	«HR 140 bpm, spontaneously breathing, SpO ₂ – 90%»
20	Specify the need: - for follow-up of the infant's condition (pulsioximetry plus clinical monitoring) - to assess the Apgar score @ 5 minute - to inform the parents about the results of resuscitation - to transfer the infant to the neonatal intensive care unit (ward)	

STUDENT		EXAMINER
6. CHEST COMPRESSION PERFORMANCE		
9	Place both thumbs (one above the other) over the lower half of the infant's sternum (at the point above the xiphoid process). Start chest compressions with a rate of 100-120 per minute and a depth by at least 1/3 of the anteroposterior dimension of the chest. Avoid leaning. Release all pressure between compressions and allow for complete chest recoil.	Examiner "leaves" to take an AED
10	After every 15 compressions, perform 2 lung ventilations with an Ambu bag.	
7. APPLYING ELECTRODES OF THE AED		
11	Without interrupting the chest compressions, ask the assistant (examiner) to place the AED near the patient's chest, open and turn on the device, and listen to the commands given by the AED after it is turned on.	The examiner brings an AED and follows the instructions
12	The child's age is less than 8 years, so you should ask the examiner to switch the AED to the pediatric mode or take the pads for children	Take out pediatric pads or switch the AED to pediatric mode
13	Apply the pads to the patient's chest in the anterior-posterior position (ask the examiner for assistance). Connect the electrodes to the AED. At the time of rhythm assessment, stop all actions, including chest compression. Say loudly "Do not touch the patient"	Assists with the application of AED electrodes, following the student's instructions. When the command "Do not touch the child" is given, takes hands off the child
14	Wait for the result of the rhythm assessment	Non-shockable rhythm
8. CONTINUATION OF CPR AFTER RHYTHM ASSESSMENT		
15	If defibrillation is "not indicated" and the AED instructs you to "continue CPR," immediately resume chest compressions and Ambu bag ventilation (15:2) until the AED instructs you to reassess the rhythm. Ask the examiner to assist you with ventilation. While perform chestcompressions, the student counts out loud the last 3 compressions (13-14-15)	The examiner performs 2 ventilations after 15 compressions
16	After 2 minutes, when the AED signal is heard, reassess the rhythm, the student should stop CPR and take his/her hands away from the infant, announcing to the assistant "do not touch the child", and then change with the assistant for compressions, minimizing the break without compressions to 10 seconds	Stops CPR, removes the mask from the infant's face when instructed not to touch the child "Non-shockable cardiac arrest rhythm" Changes roles with the student
17	The student notes the need to stop resuscitation.	The child starts crying
9. FINAL STEPS		
18	The student checks the child`s breathing and pulse on the brachial artery	The baby is breathing, the pulse is more than 60

STUDENT		EXAMINER
19	To put the child in a safe position, control breathing (do not remove the AED electrodes until the ambulance arrives). Completing the scenario	

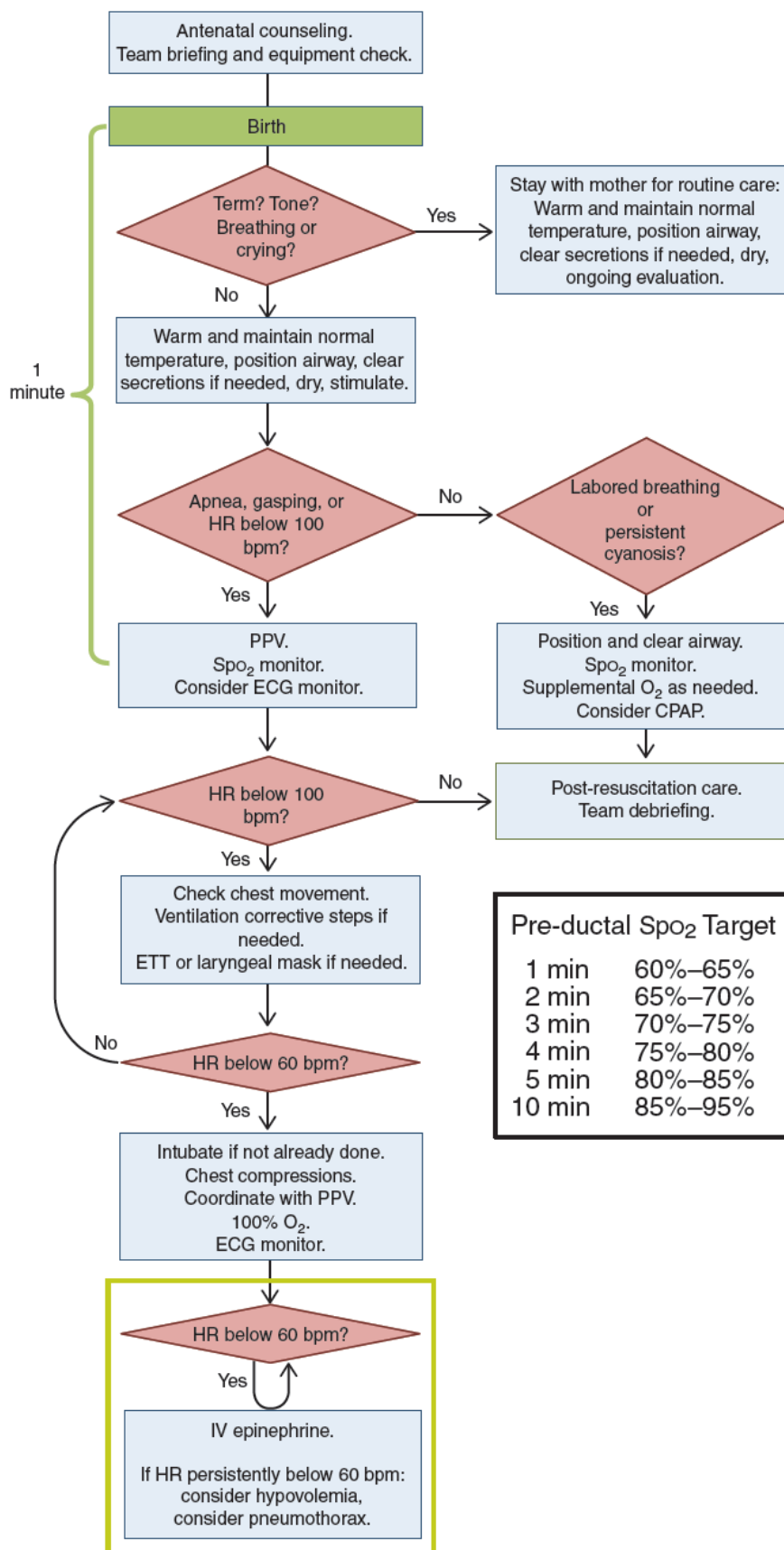
Performance Algorithm No. 4

STUDENT		EXAMINER
To introduce yourself		
Receive the task from the examiner		"The child is in the early childhood unit in the bed, not moving. There are no visible chest movements, the skin is pale and cyanotic. There is a nurse's station nearby
1. CHECKING SAFETY OF RESCUER AND CHILD		
1	Assess the threats, taking into account personal safety (look around, ask the examiner if it is safe, wear gloves).	"Safe"
2. CHECKING THE CHILD/INFANT REACTION		
2	Check for responsiveness to verbal stimulation, (call out to the child, "Are you okay?") and follow the reaction	Unresponsive
3	If he/she does not respond, call for help, stabilize the child's head and gently shake the shoulder with the other hand, while saying the infant's name loudly or "Boy, wake up"	Unresponsive
4	If he/she does not respond, ask the person who is nearby (examiner) to call the intensive care unit team and bring an AED. Give clear instructions on how to call for help (department, age of the child, what happened, etc.)	Call the intensive care unit team according to the instructions provided by the rescuer
3. ENSURING AIRWAY PATENCY		
5	Ensure airway patency with head tilt - chin lift	
6	Quickly check the mouth to make sure there is no foreign body (ask the examiner).	"Nothing in the mouth"
4. ASSESSMENT OF BREATHING		
7	Assess breathing for no longer than 10 s. Look for respiratory effort, listen and feel for movement of air from the nose and/or mouth.	"The child is not breathing"
5. POSITIVE PRESSURE VENTILATION		
8	Check the Ambu bag for leaks. Place the face mask on the child's face and secure it with your fingers in the "Ok" position. Tilt the child's head and tighten the lower jaw, sealing the mask to the face with your left hand. With the right hand, perform squeezes of the Ambu bag (follow the movements of the infant's chest, avoid hyperventilation). The breath should last for 1 second. Make up to five attempts to achieve effective breaths, if still unsuccessful, move on to the next step.	Examiner confirms ventilation of baby's lungs
9	Check clear signs of circulation (such as movement, coughing)	No visible signs of circulation
10	Carefully move the child from the bed to a flat, hard surface (floor).	
6. CHEST COMPRESSION PERFORMANCE		

STUDENT		EXAMINER
11	<p>Get on your knees on the side of the child. Chest compressions should compress the lower third of the sternum (the hand position is found by finding the angle where the lowest ribs join in the middle and placing the hand one finger's breadth above this). Place the heel of one hand over the lower third of the sternum one finger's breadth above the angle of the junction of the ribs</p> <p>Start chest compressions with a rate of 100-120 per minute and a depth by at least 1/3 of the anteroposterior dimension of the chest. Avoid leaning. Release all pressure between compressions and allow for complete chest recoil.</p>	Examiner "leaves" to take an AED
12	After every 15 compressions, tilt the child's head, tighten the lower jaw, and give 2 effective rescue breaths with Ambu bag and mask, then immediately resume CPR by redefining the chest compression position	
7. APPLYING ELECTRODES OF THE AED		
13	Without interrupting the chest compressions, ask the assistant (examiner) to place the AED near the patient's chest, open and turn on the device, and listen to the commands given by the AED after it is turned on.	The examiner brings an AED and follows the instructions
14	The child's age is less than 8 years, so you should ask the examiner to switch the AED to the pediatric mode or take the pads for children	Take out pediatric pads or switch the AED to pediatric mode
15	<p>Apply the pads to the patient's chest in the anterior-posterior position (ask the examiner for assistance).</p> <p>Connect the electrodes to the AED.</p> <p>At the time of rhythm assessment, stop all actions, including chest compression. Say loudly "Do not touch the patient"</p>	Assists with the application of AED electrodes, following the student's instructions. When the command "Do not touch the child" is given, takes hands off the child
16	Wait for the result of the rhythm assessment	Shockable rhythm
8. CONTINUATION OF CPR AFTER RHYTHM ASSESSMENT		
17	<p>Do not touch the patient until the charge is delivered. Make sure no one else is touching the child.</p> <p>Press the shock button and say "Shock, do not touch child" loudly</p>	Does not touch the child after the command
18	<p>After the shock, immediately resume chest compressions and Ambu bag ventilation (15:2) until the AED instructs you to reassess the rhythm.</p> <p>Ask the examiner to assist you with ventilation. While performing chest compressions, the student counts out loud the last 3 compressions (13-14-15)</p>	The examiner performs 2 ventilations after 15 compressions
19	<p>After 2 minutes, when the AED signal is heard, reassess the rhythm, the student should stop CPR and take his/her hands away from the infant, announcing to the assistant "do not touch the child".</p> <p>Indicate the need to switch roles with the assistant (to avoid fatigue of the rescuer who performs chest compressions).</p> <p>Wait for the result of the rhythm assessment</p>	<p>Stops CPR, removes the mask from the infant's face when instructed not to touch the child</p> <p>"Non-shockable cardiac arrest rhythm"</p>

STUDENT		EXAMINER
20	Swap roles with the assistant for compressions, minimizing the break without compressions to 10 seconds. Now you will ventilate the child with Ambu bag.	Changes roles with the student
9. FINAL STEPS		
21	<p>The doctor from the pediatric intensive care unit comes in. When asked, the student stops resuscitation. He answers that the resuscitation lasted about 5 minutes, and a shock was administered once because of the shockable rhythm.</p> <p>Completing the scenario.</p>	The doctor from the intensive care unit came in (you take over this role) introduces himself and asks how long the resuscitation was carried out and to what extent?

Neonatal Resuscitation Algorithm



ALGORITHM OF PAEDIATRIC BASIC LIFE SUPPORT (ERC GUIDELINES 2021)

SAFE? - SHOUT 'HELP'

