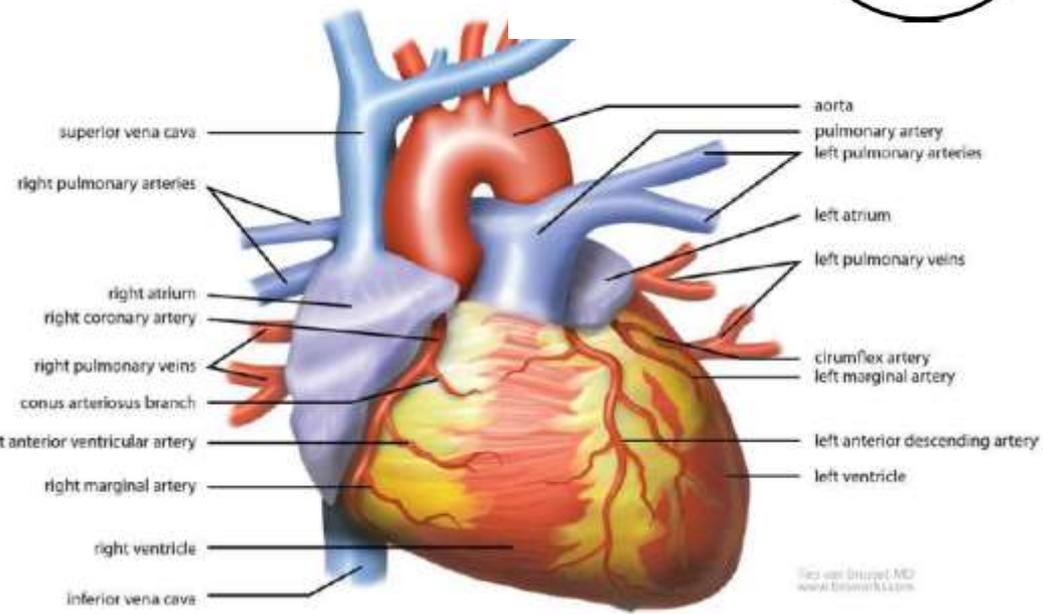
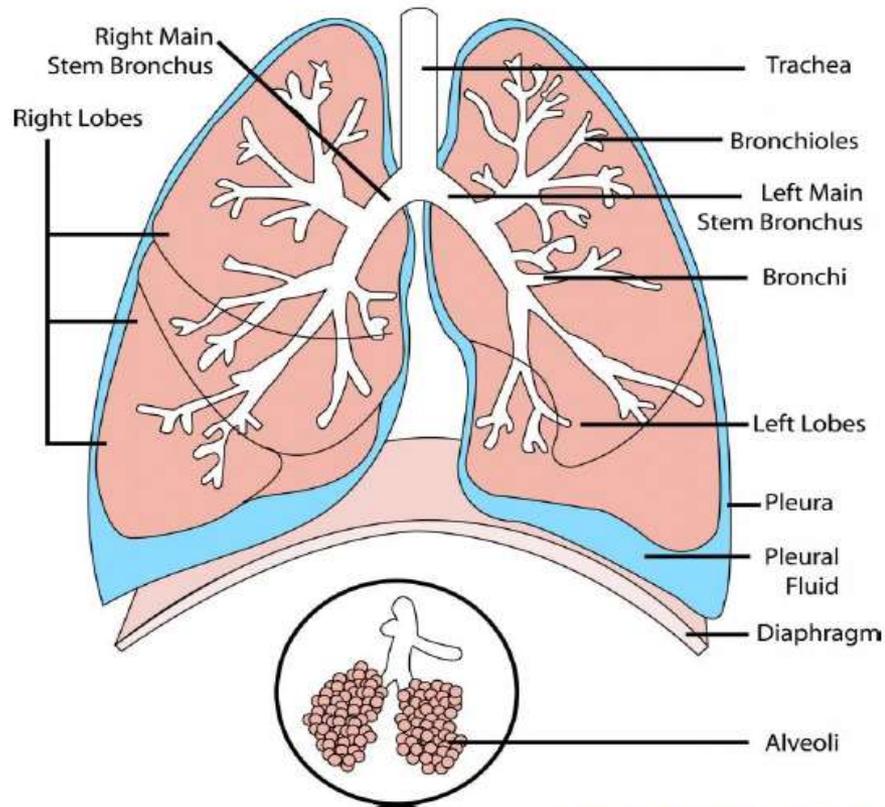


The pediatric cardiopulmonary resuscitation graduates' training

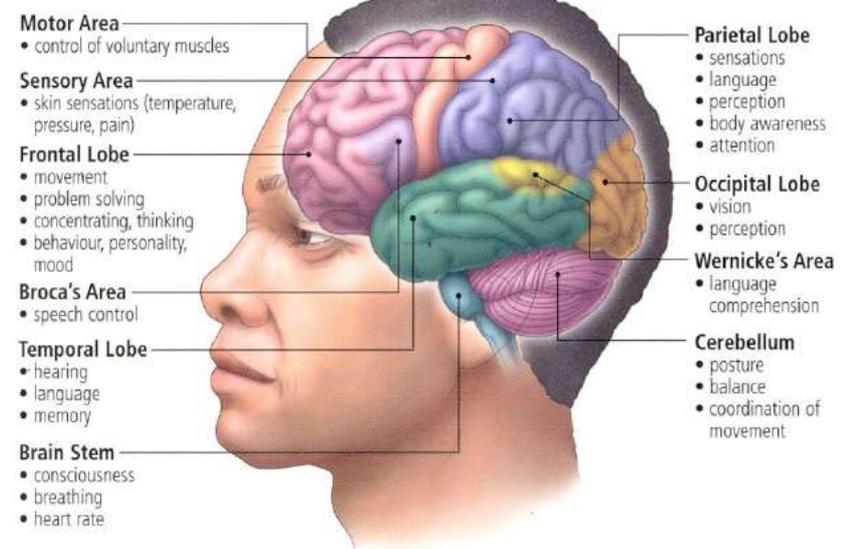
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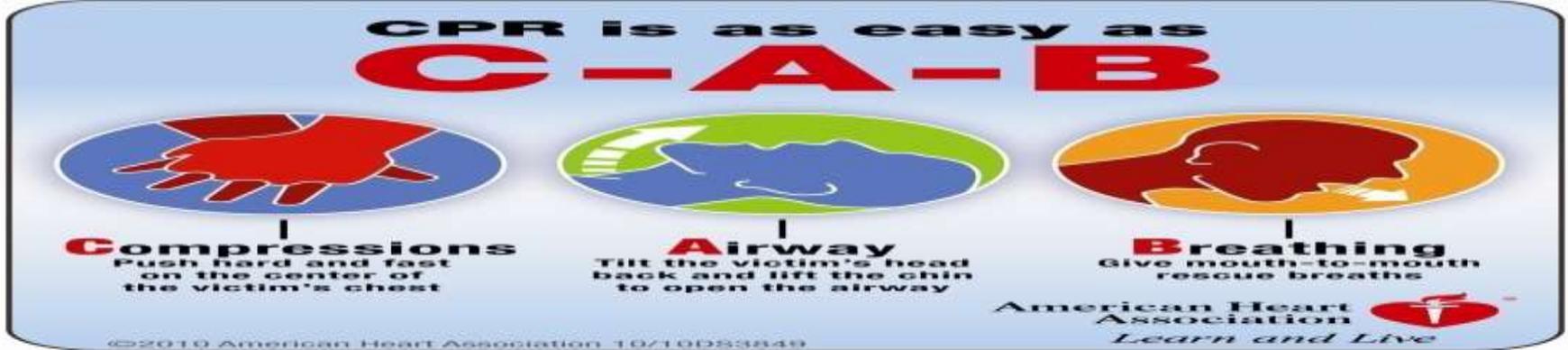
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Functional Areas of the Brain'





In 1988 the American Heart Association (AHA) and the American Academy of Pediatrics (AAP) introduced first pediatric courses, pediatric basic life support (PBLIS) and pediatric advanced life support (PALS). Since 2004 the use of automated external defibrillators (AED) on children was approved by the AHA. In 2010 the AHA updated their CPR guidelines which stated the importance of high quality CPR (sufficient rate and depth without excessively ventilating) and the changes of the order of interventions from airway, breathing, chest compressions (ABC) to chest compressions, airway, breathing (CAB).



- Approved national pediatric cardiopulmonary resuscitation (CPR) recommendations are not still available in Ukraine, nevertheless CPR history starts since 1740, when the Paris Academy of Sciences officially recommended mouth-to-mouth resuscitation for drowning victims. In 1960 modern CPR was developed.
- In 2005 American Heart Association (AHA) developed a revolutionary product that allowed anyone to learn the core skills of basic CPR, use of automated external defibrillators (AED) and choking relief in just 20 minutes.
- In 2015 some Pediatric basic life support (PBLIS) guideline changes have been made both by European Resuscitation Council and AHA with slight differences in approaches.



CPR practical skill with peculiarities in childhood is a stage of a final practically oriented exam in Pediatrics. The AHA's PBLS and PALS courses have been updated to reflect new science in the 2015 AHA Guidelines update for CPR, these recommendations were used as basis for working-out of both basic pediatric CPR training and set of tests for evaluation of its effectiveness.



Three low-fidelity and one mid-fidelity manikins (three infants, one toddler) were used to master CPR skills.



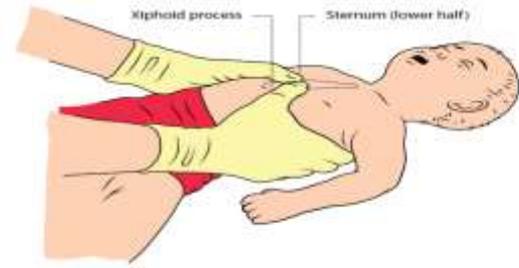


Fig. 1.20. Chest compression – infant.



Fig. 1.22. Chest compression with two hands – child.

- We have chosen AHA PBLS guidelines for graduates' training in 2017-2018 as a stage in preparing to the final exam in Pediatrics.
- **The aim of the CPR training was to recognize need of CPR and master basic CPR skills in children of two age groups (up to 1 year old and 1-8 years old) except neonates.**
- In order to achieve this aim the following components were included in the course: high-quality CPR for children and infants; the chain of survival, specifically the BLS components; use of an AED; effective ventilations using a barrier device; importance of teams in multirescuer resuscitation and performance as an effective team member during multirescuer CPR; relief of foreign-body airway obstruction (choking) for infants and elder children.



- Recommended by AHA duration for full BLS provider course is approximately 4.5 hours to complete, and for BLS renewal course is approximately 3 hours to complete, including skills practice and testing, which means that our training was at least twice shorter as compared to minimal recommended by AHA such course duration.

Shortening may be explained by the need of mastering only pediatric peculiarities of BLS. One more discussed issue was the availability of the AED use in Ukraine, especially for the pediatric patients. Nevertheless students have passed some CPR training on another departments, initially they demonstrated some skills loss, especially due to recent frequent CPR updates.



- Training class was incorporated within module 5 for Ukrainian speaking 6 year students (medical faculty №2, groups №23-31, medical faculty №4, groups №1-4, specialty “Pediatrics”, “Medical Psychology”) and modules 5/6 for English speaking groups №41-51, medical faculty №2, totally 25 groups, 19 of which already have passed the training course.
- The place of course was a modernly equipped class based on the Chernivtsi Hospital for Emergency Care. The course duration was 1,5 hours. Finally course was divided in 7 stages:
 - (1) initial paper testing - 10 min;
 - (2) instructor’s introduction – 5 min;
 - (3) demonstration of 6 short training videos – 25 min;
 - (4) comments and discussion - 5 min;
 - (5) students’ practice with manikins - 30 min;
 - (6) cross-exam and debriefing – 5 min;
 - (7) final paper testing - 10 min. Testing (stages 1 and 7) was approved since spring semester.

Youtube video-based course with real scenarios was demonstrated via big smart board. Instructor-led, hands-on practical class training format reinforced skills proficiency. Emphasis is done on high-quality CPR including a team dynamics classroom activity especially in stages 4-6. In the instructor-led course, students participated in simulated clinical scenarios and learning stations.





Totally 6 trained teachers played a role of instructors.





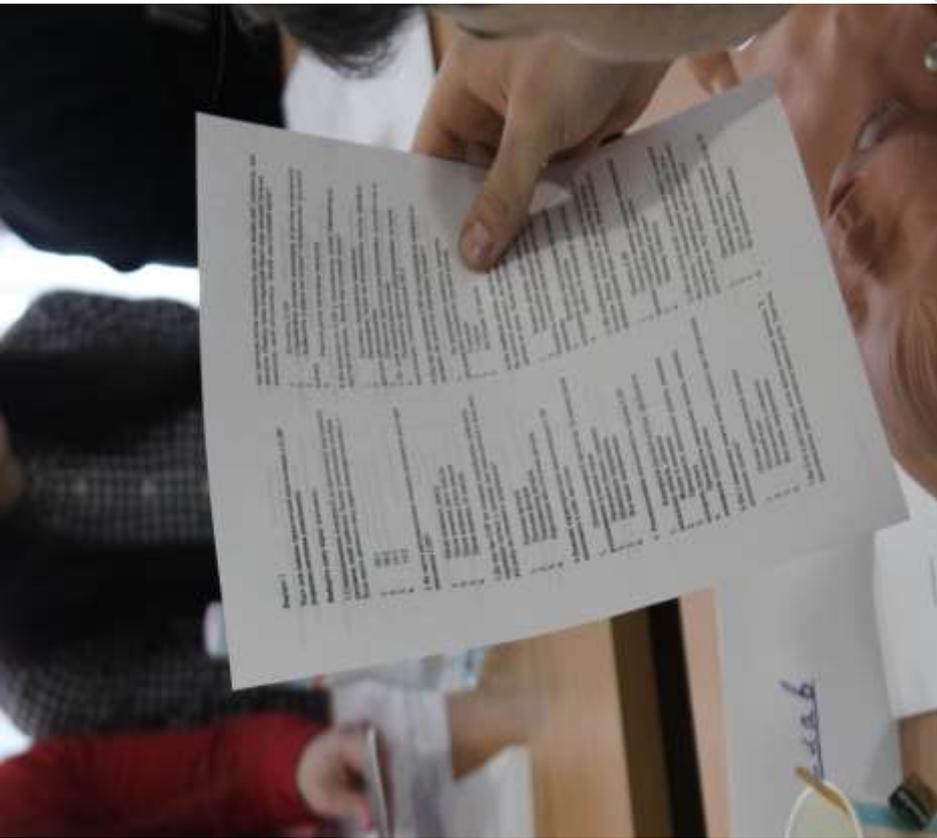
Teachers previously were trained by certified instructor working in the Intensive Care Unit of the Municipal Medical Institution "Regional Children's Clinical Hospital".



Students (groups of 5 up to 15) were working with the teacher/instructor to complete BLS skills practice and skills testing. Students also complete a written initial and final testing.
Students' practice with manikins



- We have developed a base of paper tests same both for initial and final testing of students for cardiopulmonary resuscitation (CPR) skills.
- Total number of tests was 24 short questions with single answer choice out of 4 proposed answers. These tests were chosen out of 40 free available tests on official AHA website. Set of 24 tests consisted of 12 questions on PBLIS (6 of basic CPR, 6 of first aid) and 12 questions on ALS (5 of advanced cardiovascular life support including AED use and 7 of PALS).
- The tasks of the course were to master high-quality child CPR AED and infant CPR, to recognize patients who do and do not require immediate intervention, to recognize cardiopulmonary arrest early and application of CPR within 10 seconds in order to pass successfully the 1- and 2-rescuer child BLS with awareness of AED use and 1- and 2-rescuer infant BLS skills.
- Testing was implemented before and after training course, every attempt lasted up to 10 min. Only first 12 tests were used to evaluate the effectiveness of basic CPR training, while the rest 12 questions were used as control set. Current and final academic achievements and results of test anxiety testing were used for association assessment.



- The results of initial total testing was average of $12,4 \pm 2,2$ correct answers (min-max: 11-16) or 51,7% and finally there was an improvement up to average $16,4 \pm 2,2$ ($p < 0,0001$) of the sum of initially correct and corrected for proper answers (min-max: 14-22) or 68,3%. Taking into account gain of correct answers and loss due to wrong corrections of initially true answers 60% of students had improved initial results and 40% of participants have not changed them.
- PBLs testing was average of $6,0 \pm 1,2$ correct answers (min-max: 5-8) or 50,0% and finally there was an improvement up to average $7,2 \pm 1,3$ of correct answers (min-max: 6-9) ($p < 0,17$) or 60% (min-max: 50-75%). There was almost significant difference in gain of correct answers of PBLs versus PALS – $1,2 \pm 0,5$ versus $0 \pm 1,2$ correspondingly ($p < 0,08$). All 100% of students have improved their initial results in the PBLs set of tests.

- The best final results with non-significant gain were demonstrated in basic CPR testing: $3,2 \pm 1,3$ of correct answers (min-max: 2-5) or 53% with improvement up to $3,6 \pm 1,0$ ($p < 0,54$) of correct answers (min-max: 3-5) or 60%. Significant gain of correct answers was observed in first aid set of tests: $2,8 \pm 0,5$ of correct answers (min-max: 2-3) or 47% with improvement up to $3,6 \pm 1,0$ ($p < 0,04$) of correct answers (min-max: 3-4) or 60%.
- According to correlation analysis the final results of total testing significantly associated with initial basic CPR testing results ($r = 0,93$; $p < 0,02$), anxiety testing results ($r = 0,93$; $p < 0,03$), and the gain of final CPR testing significantly associated with improvement in step II testing results in Pediatrics ($r = 0,88$; $p < 0,05$).



Conclusions.

- Pediatric basic CPR training course allowed to master the basics of child CPR with breaths, child choking relief and general awareness of AED. The BLS course trained students to promptly recognize several life-threatening emergencies, give high-quality chest compressions, deliver appropriate ventilations and provide early use of an AED.
- Recommendations of diminishing number of students up to 6 in a group, increase of the course duration up to 3 hours and questionable duration of validity of the completed basic CPR training are to be discussed.
- According to final BLS skills testing in order to improve students' basic pediatric CPR skills the AED simulator is to be added to the equipment for the training with manikins. Effectiveness of the basic CPR training was approved by the significant increase in correct answers of final total testing as compared to initial testing due to set of testing of pediatric BLS and first aid skills.

Thank You for attention!

