American Resuscitation Council

Neonatal Resuscitation Program

Provider Manual

Table of Contents

List of Figures

List of Tables

Introduction to Neonatal Resuscitation

Thanks to improvements in obstetrics and gynecology, the vast majority of neonates transition successfully from fetus to healthy newborn. Unfortunately, about ten percent of neonates do require some level of medical assistance to make this transition. Every medical professional who works in Labor and Delivery or the Neonatal Intensive Care Unit (NICU) must have a deep understanding of the principles and practice of neonatal resuscitation.

The training in this manual is based on the consensus guidelines published by the American Heart Association (AHA), the American Academy of Pediatrics (AAP), and the International Liaison Committee on Resuscitation.[1] It contains the core content presented in the 7th edition of the Textbook of Neonatal Resuscitation; however, it has been streamlined to help learners acquire the information more quickly and retain it more effectively. The 11 lessons of the 7th edition have been distilled into 9 core lessons, covering the same content in a more intuitive and focused manner.

Since the 6th edition was published, additional emphasis has been placed on the proper preparation for neonatal resuscitation and post-resuscitation care. This is also reflected in this training. Providers who are familiar with the 6th edition will also notice updated recommendations regarding umbilical cord clamping, oxygenation, continuous positive airway pressure (CPAP) usage with positive end-expiratory pressure (PEEP), thermoregulation, and others. Likewise, there is a greater emphasis on early intubation over chest compressions. These evidence-based recommendations are supported by the peer-reviewed literature as detailed by the authors of the consensus guidelines.[2]

Learners will be required to pass a 50-question examination to determine whether they have adequately assimilated the knowledge provided in this training. While successful completion of the examination is sufficient to receive a Provider Card, it does not ensure competency. As noted by the AHA and the AAP in their programs, ensuring competency is the responsibility of the local hospital or clinical setting in which the provider is employed.

Unit One: Physiology and Pathophysiology of the Neonate

Cardiopulmonary Function of the Fetus

Before birth, the neonate's lungs and gastrointestinal system are not fully functional. Oxygen and nutrients are provided by the placenta, which also clears waste products, such as carbon dioxide, created by the fetus. Rather than the fetal lungs participating in gas exchange, carbon dioxide diffuses across the placenta to be cleared by the mother.

The fetal lungs are filled with amniotic fluid, and the blood vessels surrounding the fetal lung alveoli are constricted. Essentially, the lungs are bypassed by the cardiac and systemic circulation (Figure 1) in what is called a "right-to-left shunt." Instead of sending blood to the lungs, the right side of the fetal heart sends blood through the foramen ovale and the ductus arteriosus to the left side of the heart. Understanding this unique fetal anatomy is essential to understanding the transition that occurs during birth and the problems that can occur in the neonatal period.

The Birth Transition

Several dramatic and remarkable changes take place during the transition from fetus to newborn. For the first time, air fills the infant's lungs, driving the fluid out of the alveoli and into the vasculature. In short order, the neonate's circulatory system must switch from placenta-based oxygenation to lung-based oxygenation. The blood vessels around the alveoli dilate and gas exchange across the lungs begins (Figure 2). The right heart in the neonate has just increased its workload considerably—instead of shunting blood to the left heart, it now must move it through the entire pulmonary vasculature and the foramen ovale/ductus arteriosus. Since any blood that moves through the foramen ovale and ductus arteriosus is unoxygenated, these structures should close to create the vasculature the neonate will have throughout life. While this process happens relatively quickly, it is not instantaneous. In healthy infants, fluid within the neonatal lungs may persist for several hours and it may take up to 2 days after birth for the ductus arteriosus to fully close. Complete dilation of the pulmonary blood vessels may not occur for several months after birth.