

Abstract:

“Neonates are not just small children.” Health care providers in the emergency department should recognize presenting signs and symptoms of neonatal clinical problems in order to differentiate “sick” from merely “fussy” newborns. In this review, common neonatal presenting complaints will be discussed with the goal of recognizing normal and abnormal findings in the first 28 days of life. Topics will include respiratory distress, cyanosis, sepsis, meningitis, neonatal seizures, and feeding difficulties in the newborn.

Keywords:

neonatal sepsis; meningitis; respiratory distress in the neonate; cyanosis; neonatal seizures; feeding difficulties; inborn errors of metabolism

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1522-8401

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Sick or Fussy? Normal and Abnormal Findings in the First Week of Life

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The idea that “children are not just small adults” is pervasive in pediatrics.^{1,2} Neonatologists take this adage one step further, reminding trainees that “neonates are not just small children.” When a neonate presents to the emergency department (ED), it is essential that health care providers recognize presenting signs and symptoms of neonatal conditions whose accurate diagnosis requires a keen awareness of the distinction between “sick” and merely “fussy” infants.

APPROACH TO THE FUSSY INFANT

Clinical Presentation

Crying up to 2 hours per day is normal in neonates. “Colic” is traditionally defined as crying more than 3 hours a day, 3 days a week for 3 weeks or longer in an otherwise well-fed, growing, and healthy infant.³ The crying might begin suddenly and for no apparent reason, during which time the infant is difficult or impossible to console. When a newborn presents to the ED with crying, it is important to exclude illness so as to provide appropriate reassurance. Ensure that the baby is being appropriately fed, changed, soothed, and not

shaken. Sources of crying not to miss in the neonatal period include the following:

- Sepsis/meningitis: A neonate with sepsis or meningitis may present as a fussy, irritable infant who cannot be easily consoled (see below).
- Hair tourniquet: Perform a full body examination of the infant to exclude a hair tourniquet, typically involving a thread of hair wrapped around the toes, fingers, or genitalia with associated pain, erythema, and edema.
- Corneal abrasion: An unusually fussy infant who is unwilling to open her eyes may be suffering from a corneal abrasion. Neonates may scratch the cornea with sharp fingernails, causing severe eye pain, inability to open the eye, watery eye(s), and light sensitivity.
- Anomalous origin of the left coronary artery from the pulmonary artery: Although rare, anomalous origin of the left coronary artery from the pulmonary artery is life-threatening and should be considered in a neonate who presents with inconsolable crying. Shortly after birth, pulmonary artery pressure and pulmonary vascular resistance (PVR) decrease, resulting in the left ventricular myocardium being perfused by relatively desaturated blood under low pressure, leading to myocardial ischemia. Initially, this myocardial ischemia is transient during periods of increased myocardial demand such as crying and feeding. Inadequate myocardial perfusion causes chest pain (angina), which may be misinterpreted as “colic.” ❏

APPROACH TO NEONATAL RESPIRATORY DISTRESS AND HYPOXEMIA

“Doctor, my baby is breathing fast. Is this normal?” In contrast to older children, a normal

neonatal respiratory rate ranges from 30 to 60 respirations/min (Table 1).⁴ New parents are often concerned by periodic breathing, a benign neonatal breathing pattern characterized by pauses for up to 10 seconds followed by a series of rapid, shallow breaths with spontaneous resolution. In contrast, retractions, grunting, and nasal flaring suggest the presence of parenchymal lung disease with decreased lung compliance and associated respiratory distress. Upper airway obstruction and metabolic acidosis with respiratory compensation can present as respiratory distress in neonates. Cyanosis with either comfortable tachypnea or without respiratory distress is more likely due to congenital heart disease (CHD) and warrants an echocardiogram and consultation with neonatology and pediatric cardiology.

Evaluation for Neonatal Respiratory Failure and Cyanosis

- Pulse oximetry: Preductal (right hand) and postductal (lower extremity) saturation readings by pulse oximetry can help determine the etiology of hypoxemia in a neonate. Equivalent preductal and postductal saturations in a cyanotic neonate suggest that either the ductus arteriosus is closed or the ductus is patent with subsystemic PVR. Hypoxemia in this setting may be caused by parenchymal lung disease with intrapulmonary shunting, or cyanotic CHD with ductal-dependent pulmonary blood flow. Ductal-dependent systemic blood flow lesions (eg, hypoplastic left heart syndrome, critical aortic stenosis, interrupted aortic arch, and coarctation of the aorta) can present with postductal desaturation. Anatomic pulmonary vascular disease (eg, pulmonary venous stenosis, and total or partial anomalous pulmonary venous return with obstruction) can cause suprasystemic PVR with right-to-left shunting across the patent ductus arteriosus and resulting postductal desaturation.
- Chest radiograph: It is important to note whether the severity of hypoxemia is out of proportion to radiographic findings. Marked hypoxemia despite provision of supplemental oxygen, when coupled with the absence of parenchymal lung disease on radiograph, is concerning for an extrapulmonary right-to-left shunt.⁵ The presence of parenchymal lung disease, pneumothorax, or a cystic mass (congenital pulmonary airway malformation) can direct management accordingly.

TABLE 1. Normal resting vital signs in neonates.

Normal Resting Vital Signs in Neonates Aged <28 d

Heart rate (beats/min)	100-160 ^A	
Respiratory rate (breaths/min)	35-55	
Blood pressure (mm Hg)	Systolic range: 65-85	Diastolic range: 45-55
Temperature (°C)	36-37.9	

^A Sinus bradycardia with a heart rate of 80 to 100 beats/min during sleep is normal in a full-term healthy infant.

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