AAP Journals BLOG

We Need an Apnea Person!

July 21, 2017

My research mentor during fellowship at Northwestern University was Dr. Carl Hunt. He offered two areas of research for me to choose from: arachidonic acid metabolites in hyperoxic lung injury in rabbits or apnea (and theophylline therapy) - central hypoventilation syndrome -sudden infant death syndrome. I almost immediately chose the lung injury research with enthusiasm. Who really wants to be “an apnea person”?

Joseph R. Hageman, MD, NeoReviews Editorial Board Member

Article type: NeoReviews Blog

My research mentor during fellowship at Northwestern University was Dr. Carl Hunt. He offered two areas of research for me to choose from: arachidonic acid metabolites in hyperoxic lung injury in rabbits or apnea (and theophylline therapy) - central hypoventilation syndrome -sudden infant death syndrome. I almost immediately chose the lung injury research with enthusiasm. Who really wants to be “an apnea person”? I thought I was safe, and then Carl left, as did Dr. Bob Brouillette, at about the time my fellowship ended.

A couple of months after I had settled in at Evanston Hospital and set up my research lab, I got a call from Dr. Ed Ogata at Children’s Memorial Hospital in Chicago asking me if I would be willing to help, and I was off to learn more about reading monitor downloads with Dr. Tom Keens at Children’s Hospital of Los Angeles.

Here we are, approximately 34 years later, and we are all still struggling to a degree with what to do with preterm infants who are ready for discharge but continue to have cardiorespiratory events, most commonly related to immaturity of their cardiorespiratory control system, otherwise known as apnea of prematurity (AOP).

Bob Darnall published a seminal paper about “the margin of safety” of the number of days with apnea off caffeine therapy after which the preterm infant could be safely discharged (Darnall, 1997). This approach using “a brady watch,” as it is called in our NICU at University of Chicago, is still being utilized. To characterize the national approach to infants with isolated persistent apnea, I worked with Christine Carlos and others to survey neonatologists in the United States, Canada and France working with an organization I have been a member of for about 25 years, the American Association of SIDS Prevention Professionals (AASPP).

We looked at when infants are being discharged from the NICU:

1. Were pre-discharge cardiorespiratory recordings performed?

2. How many days did babies need to be event-free prior to discharge?

3. Were the discharged babies sent home with apnea monitors/pulse oximeters?

4. Were discharged infants receiving caffeine therapy? (2)

In general, discharge practices are not well standardized across institutions and across these countries. Canada and France tend to discharge their infants at later postmenstrual ages (PMAs) without monitors or caffeine therapy. In the United States, NICUs tend to discharge these infants at an earlier PMA and will discharge some of them on home caffeine therapy and home monitoring. In all 3 countries, the "margin of safety" for apnea free days is utilized, although in France, the number of days tends to be fewer (<5 days). Newer clinical studies of caffeine therapy for preterm infants starting at 33 weeks' PMA have been performed by Rhein and co-investigators (including Carl Hunt and Bob Darnall), with the idea that caffeine therapy will result in less intermittent hypoxemia in these infants (3).

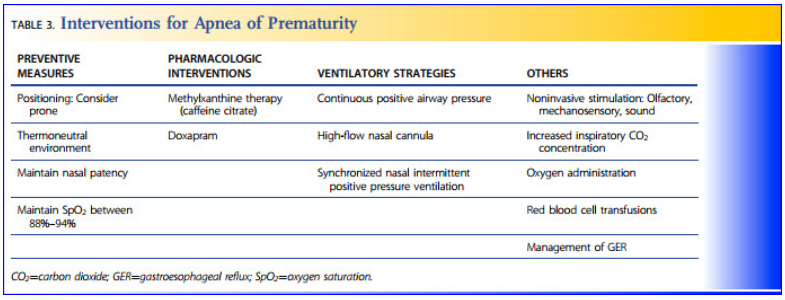

TABLE 3. Interventions for Apnea of Prematurity

PREVENTIVE MEASURES	PHARMACOLOGIC INTERVENTIONS	VENTILATORY STRATEGIES	OTHERS
Positioning: Consider prone	Methylxanthine therapy (caffeine citrate)	Continuous positive airway pressure	Noninvasive stimulation: Olfactory, mechanosensory, sound
Thermoneutral environment	Doxapram	High-flow nasal cannula	Increased inspiratory CO_2 concentration
Maintain nasal patency		Synchronized nasal intermittent positive pressure ventilation	Oxygen administration
Maintain SpO_2 between 88%–94%			Red blood cell transfusions
			Management of GER

CO_2=carbon dioxide; GER=gastroesophageal reflux; SpO_2=oxygen saturation.

In the March 2017 issue of *NeoReviews*, Kesavan and Parga have provided a well-organized and well-presented overview of AOP, which I highly recommend (4). They provide a very thoughtful discussion and substantiate the lack of consensus in the clinical approach to the management of this very common entity.

In addition, they are careful in their description of the state-of-the-art when it comes to the evaluation and decisions for discharge in this group of infants.

We still have a long way to go as discussions about NICU discharge of these infants continue. Because I am our unit's QI person and not involved with the daily care of these infants at this point … there are certain advantages to being in this role, as I cannot be "the apnea person."

References

- Darnall RA, Kattwinkel J, Nattie C et al. Margin of safety for discharge after apnea in preterm infants. *Pediatrics*. 1997;100:795-801, PMID: 9346978.
- Carlos C, Hageman J, Pellerite M et al. Neonatal intensive care unit discharge of infants with cardiorespiratory events: Tri-country comparison of academic centers. *J Neonatal Perinatal Medicine.* 2015;8:307-311.
- Rhein LM, Dobson NR, Darnall RA et al. Effects of caffeine on intermittent hypoxia in infants born prematurely. *JAMA Pediatr.* 2014;168:250-257.
- Kesavan K, Parga J. Apnea of prematurity: Current practices and future directions. *NeoReviews*. 2017;18:e149-e160, **doi:** 10.1542/neo.18-3-e149.