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EDITORIAL

Discharge without alarm(s)!

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One of the hallmark criteria for discharge of any preterm infant, particularly for those of very low birth weight (VLBW), from the Neonatal Intensive Care Unit (NICU) is the successful completion of an apnea and bradycardia 'countdown.' The margin of safety for an apnea-free countdown, however, remains controversial despite the longstanding recommendations to standardize management strategies.[1–3] Although apnea of prematurity is one of the most common diagnoses in the NICU, there remains to this day a lack of consensus on the definition of a 'clinically significant event' as well as substantial practice variation with respect to 'reasonable inpatient monitoring' of these infants.[2–5] These dilemmas are a source of frustration not only for the neonatal healthcare team, but also for families of these infants, for whom recurrent apnea/bradycardia events are a source of immense anxiety both during and after the initial NICU hospitalization. The Committee on Fetus and Newborn's *Clinical Report on Apnea of Prematurity* encourages each NICU to develop their own policies and procedures to address the issues surrounding caregiver assessment, intervention and documentation of apnea/bradycardia/desaturation events and the duration of the period of observation before discharge.[3] Nevertheless, there are few published studies that document successful implementation of a standardized protocol.[6,7]

In this month's *Journal of Perinatology*, Chandrasekharan *et al.*[8] report on the impact of implementation of a standardized institutional protocol for monitoring apnea and bradycardia events in VLBW infants. The protocol's focus was on standardization of the duration of observation for apnea/bradycardia/desaturation events in preterm infants who were otherwise ready for discharge and the study specifically examined the impact of this protocol on NICU length of stay and hospital readmission within 30 days after discharge from the NICU. This was a large contemporary cohort of VLBW infants born before ($n = 426$, 2011–2013) and after ($n = 369$, 2014–2016) the initiation of an algorithm that categorized apnea/bradycardia/events according to severity and need for intervention (apnea with need for stimulation, apnea without need for stimulation and without bradycardia or desaturation, bradycardia with and without stimulation, isolated bradycardia or desaturation events) with corresponding pathways of observation until discharge. The group is to be commended for their ability to achieve the collaboration essential to the success of any protocol implementation, with 34 providers agreeing on the criteria for the protocol, commitment to utilizing said criteria and supporting the nursing staff through 3 months of education. With these definitions in place, inter-provider variability improved and there was a subsequent significant reduction in the duration of observation of apnea spells from 8 (6–10) days to 7 (6–8) days, as well as bradycardic spells from 6 (5–9) days to 5 (5–7) days. Interestingly, despite this improvement, the overall length of NICU stay did not significantly change, which may speak to the influence of other morbidities, such as bronchopulmonary dysplasia, which occurred at higher rates in infants born during the last study year. It may be that any reduction of length of stay due to reduced observation period for apnea/bradycardia events was offset by time needed to achieve oral feedings and/or to wean from a nasal cannula. Conversely, documented hospital readmission rate decreased after implementation of the protocol despite no significant clinical differences between the two cohorts. As the authors acknowledge, implementation of the apnea/bradycardia protocol and the intensive staff education may have led to increased family education, satisfaction and overall confidence in caring for their infants, which could have decreased healthcare utilization post discharge. However, this study did not document caregiver roles/education/visitation rates pre and post implementation nor adjust for socioeconomic variables between the cohorts that could have confounded these results.

There are a number of controversies regarding apnea/bradycardia management that are highlighted in this study. Caffeine use was limited and most likely would not affect the length of stay. The availability of apnea monitors also can result in altering discharge practice and also requires a standardized protocol to identify appropriate infants and resources. The practice of continued pulse oximetry monitoring up until discharge in the convalescing preterm infant may be difficult to justify without understanding the outcome of intermittent desaturations, particularly for those that occur with feedings.

Chandrasekharan *et al.* raise important question for the daily practice of neonatology: What is the correct algorithm for monitoring our most vulnerable but convalescing patients? What should be considered a clinically significant event? Furthermore, how many apnea/bradycardia events are 'too severe' or 'too many in number' to accept? Should length of stay and hospital readmission be our quality indicators for this morbidity or should it be neurodevelopmental outcome at a defined point in time? This study challenges other NICUs to consider the impact of creating an algorithm of their own during a time when there is controversy on the validity of nursing documentation of events versus electronic monitor downloads as well as implementation of practice changes as many NICUs transition from open bay to single room environments. Nevertheless, this study speaks to successful protocol development, implementation and examination of outcome measures, all of which can guide other NICUs to establish their own best practices in the management of apnea and bradycardias of prematurity and to discharge without alarm.

CONFLICT OF INTEREST

The authors declares no conflict of interest.

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