Longitudinal Assessment of Hemoglobin Oxygen Saturation in Preterm and Term Infants in the First Six Months of Life

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Objective To report longitudinal home recordings of hemoglobin O_2 saturation by pulse oximetry (Spo_2) during unperturbed sleep in preterm and term infants.

Study design We recorded continuous pulse oximetry during the first 3 minutes of each hour of monitor use (nonevent epochs) for 103 preterm infants born at <1750 g and ≤34 weeks postmenstrual age (PMA), and 99 healthy term infants.

Results Median baseline Spo_2 was approximately 98% for both the preterm and term groups. Episodes of intermittent hypoxemia occurred in 74% of preterm and 62% of term infants. Among infants with intermittent hypoxemia, the number of seconds/hour of monitoring <90% Spo_2 was initially significantly greater in the preterm than the term group and declined with age at a similar rate in both groups. The 75th to 95th percentiles for seconds/hour of Spo_2 <90% in preterm infants were highest at 36 weeks PMA and progressively decreased until 44 weeks PMA, after which time they did not differ from term infants.

Conclusions Clinically inapparent intermittent hypoxemia occurs in epochs unperturbed by and temporally unrelated to apnea or bradycardia events, especially in preterm infants at 36 to 44 weeks PMA. *(J Pediatr 2011;159:377-83)*.

The memory monitor developed for the Collaborative Home Infant Monitoring Evaluation (CHIME) study was designed to automatically store all physiological data during the first 3 minutes of each hour.[1,2] These 3-minute nonevent epochs provided an opportunity to longitudinally record hemoglobin O_2 saturation (Hbo_2 SAT) by pulse oximetry (Spo_2) during nocturnal intervals unperturbed by apnea or bradycardia alarms that triggered an event recording. On the basis of these CHIME 3-minute nonevent recordings, we previously reported that healthy term infants at 2 to 25 weeks of age generally had baseline Spo_2 levels >95% but frequently had acute intermittent hypoxemia events (Spo_2 <90%), particularly during the earliest postnatal weeks.[3] There are no prior analyses of longitudinal Spo_2 during infancy that compare infants born preterm and at term. We hypothesized that preterm infants would have more episodes of intermittent hypoxemia. Our objective was to determine the frequency with which preterm infants have intermittent hypoxemia during unperturbed nocturnal epochs of apparent sleep recorded at home and to compare Spo_2 in infants born preterm with infants born at term.

Methods

Detailed methods for the CHIME study and for the recording and analysis of Spo_2 have previously been reported.[2,3] Written informed consent was obtained for each infant, and the study was approved by the institutional review board at each of the five clinical sites.

The CHIME study included preterm infants born at <1750 g and <35 weeks postmenstrual age (PMA) and healthy term infants. Because of the data processing costs associated with scoring physiological data for this analysis, a priori sample size considerations led to a targeted sample size of 100 healthy term and 100 preterm infants, giving 80% power to detect a medium effect size (difference in means divided by the standard deviation) of 0.40, or of detecting an OR of ≤ 2.4 for outcome events with a prevalence between 0.20 and 0.80. To ensure an

CHIME	Collaborative Home Infant Monitoring Evaluation
GEE	Generalized Estimation Equation
NICU	Neonatal intensive care unit
PMA	Postmenstrual age
Spo_2	Hemoglobin O_2 saturation by pulse oximetry
Hbo_2 SAT	Hemoglobin O_2 saturation

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