

Car Seat–Associated Hypoxia: Low Birth Weight Term Newborns, Another Group at Risk

Joel L. Bass, MD

Oxygen desaturation of premature newborns in car seats was first reported by Willet¹ in 1986. In response to that study, the American Academy of Pediatrics (AAP) recommended in 1991 that infants <37 weeks' gestation be monitored for oxygen desaturation and bradycardia in their car seat before discharge.² The most recent AAP statement on this issue identifies other infants who are ≥37 weeks and who may be at risk for this problem as potential candidates for car seat testing.³ Although term low birth weight newborns are not specifically mentioned in that statement, they would be logical candidates for inclusion given the presumed mechanism of desaturation in these devices (physical-mechanical mismatch) as well as case reports of desaturation in some low birth weight newborns.⁴ The current report by Davis⁵ provides the results of the first large-scale study of car seat testing in term low birth weight newborns.

Unfortunately, although the AAP advice on the need to test certain high-risk infants is quite clear, the current statement does not provide exact thresholds for determining an abnormal result. This has resulted in varying criteria being used in both clinical and research settings. In the current report, an oxygen saturation of <88% was used to determine an abnormal result. Because other institutions use significantly higher thresholds,⁶ it difficult to interpret the true scope of risk to this group of newborns. Had levels of desaturation of 88% to 92% been included, it is

quite possible that the number of newborns at risk in this category would have been substantially higher than the reported 4.8%. Despite this limitation, the current report clearly demonstrates that term low birth weight newborns are another group that is likely to be at risk and need careful evaluation before discharge. Also of note, evidence of maternal opiate use was found to be a significant predictor of car seat–associated hypoxia in both univariate and multivariate analysis.

A key issue in this field of research is the significance of any level of subclinical oxygen desaturation in newborns. This question is all the more compelling because there is evidence that some full-term newborns without any risk factors also have car seat–associated oxygen desaturation.⁷ Some have even called into question the validity of car seat testing as a routine procedure, claiming that there is no clear evidence of improved clinical outcomes associated with the testing and suggesting that an abnormal result on a car seat challenge could cause potentially harmful parental anxiety.⁸ Although it is true that there are no experimental studies that specifically demonstrate the risk to an individual newborn with an abnormal car seat test, given the currently available published information, it is unlikely that any randomized control trial could be performed at this juncture that could conclusively address that concern. As Davis correctly noted,⁵ there are other highly relevant reports in 2

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Department of Pediatrics, Newton-Wellesley Hospital, Newton, Massachusetts

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Address correspondence to Joel L. Bass MD, Department of Pediatrics, Newton-Wellesley Hospital, 2014 Washington St, Newton, MA 02462. E-mail: jbass@partners.org

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closely related areas that make the testing compelling. The first concerns the contribution of tissue hypoxia to increased neonatal morbidity, and the second concerns potential interference with ultimate cognitive outcomes. There is credible evidence to suggest that chronic hypoxia is associated with both apparent life-threatening events⁹ and sudden infant death syndrome.¹⁰ There are also reports of both apparent life-threatening events¹¹ and sudden infant death syndrome¹² occurring in car seats. The cognitive effects of both intermittent and chronic hypoxia in children, even with low-grade desaturation, has been conclusively documented in a large-scale review of the subject¹³ in so many other circumstances that it would be difficult to justify ignoring hypoxia in car seats. Of particular significance is the fact that newborns spend a considerable amount of time in car seats when used as infant carriers in addition to transport.¹⁴ Considering these risks, this new information on term low birth weight newborns is quite troubling given the biological plausibility of the association.

The report by Davis⁵ is a significant contribution to our understanding of the epidemiology of risk for oxygen desaturation of newborns in car seats. It has also drawn attention to the need for ongoing research in this area. Given that during normal breathing both term and preterm newborns maintain pulse oximetry levels $\geq 93\%$ to 97% ,¹⁵ coupled with the known risks of subclinical hypoxia, it would be prudent to include all failures $< 93\%$ in future research on this problem. Although, as the author suggested, more

evidence may be needed before making a recommendation to test all of these newborns, clinicians will need to take this new information into account and assess these patients carefully before discharge. If there is evidence of prenatal opiate exposure in a term low birth weight newborn, a car seat tolerance test would seem reasonable, given the consistently significant association with that risk factor observed in the report.

ABBREVIATION

AAP: American Academy of Pediatrics

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