Noninvasive Carbon Monoxide Screening for Environmental Tobacco Smoke Exposure in Children.

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Introduction

Exposure to environmental tobacco smoke (ETS) has been associated with an increased risk of perioperative respiratory complications in children (1-3). Due to the stigma attached to smoking, it is often difficult to obtain an accurate history for ETS exposure, so a preoperative screening tool would be desirable. Cotinine measurement in urine or serum is accurate and is considered the gold standard for testing for ETS exposure but is neither rapid nor noninvasive. Carbon monoxide is a product of combustion in tobacco smoke and can be measured in blood noninvasively by pulse CO-oximetry (SpCO) or in the lab by co-oximetry (COHb). The purpose of this study was to evaluate the ability of SpCO to screen for ETS exposure in children.

Methods

Following IRB approval and parental consent, 138 children aged 2-16 years having outpatient surgical procedures were enrolled. The child's parent was asked to complete a questionnaire designed to estimate ETS and other sources of carbon monoxide in the home. Immediately following induction of anesthesia, SpCO was measured with the Radical-7 Rainbow SET CO-Oximeter (Masimo, Irvine, CA) using an appropriately sized non-disposable sensor, and blood was drawn for laboratory measurement of serum cotinine and COHb. Regression analysis determined the correlation of SpCO with serum cotinine values. ROC curves analyzed the ability of SpCO or COHb to predict ETS exposure based on cotinine cutoff values known to be present in children exposed to ETS (4).

Results

SpCO did not correlate with cotinine (Fig 1). SpCO and COHb have poor discriminating ability for ETS exposure (Fig 2&3). Conclusion: The Masimo SpCO device does not appear to be a useful preoperative screening tool for ETS exposure in children. Similarly, blood COHb by co-oximetry has poor ability to identify ETS exposure.

References: (1) Drongowski RA et al. Pediatr Anesth 2003;13:304-10 (2) Lakshmipathy N et al. Anesth Analg 1996;82:724-7 (3) Skolnick ET et al. Anesthesiology 1998;88:1144-53. (4) Pirkle JL et al. JAMA 1996;275:1233-40.

Fig 1 Regression analysis Serum cotinine vs SpCO

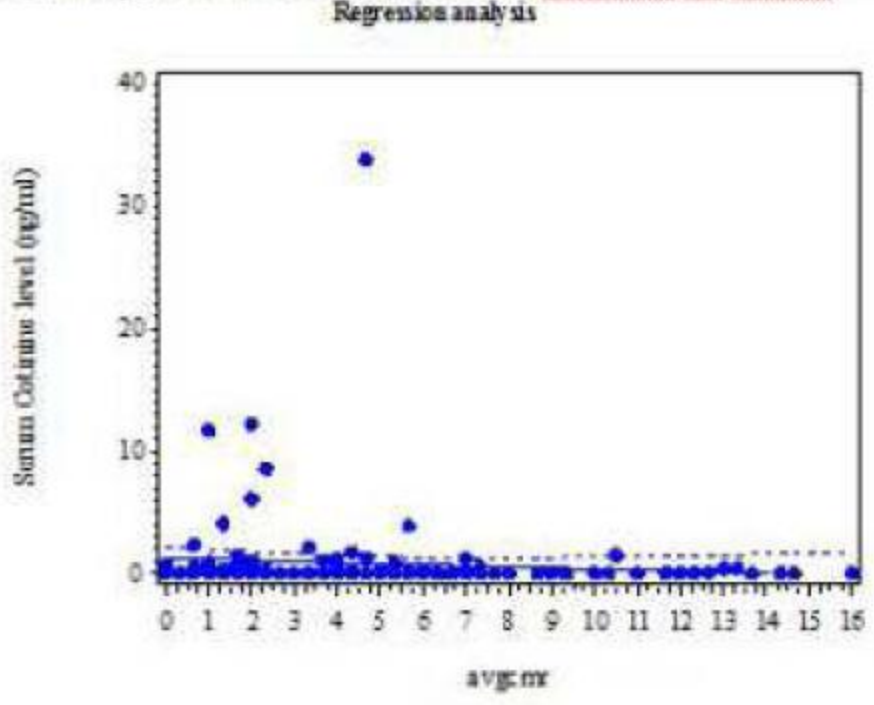

Figure 2

Fig 2 Discriminating ability of SpCO for ETS exposure

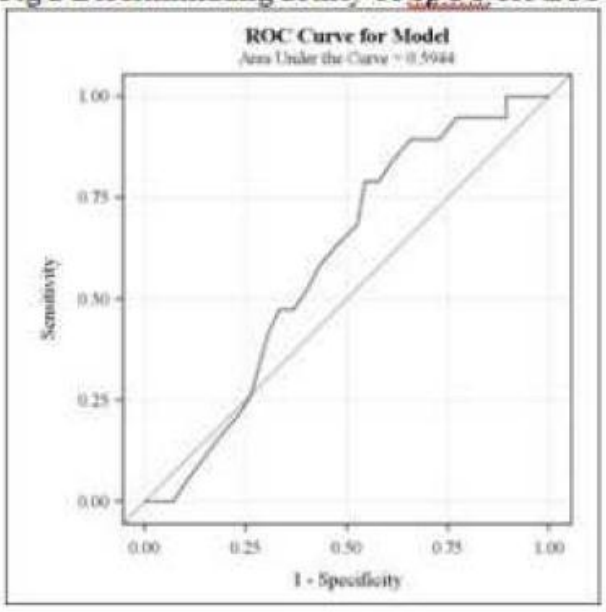

Fig 3 Discriminating ability of COHb for ETS exposure