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Use of capnography to optimize procedural sedation in the emergency department pediatric population

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Background: Hypoventilation in the pediatric population during procedural sedation in the emergency department (ED) may cause rapid decompensation because of reduced functional residual capacity in comparison to the adult population. Data suggest that capnography presents advantages over pulse oximetry in detecting respiratory depression before hypoxemia occurs.

Aim: The purpose of this study was to evaluate whether the addition of capnography to standard monitoring during procedural sedation confers clinical benefit (evidenced by interventions for hypoventilation) in research published from 2006 to 2016.

Method: Titles, abstracts, and full-text content were reviewed to identify studies in the PubMed database. The Cochrane Risk of Bias tool was used to assess the quality of included studies.

Results: Of 381 identified studies, one randomized controlled trial (RCT) and two observational studies met criteria for full text review. In the RCT (N=154), six patients received supplemental oxygen for hypoventilation and there was no statistical significant difference (p=.80) in the rate of oxygen desaturation between the groups; staff could view the capnography monitor (intervention) or were blinded to it (control). In one observational study, four of the 58 enrolled patients received supplemental oxygen for SpO2 less than 95% and two had repositioning of their airway with a shoulder roll or head tilt. In the second study, adverse respiratory events with intervention occurred in 14 of 125 enrolled children (11%; 95% confidence interval 4.0% to 14%): jaw thrust in four, supplemental oxygen in six and bag-valve-mask ventilation in four. Although capnography detected apnea before pulse oximetry in all occurrences of patient desaturation in the studies, no serious adverse events were documented.

Conclusion: Capnography can detect hypoventilation that may lead to hypoxia prior to changes in pulse oximetry. However, more data is needed to generate compelling evidence on clinical benefit during procedural sedation in the ED pediatric population.

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