A Retrospective Description of Anesthetic Medication Dosing for Underweight, Normal Weight and Overweight/Obese Children

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Introduction

Pediatric obesity is a major health concern in the U.S. and as many as 30% who require general anesthesia may be overweight or obese.1,2 Drug dosing in obese patients creates challenges due to the differential effects of body composition on the pharmacokinetics and pharmacodynamics of medications and the lack of data supporting dosing recommendations.3 The lack of data and recommendations is even greater for children, leaving significant gaps in the understanding of correct dosing in the clinical setting.4

Objectives

To examine whether the dosages of medications commonly administered to children peripherally varied by the classification of drug (i.e., recommended dose per ideal weight [RDIW]) versus actual weight (RDAW) and/or weight category of the child (i.e., underweight [UW], normal weight [NW] or overweight/obese [OW]).

Methods

• To determine whether children who are UW or OW were more likely than other children to receive under or over recommended doses, (RD) of commonly used medications.
• To compare the proportion of doses administered within recommended range between drug categories.

Hypothesis: Children who are OW would be more likely to receive higher than recommended doses in the RDIW category.

Specific Aims

• To determine whether children who are UW or OW were more likely than other children to receive under or over recommended doses, (RD) of commonly used medications.
• To compare the proportion of doses administered within recommended range between drug categories.

Results

The table describes the proportion of children in each weight group who were under- or overdosed with agents in each drug category.

Overweight patients:
• More likely to be underdosed 1.33[1.22, 1.46]; 1216 (38%) vs. 2307 (31%) and overdosed 1.41[1.17, 1.69]; 197 (6%) vs 327 (4%), but less likely to receive drugs within recommended dose range 0.70[0.66, 0.78]; 1816 (56%) vs 4763 (64%).
• As a group, OW patients have lower odds of getting underdosed 0.26[0.22, 0.31]; 267 (20%) vs 949 (30%) and higher odds of getting the recommended dose 2.04[1.76, 2.36]; 871 (66%) vs 945 (49%) of RD medications than RDAW.

Underweight patients:
• More likely to be overdosed 2.71[2.15, 3.43]; 96 (11%) vs 428 (4%) and less likely to be underdosed 0.58[0.49, 0.68] 200 (23%) vs 332 (34%).
• Less likely to be overdosed 2.71[2.15, 3.43]; 96 (11%) vs 428 (4%) p <0.05 and underdosed 0.58[0.49, 0.68] 200 (23%) vs 332 (34%) with RDIW compared to RDAW medications, but more likely to receive the recommended dose 3.41[2.49, 4.67]; 291 (81%) vs 281 (55%) of RDW meds than RDAW.

RDIW and RDAW medications:
• More likely to be overdosed 2.4[1.98, 2.85]; 331 (7%) vs 193 (3%) and recommended dose 2.05[1.90, 2.23]; 3260 (71%) vs 3319 (55%) of RDIW medications compared to RDAW and less likely to be underdosed 0.38[0.35, 0.41]; 981 (22%) vs 2542 (42%) with RDIW than RDAW medications.

Discussion/Implications

• These data suggest that 62% of children studied receive doses of commonly used agents outside current recommended dose ranges.
• OW children were less likely to be given drugs within the recommended range compared to other children.
• Furthermore, drugs in the RDIW category were more likely overdosed and less likely underdosed than drugs in the RDAW category.
• The implications of these findings in relation to safety and efficacy are unknown, and are limited given the lack of PK and PD data in children of varying weight groups.
• Implications are further limited by the nature of data retrieval, and the unknown influence of titration to effect in the presence of other agents or individual co-morbid conditions.
• Importantly, IW was calculated using the conservative estimate at the 50th percentile which may have resulted in over classification into the extreme weight groups.

References

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