The association of weight with drug dosing variation in children hospitalized with asthma

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Introduction

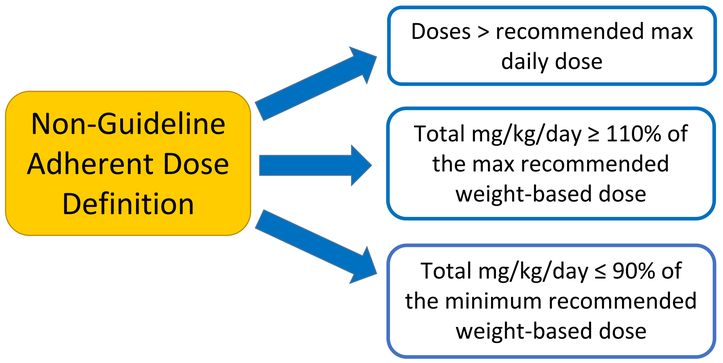
- Drug dosing recommendations for hospitalized children with asthma and obesity remain limited[1]
- This knowledge gap may lead to variability in prescribing practices in children with obesity
- As such, this population may be at serious risk of under or over-exposure to drugs and possible adverse drug events

Objectives

- To examine the prevalence of non-guideline adherent drug dosing by weight category in children hospitalized with asthma prescribed commonly used steroid drugs (Table 1)

Methodology

- Retrospective cohort study of children aged 2-17 years prescribed steroids during hospitalization for asthma in the years 2010-2017 using the Cerner Health Facts® database
- Steroid doses categorized as guideline adherent or non-guideline adherent based on NHLBI asthma guidelines[2]



- Weight categories were defined using age and sex specific BMI percentile guidelines from the CDC
- Chi-square tests and multivariable logistic regression models determined statistical differences in non-guideline adherent doses of all included steroid drugs between weight categories

Table 1. Included drugs and recommended daily dosing

Drug	Total Body Weight Based Dosing	Maximum Daily Dose
Prednisone	1-2 mg/kg/day	80 mg
Prednisolone	1-2 mg/kg/day	80 mg
Methylprednisolone	1-2 mg/kg/day	80 mg
Dexamethasone[3]	0.6 mg/kg/dose	16 mg

Figure 1. Proportion of encounters receiving non-guideline adherent drug prescriptions

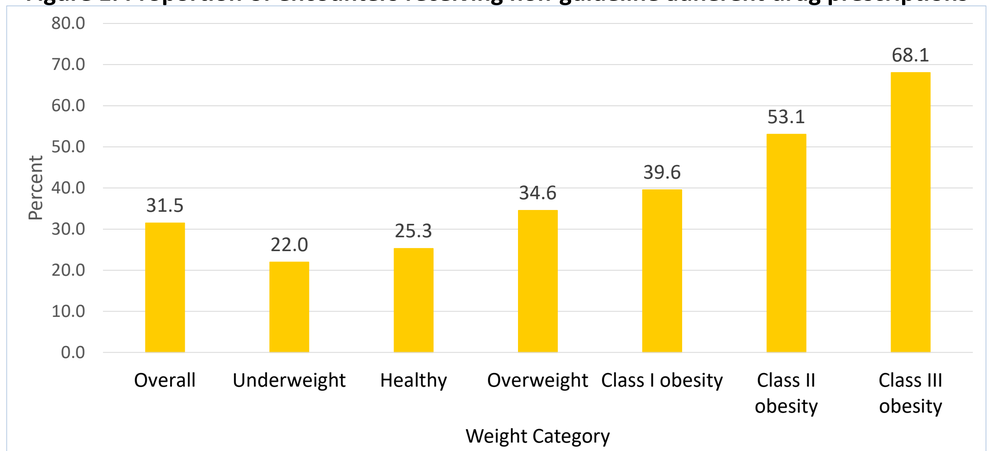
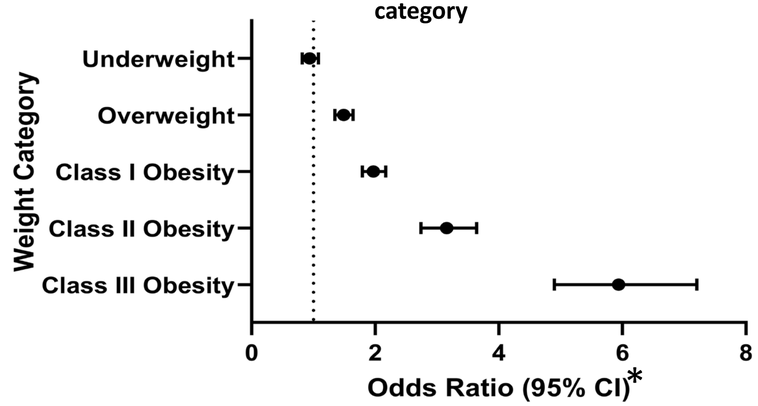


Figure 2. Adjusted likelihood of receiving non-guideline adherent steroid dose by weight category



*Model adjusted for all other significant variables associated with receiving non-guideline adherent doses: age, gender, race, payer, drug received, census region, teaching facility, and urban/rural location

Results

- We identified 24,155 patients hospitalized for asthma exacerbations who received at least 1 of the included drugs

Table 2. Select demographics

		Overall (%)
Age	2-5 years	8656 (35.8)
	6-10 years	10822 (44.8)
	11-14 years	3234 (13.4)
	15-17 years	1443 (6)
Gender	Male	14451 (59.8)
Race	Non-Hisp White	71925 (29.8)
	Non-Hisp Black	12308 (51.0)
Payor	Government	13475 (55.8)
	Private	4681 (19.4)

Table 3. Cohort weight categories

Weight Category	N (%)
Underweight	1,790 (7.4)
Healthy weight	13,040 (54.0)
Overweight	3,554 (14.7)
Class I obesity	3,648 (15.1)
Class II obesity	1,353 (5.6)
Class III obesity	770 (3.2)

- **A substantial number of children overall received non-guideline adherent drug doses (31.5%)** (Figure 1)
  - Rates of non-guideline adherent prescriptions increased as weight category increased, from 25.3% of the healthy weight group to 68.1% of those with Class III obesity (p<0.001)
- Weight category remained a significant independent predictor of receiving a non-guideline adherent dose in adjusted multivariable logistic regression models (p<0.0001) (Figure 2)

Conclusion

- Variation in prescribing practices for asthma exacerbation increases with increasing weight category, disproportionately affecting children with severe obesity
- This variation may put children with obesity at risk for potential adverse drug events or therapeutic failure

References

1. Harskamp-van Ginkel MW, Hill KD, Becker KC, et al. Drug Dosing and Pharmacokinetics in Children With Obesity: A Systematic Review. *JAMA Pediatr*. 2015;169(7):678-685
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3. Keeney GE, Gray MP, Morrison AK, et al. Dexamethasone for acute asthma exacerbations in children: a meta-analysis. *Pediatrics*. 2014;133(3):493-499