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## MSHP Annual Meeting 2016

### Controversies & Conundrums in Obesity

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## Objectives

- Differentiate between antibiotic dosing, and administration, in obese patients versus normal weight patients

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## Abbreviations

- VD: Volume of Distribution
- CL: Clearance
- PK: Pharmacokinetic
- BMI: Body Mass Index
- IBW: Ideal Body Weight
- TBW: Total Body Weight
- PNWT: Predicted Normal Weight
- LBW: Lean Body Weight
- AdjBW or ABW: Adjusted Body Weight

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## Obesity, a growing epidemic

- Earlier estimate: > 1/3 (>78 million) US adults obese
- Initial data: surgery did not help lifespan/ QOL
- Newer data: surgery benefits

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## WHO Estimates

- 2014: >600 million adults, over 18, obese
- 2014: >1.9 billion adults, over 18, overweight
- 2013: 42 million children < 5 obese
- Increasing: 'under-developed' Countries

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## Body Mass Index

- Based solely on height versus weight
- Muscle mass artificially inflates BMI
- On-line calculators available on many sites
- Different BMI scales
- If studies don't match your patient's BMI, caution with data

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### Adult BMI Used by Many Studies

Under-Weight	Ideal Body Weight	Overweight	Obese	Severely Obese	Morbidly Obese	Super Obese
Less than 19	19 to 25	25 to 30	30 to 35	35 to 40	40 to 50	> 50




### BMI: match the patient!

Underweight: less than 19    Ideal: 19 to 25    Overweight: 25 to 30  
 Obese: greater than 30, Severely Obese: greater than 35  
 Morbidly Obese: greater than 40    Super Obese: greater than 50

A. 70", 138 lb, BMI: 19.8


B. BMI 25 < 30

C. 64", 230 lb, BMI: 39.5




### Studies

- Most: small numbers of patients
- Need: multi-site studies for large numbers
- Verify: numbers at end of study match numbers required to see a difference
- Retrospective: less reliable than prospective
- May see additional changes with weight reduction surgery (ie not normalized)
- Need studies on this population




### Antibiotic Studies

- Often under-dosed, ICU pts: VD higher
- Lipophilic: TBW (higher load than maint)
- Hydrophilic: IBW/ABW
- Check levels when able
- Many studies did not include those with comorbidity



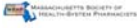
### Available Adult Data

Medication	Data	Recommendation
Aminoglycosides	Weak	? Load AIBW, then renal fct/levels (ABW high, IBW low)
Beta lactams	Weak-Mod	Higher doses required, AIBW or ABW
Carbapenems	Weak-Mod	4 hr infusion, upper limit of dosing
Cefazolin	Weak-Mod	High end of dosing, prophylaxis for surgery (2 to 3 gm). Studies primarily in weight loss surgery and pregnancy.
Cephalosporins	Weak	Upper end of dosing
Ciprofloxacin	Weak	Upper end of dosing, old data- outdated?
Daptomycin	Weak	TBW with cap? Appears different PK/PD



### Available Adult Data

Medication	Data	Recommendation
Ertapenem	Weak	Conflicting data regarding dose (4 hr infusion)
Fluoroquinolones	Weak	Higher end of dosing, lower tissue concentrations
Levofloxacin	Weak	Conflicting data
Linezolid	Weak	Continuous infusion; ? IBW, AIBW
Macrolides	Weak	undetermined
Meropenem	Weak	Upper end of dosing, 4 hr infusion?



### Available Adult Data

Medication	Data	Recommendation
Piperacillin/Tazobactam	Moderate	4 hr infusion
QuinipristinDaltopristin	Weak	TBW, with cap?
Vancomycin	Moderate	Nomogram, max dosing, use levels
Voriconazole	Weak	Conflicting data
**Oseltamivir**	Weak	160 mg bid (unless decreased renal fct)

- ### Key Takeaways
- Majority of antibiotic data, in obese patients: weak
  - Use ABW dosing recommendation if data lacking
  - Create Multidisciplinary Committee for dosing plans on all populations
  - While data remains limited in pediatric patients, decision tools available

- ### Post-Test
- In regards to antibiotics in obese adult patients:
- A. As long as renal and hepatic function are normal, no dose change is required
  - B. Dosing information should be separated by BMI category, but data is lacking.
  - C. Antibiotics that are not fat soluble never require dose changes in obese adults.
  - D. Patients with a BMI > 50 must be dosed on actual body weight for antibiotics, because their infections are so difficult to treat

- ### Pediatrics: take home info
- Limited pedi data, less on obese pedi
  - Cannot 'class' dose meds without data
  - Extra caution: narrow therapeutic range
  - Load doses: ABW or TBW, break up load (ie narrow therapeutic range)
  - Maintenance doses: IBW

- ### Pediatrics: take home info
- Decision tool recommended
  - Create decision support tool, based on current tools
  - Prioritize medications to review
    - Determination of weights (ie TBW, ABW, IBW, LBW)
    - Determine scoring

- ### Pediatrics: take home info
- Sites FOR REVIEW, that may be useful:
    - <http://onlinelibrary.wiley.com/doi/10.1111/anae.12860/pdf>
    - <http://www.schn.health.nsw.gov.au/policies/pdf/2013-7034.pdf>
    - [http://pals-guidelines.mscscience.com/pals\\_review\\_meds2\\_learn\\_2.html](http://pals-guidelines.mscscience.com/pals_review_meds2_learn_2.html)
    - <http://www.ncbi.nlm.nih.gov/pubmed/25961828>
    - <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3018176/>

## References: ClinCalc

- Drug Dosing in Obesity Reference Table
- An evidence-based drug dosing resource
- Dosing weight-based medications in obese patients can often be a tricky proposition. Most medications do not have guidelines for morbidly obesity, forcing clinicians to pursue in-depth literature searches in order to decide on a dose.
- The purpose of this page is to serve as a dynamic, growing repository of evidence-based recommendations regarding medication dosing in obese patients. I would encourage you to examine each medication's cited references in order to form your own conclusions. As always, reasonable clinical judgment is required in conjunction with this information.
- Lastly, if you have primary literature regarding obesity dosing for a medication that is not listed on this table, please [contact me with the drug name and citation](#) and I would be happy to add it to the list.
- Acyclovir † Dose using [ideal body weight \(per package insert\)](#)
- No information about dose adjustments in extremely obese patients exists
- ClinCalc (2015). Drug Dosing in Obesity Reference Table. Retrieved from ClinCalc online <http://clincalc.com/Kinetics/ObesityDosing.asp>



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