

SHC Antimicrobial Dosing Guide for Obesity
Definitions and Equations

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height}^2 (\text{m}^2)}$$

WHO BMI Classification	Definition
Obese Class I and II (obese)	BMI 30-40 kg/m ²
Obese Class III (morbidly obese)	BMI ≥ 40 kg/m ²

Body Weight	Equation ¹
IBW (kg) Ideal body weight	Male: $50.0 + 2.3 \times (\text{number of inches over 5 ft})$ Female: $45.5 + 2.3 \times (\text{number of inches over 5 ft})$
AdjBW (kg) Adjusted body weight	$\text{IBW} + \text{C} \times (\text{TBW} - \text{IBW})$ C = either 0.3 or 0.4 (AdjBW _{0.3} or AdjBW _{0.4})
LBW₂₀₀₅ (kg) Lean body weight	Male: $\frac{9270 \times \text{TBW}}{6680 + 216 \times \text{BMI}}$ Female: $\frac{9270 \times \text{TBW}}{8780 + 244 \times \text{BMI}}$
LBW (for anti-tuberculosis medications):	<ul style="list-style-type: none"> Obesity: ATS/CDC Guidelines recommend dosing based on estimated lean body weight. Lean Body Weight (men) = $(1.10 \times \text{Weight(kg)}) - 128 \times (\text{Weight}^2 / (100 \times \text{Height(m)})^2)$ Lean Body Weight (women) = $(1.07 \times \text{Weight(kg)}) - 148 \times (\text{Weight}^2 / (100 \times \text{Height(m)})^2)$
TBW (kg) Total/actual body weight	

Table 1.^{1,153} Recommended Antibiotic Dosing in Obesity (BMI ≥ 30 kg/m²)

Drug	Dose ^a	Study Type ^b			Comments
		Case studies	PK/PD studies	Clinical outcomes	
Acyclovir ^{146-148, 162}	Use ideal or adjusted body weight		•	•	<ul style="list-style-type: none"> PK study: 5mg/kg IV x1 showed that dosing based on IBW in obese patients led to lower AUC than dosing by TBW in normal-weight patients. Authors suggest using AdjBW Renal function may be a more important consideration than weight-based dosing in obese patients No difference in AKI rates with AdjBW compared to IBW dosing¹⁶²
Aminoglycosides					
- At SHC, weight-based dosing is recommended. For AUC/MIC targeted bedside dosing approach, see references 151-152					
Amikacin	Use adjusted body weight (AdjBW _{0.4}) for initial dose		•		Adjust by TDM
Gentamicin ⁵⁵⁻⁶¹	Use adjusted body weight (AdjBW _{0.4}) for initial dose		•		Adjust by TDM
Tobramycin ^{55-57,61,62}	Use adjusted body weight (AdjBW _{0.4}) for initial dose		•		Adjust by TDM
Amoxicillin ± clavulanate	Amoxicillin: 1g PO every 8 hours Amoxicillin/clavulanate: 875mg/125mg PO every 8 hours or 2000mg/125mg XR PO BID		•		
Ampicillin	Insufficient data	•			<ul style="list-style-type: none"> Consider upper limit of normal dosing in severe infections,^c e.g. up to 2g q4h Single study with 6 patients: higher V_d but decreased V_d/kg_{TBW}, CL unchanged²

Drug	Maximum Dose ^a	Study Type ^b			Comments
		Case studies	PK/PD studies	Clinical outcomes	
Amphotericin (Liposomal) 135,150,160	Adjusted body weight Total body weight in life-threatening infections and/or critically ill; caution with doses > 5mg/kg/day		•	•	<ul style="list-style-type: none"> - Limited clinical data. In 1 study, use of TBW correlated with increased nephrotoxicity without significant difference in efficacy (mortality, readmission, LOS) compared to AdjBW.¹⁶⁰ - Caution using TBW with doses > 5mg/kg. PK reported to be non-linear at >5mg/kg doses (max Cmax and AUC at 10mg/kg/day). - 1 PK study suggests fixed dose for ≥ 100 kg, i.e. 300mg max for 3mg/kg or 500mg max for 5mg/kg.¹⁵⁰ Safety data: at doses 7.5-15 mg/kg/day, similar discontinuation rates, but high rate (up to 40%) of kidney injury
Aztreonam	Insufficient data	•			<ul style="list-style-type: none"> - Single case report suggests higher dosing needed⁴³ - Consider upper end of normal dosing in severe infections, ^c e.g. 2g q6-8h
Cefazolin ¹⁵⁻²¹	Insufficient data	•	•	•	<ul style="list-style-type: none"> - Consider upper limit of normal dosing in severe infections, e.g. up to 2 g q8h (option for continuous infusion)²², or 1.5-2 g q6h intermittent dosing - In post-trauma critically ill patients, data suggests 2g q6h if CrCl > 215 ml/min.²³
Caspofungin ^{133-135,155}	70 mg x1, then 50-70 mg daily		•	•	<ul style="list-style-type: none"> - Higher dose may be considered in serious infections, mainly based on PK optimization and low risk of serious adverse effects. Limited clinical data. - 17 studies reported lower echinocandin exposure in overweight/obese compared to normal weight.¹⁵⁵ - One PK study suggests 70mg daily for wt >80kg in critically ill.¹⁵⁶ - One retrospective study showing worse outcomes (infection related LOS) in obese with Candidemia¹⁵⁷
Cefepime, ceftazidime ^{14,24,25}	Up to 2g q8h extended infusion	•			<ul style="list-style-type: none"> - Extended infusions preferred for obese patients with critical illness or higher CrCl to overcome variability in serum concentrations
Cefpodoxime	No data				<ul style="list-style-type: none"> - Consider upper end of normal dosing in severe infections, ^c up to 400mg PO every 12 hours
Ceftaroline ⁷¹⁻⁷³	No change to dose		•	•	<ul style="list-style-type: none"> - Based on PK simulations, consider q8h if targeting 50% fT>MIC for MRSA
Ceftazidime/ avibactam ^{26,27}	No change to dose		•		
Ceftolozane/ tazobactam ²⁸	No change to dose		•	•	
Ceftriaxone	Insufficient data			•	<ul style="list-style-type: none"> - Consider 2 g every 24 hours or 2 g every 12 hours in severe infections¹⁶³
Cephalexin	No data				<ul style="list-style-type: none"> - Consider upper end of normal dosing in severe infections, ^c e.g. 500-1000 mg q6h

Drug	Maximum Dose ^a	Study Type ^b			Comments
		Case studies	PK/PD studies	Clinical outcomes	
Cidofovir ¹⁴⁹	Use adjusted body weight				<ul style="list-style-type: none"> - No data - Based on similar PK profile and physiochemical properties as acyclovir, long intracellular half-life, dose-limiting toxicity (e.g. myelosuppression, nephrotoxicity)
Ciprofloxacin ⁴⁴⁻⁴⁷	In critically ill patients on CRRT: 750mg PO q12h or 400 mg IV q8h	•	•		<ul style="list-style-type: none"> - Insufficient data in other populations and settings: consider upper end of normal dosing in severe infections,⁶
Clindamycin ^{18,74-76}	IV: 600 mg q6h or 900 mg q8h PO: 450 - 600 mg q6h or 600- 900 mg Q8H		•	•	<ul style="list-style-type: none"> - Studies from prosthetic joint infection and SSTI suggest increased doses warranted - Manufacturer maximum: 2,700 mg/day in severe infections; 4,800 mg/day given by intermittent or continuous infusion for life-threatening infections⁷⁷
Colistin methanesulfonate ⁶³⁻⁶⁷	Use IBW	•	•	•	<ul style="list-style-type: none"> - Maximum dose of 360 mg daily to limit the risk of nephrotoxicity - Caution: PK study reports suboptimal PK/PD target attainment with 360mg IV daily at CrCl > 80mL/min and isolate MIC = 2 mg/L, though not clinical validated
Dalbavancin ⁷⁸⁻⁸¹	No change to dose		•	•	<ul style="list-style-type: none"> - Based on phase 3 trials in SSTI
Daptomycin ^{18,61,81-91}	Same weight-based dose but use adjusted body weight (ADJBW _{0.4})	•	•	•	<ul style="list-style-type: none"> - Caution in renal insufficiency, dialysis. Monitor CKs and signs of myopathy
Ertapenem ^{13,18,32-35}	No change to dose		•	•	
Fluconazole ^{135-139, 158}	Candidiasis: 12mg/kg _{TBW} X1 load, then 6mg/kg _{TBW} q24h (minimum maintenance dose 800mg if <i>C.glabrata</i>)	•	•	•	<ul style="list-style-type: none"> - In critically ill, esp with CrCl > 50, higher doses may be warranted to achieve PK/PD target of fAUC/MIC > 100, esp if MIC > 2 <i>Candida spp.</i>¹³⁷ - PK data suggests variable exposures in obese, increased risk of suboptimal PD attainment¹⁵⁸ - Limited clinical data showing worse outcomes (infection related LOS) in obese patients with Candidemia¹⁵⁷ - Consider TDM for severe infections - Doses up to 1200 mg daily have been reported for tx of <i>Cryptococcus meningitis</i>
Flucytosine ¹³⁵	IBW, then adjust by level	•			<ul style="list-style-type: none"> - Single case report. - Adjusted body weight has been suggested in life-threatening infections
Foscarnet ¹⁴⁹	Use adjusted body weight				<ul style="list-style-type: none"> - No data - Based on similar PK profile and physiochemical properties as acyclovir, long intracellular half-life (except foscarnet, which deposits in bone), dose-limiting toxicity (e.g. nephrotoxicity, electrolyte abnormalities correlating to increased risk of seizure and cardiac arrhythmia)

Drug	Maximum Dose ^a	Study Type ^b			Comments
		Case studies	PK/PD studies	Clinical outcomes	
Ganciclovir ^{149, 154, 161}	Use adjusted body weight			•	Single retrospective study: no difference in neutropenia or efficacy in AdjBW compared to TBW dosing.
Imipenem	No data				Use caution in renal impairment and with high doses (1g q6h): increased risk of seizures
Linezolid ^{18,37,81,92-100,153}	No change to dose	•	•	•	- 1 PK study in critically ill, obese patients with SSTI showed suboptimal PK/PD target attainment with 600 mg q12h for MIC ≥ 1 mg/L but increased risk of thrombocytopenia with higher dosing. Higher dosing not recommended without TDM.
Meropenem ^{4,9,18,30,36-42}	Up to 2g IV every 8 hours extended infusion, particularly in critically ill patients	•	•		- Extended infusion recommended if critically ill, FN, CF, obese with CrCl > 100 ml/min or CRRT, if targeting a higher PD endpoint of 100% fT>MIC, or infections with less susceptible pathogens (i.e. MIC ≥ 2)
Metronidazole	No change to dose		•	•	- Retrospective study (n=68 obese, n=132 non-obese) patients treated with 500mg q12-8h for anaerobic or mixed anaerobic infections resulted in 85% clinical cure rates, suggesting no dose change in obesity. - PK data suggests insufficient interstitial fluid concentrations suggesting pre-operative dosing modification.
Moxifloxacin ⁵²⁻⁵⁴	No change to dose		•		- No change to dose based on single PK study in gastric bypass surgery patients
Nafcillin	Insufficient data	•			- Single case report in critically ill, obese patient ³ : consider upper end of normal dosing in severe infections, ^c e.g. up to 2 g q4h
Omadacycline (SHC nonformulary)	No change to dose		•	•	- Gastrointestinal adverse events may be more frequent with oral loading doses
Piperacillin-tazobactam ⁴⁻¹⁴	Up to 4.5 g q8h (extended infused over 4 hours) or 4.5 g q6h (30 min infusion) CrCl 100 to < 150 ml/min: up to 4.5 g IV every 6 hours (extended infusion over 4 hours)	•	•	•	- High dose (4.5 g) and extended infusion preferred if critically ill, treating pathogen with MIC ≥ 8 mg/L, or CrCl > 100 mL/min - Caution: 4.5g every 6 hours intermittent infusion and 4.5g every 6 or 8 hours extended infusion regimens at MIC = 16 mg/L and CrCl = 150 mL/min may be insufficient
Polymyxin B ⁶⁷⁻⁷⁰	Limited data. Consider adjusted body weight (AdjBW _{0.4}), especially in upper end of dosing range	•	•		- Consider maximum dose 200-249 mg daily to limit risk of toxicity though not clinical validated; may be insufficient for MIC > 0.5 mg/L in obese patients
Sulfamethoxazole/trimethoprim ^{76,101}	SSTI or severe/complicated UTI: up to 320 mg (TMP component) PO BID or 8-10 mg _{TMP} /kg _{AdjBW} /day in divided doses		•	•	- Consider adjusted body weight when using high doses (e.g. >8 mg/kg/day) - 1 study suggests using >5mg/kg/day for weight > 120kg for the treatment of cellulitis - While dose capping was not described in obesity literature, some experts suggest a 960mg TMP daily limit. ¹⁶⁴

Drug	Maximum Dose ^a	Study Type ^b			Comments
		Case studies	PK/PD studies	Clinical outcomes	
Vancomycin ^{18,37,61,108-132}	<u>Load:</u> 20-25 mg/kg _{TBW} (consider a maximum of 3 g) <u>Maintenance (initial):</u> Use InsightRX or PK calculator (link) Target AUC ₂₄ x CL _{van} (maximum of 2g/dose) Consider an initial maximum daily dose of 4.5 g	•	•		- CL _{van} as defined by Crass et al: $9.656 - 0.078 \times \text{age} - 2.009 \times \text{SCr} + 1.09 \times \text{sex} + 0.04 \times \text{TBW}^{0.75}$, where sex is 1 if male and 0 if female, and TBW is total body weight in kg. - Adjust doses by TDM (peak and trough) using PK calculations (link) or InsightRX and AUC targets. - If calculating without software, see Hong et al for equations. ¹¹⁹ - If only measuring troughs, more cautious and frequent initial monitoring of levels may be warranted
Voriconazole , ^{135,140-145,159}	Use adjusted body weight	•	•	•	- Adjust dosing based on TDM - Retrospective TDM studies frequently showed supratherapeutic levels in obese subjects when dosed by TBW - Retrospective study showed better target attainment with AdjBW compared to TBW dosing ¹⁵⁹ - Steady state plasma PK of voriconazole did not suggest weight-based dose adjustments necessary

a. Does not include dose adjustments for renal and/or hepatic impairment. Doses listed are within usual safety margins. Adjust doses appropriate for other variables such as indication, severity, pathogen, and site of infection. Lower doses may be sufficient in mild infections (e.g. UTI). Dosages are based on the provided references and/or the authors' opinion and should not replace clinical judgment. CrCl assumes calculation using AdjBW_{0.4} unless specified in table.

b. Dots represent types of studies available and not quantity. See Meng et al 2017 Supplement for additional references and summary of studies used in developing dosing guidance.⁽¹⁾

c. Dosing recommendations are based on similarities in PK profile and dosing recommendations with other antibiotics of the same class, and toxicity risks of higher dosing regimens when there is insufficient or no data in obese patients. Clinicians must weigh the benefits and risks of larger doses in obese patients.

DOCUMENT INFORMATION

A. Original Author/Date

Lina Meng, PharmD, BCIDP, BCCCP: 12/27/2016

B. Gatekeeper

SASS Program

C. Review and Renewal Requirement

This document will be reviewed every three years and as required by change of law or practice

D. Revision/Review History

Lina Meng, PharmD, BCIDP, BCCCP: 07/24/2017, 5/22/2020, 12/2023
 Emily Mui, PharmD, BCIDP: 03/27/2017, 07/24/2017, 5/22/2020, 12/2023
 Will Alegria PharmD, BCIDP: 5/22/2020, 12/2023
 David Ha, PharmD, BCIDP: 5/22/2020, 12/2023
 Marisa Holubar MD MS: 03/27/2017, 07/24/2017, 12/2023
 Stan Deresinski MD: 03/27/2017, 07/24/2017, 12/2023

E. Approvals

Antimicrobial Subcommittee: 3/30/2017, 8/17/2017, 5/27/2020, 1/18/2024
 Pharmacy and Therapeutics Committee: 4/21/2017, 9/15/2017, 2/2024

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