



# Pharmacist Meeting

*March 2018*

# Vancomycin

## *Weight based dosing (total body weight vs adjusted)*

### ■ **Background:**

- 2012 – high incidence of supra-therapeutic troughs prompted change to adjusted body weight (ABW) dosing (for Vd and CrCl calculations)
  - Some data suggests clearance may be most closely associated with ABW → Vd increases in obese patients but not to the same extent as Cl (results in higher than expected troughs)
  - **$K = CL/\uparrow\uparrow V = \downarrow\downarrow k = \uparrow\uparrow C_{min}$**
- Lowered our percentage of troughs exceeding goal range from ~ 30% to < 10%

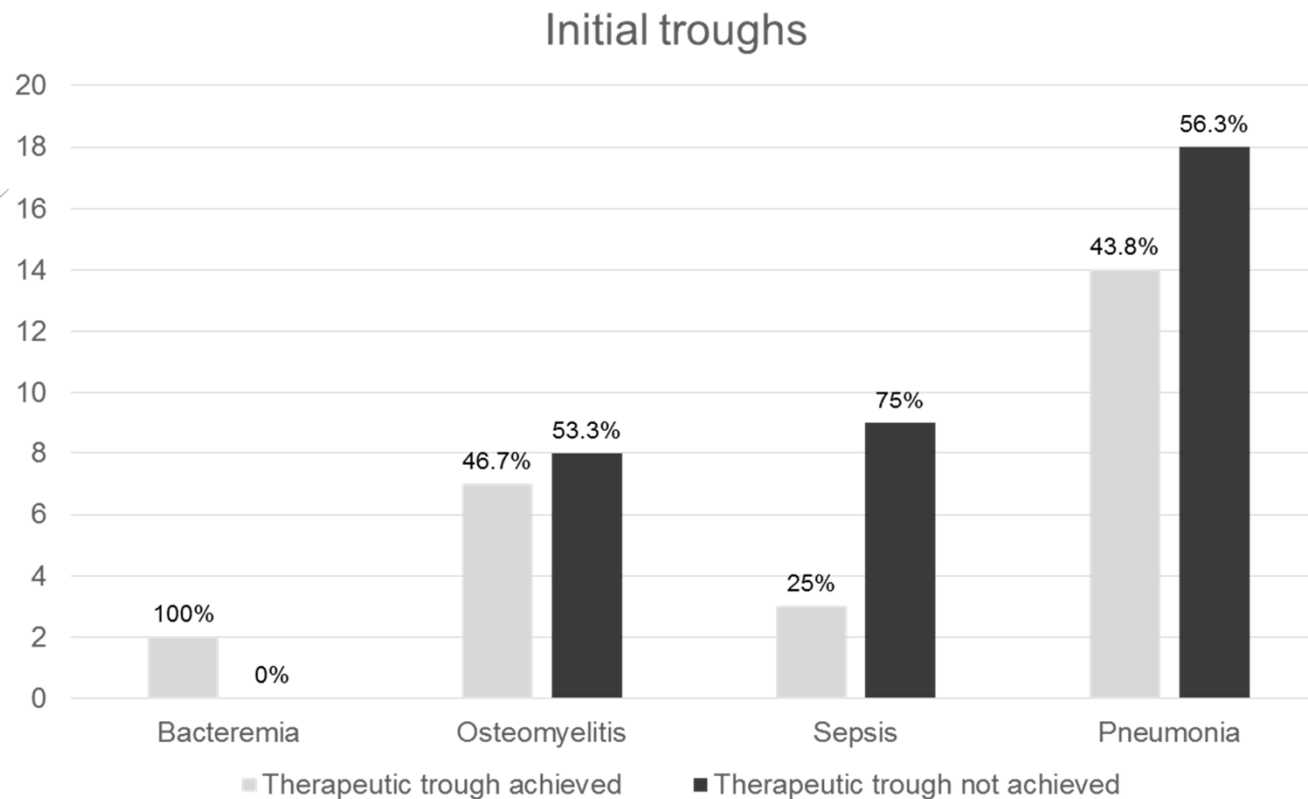
### ■ **Implications of using adjusted body weight for LD calculation**

- Adjusted body weight used to lessen chance for elevated troughs/acute kidney injury
- Loading dose goal: rapidly achieve therapeutic concentrations in patients with sepsis or complicated infections
- Smaller loading doses may contribute to initial trough being lower than needed
- Isolated cases of low troughs prompted a review – ABW for maintenance dose calculation has decreased elevated levels although higher loading doses may be needed to more rapidly attain therapeutic levels

# Vancomycin

## *Loading Doses & Attainment of therapeutic troughs*

- Retrospective review of obese patients (BMI > 30) with indications necessitating 15-20 trough



# Vancomycin

## *Loading Doses & Attainment of therapeutic troughs*

- **Average initial trough values (n=61 patients):  
(excluding hemodialysis or pulse dosed patients)**
  - Initial level < 15: 12.38 mg/dL (range 6 – 14.6 mg/L)
  - Initial level < 10 mg/L: **11.5% of patients** (n=7)
- **Significant number of patients with sub-therapeutic initial troughs**
- **This is not a problem unique to CHI Memorial**
  - Various published protocols achieved initial therapeutic concentrations in only 25-52% of cases (obese & non-obese patients)



# Vancomycin

## *Loading Doses & Attainment of therapeutic troughs*

- Average TBW loading dose → **16.9 mg/kg**, ranging from 5.7 to 29.0 mg/kg.
- Average ABW loading dose → 22.1 mg/kg, ranging from 7.8 to 36.2 mg/kg.
- Average dose variance for all patients to attain a TBW 25 mg/kg loading dose (no dose cap) → **968 mg per patient**.
- Only 3 (4.9%) out of all 61 patients reached a supra-therapeutic level.

# Vancomycin

## New Loading Dose Process

- ▶ **TOTAL body weight (TBW) to now be used for LOADING DOSE determination**
  - ▶ Maximum of 3 gram load → 25-30 mg/kg loading dose
  - ▶ Exception: Hemodialysis patients will remain with 2 gram maximum dose
- ▶ **Loading doses exceeding 2 grams**
  - ▶ To be administered using a “divided-load”
  - ▶ Example: 94 kg patient with sepsis → 2,500 mg dose (26.6 mg/kg) → 1,250 mg IV Q 6 hrs x 2 doses
  - ▶ Maintenance dose to start at next scheduled dosing interval timed from the final “divided” load
- ▶ **Divided Loading Doses (any LD > 2 grams – patients ≥ 84 kg)**
  - ▶ Doses > 2 grams → all doses will be either 2,500 mg or 3,000 mg
    - ▶ 2,500 mg (1,250 mg Q 6 hours x 2)
    - ▶ 3,000 mg (1,500 mg Q 6 hours x 2)
  - ▶ Doses < 2 grams → rounded to nearest 250 mg

# Vancomycin

## New Loading Dose Process

- ▶ **Guideline based loading doses for majority of all patients (25-30 mg/kg – TBW)**
  - ▶ Exception: patients  $\geq 123$  kg will fall short of this range
  - ▶ Calculator will advise you to administer the first maintenance dose early for these patients (examples on next slides)
- ▶ **Applies to all patients with desired trough 15-20 mg/L (except HD patients)**
  - ▶ Sepsis, meningitis, pneumonia, endocarditis, osteomyelitis
- ▶ **Acute renal failure patients → also to receive TBW loading dose**
  - ▶ Subsequent doses to be based on levels

# Vancomycin Dosing

## *Calculator Changes (comparison on next slide)*

- ▶ **Loading dose → based on TBW for ALL patients**
  - ▶ Automatically rounds all doses to the appropriate dose (obese & non-obese)
  - ▶ Rounds all LD's exceeding 2 grams to either 2.5 gm or 3 gm doses
- ▶ **Maintenance dose calculation → no change**
  - ▶ Still uses adjusted body weight (ABW) for Vd & CrCl
- ▶ **Patients  $\geq$  123 kg (if loading dose needed)**
  - ▶ 3 gm LD will not be b/w 25-30 mg
  - ▶ Calculator will advise you to give the 1<sup>st</sup> maintenance dose early based on half-life
    - ▶ < 8 hours → 6 hours post LD; 8-12 hours → 8 hours post LD; 13-24 → 12 hours post LD,  
> 24 hours → based on levels

Loading Dose: 3000 mg

LD: 22.2 mg/kg TBW

Give as 1500 mg Q6 hrs x 2 doses.:

**Begin Maintenance Dose 8 hrs after 2nd loading dose.**



# Vancomycin Calculator Changes

## New Calculator

## Current Calculator

### Vancomycin Maint. Dosing

Age	55	yrs
Gender	m	
Height	72	inches
Actual Weight	85	kg TBW
SCr	1.2	
Maint. Dose	1250	mg
Dosing Interval	12	hours
Infusion Length	1.5	hour(s)
CrCl	76.34	ml/min
Vd	56.4	L
Ke	0.0678	
1/2 life	10.23	hours

Name: \_\_\_\_\_  
Acct: \_\_\_\_\_

% Ideal: 109.5 %  
IBW: 77.6 kg  
Adj.BW: 80.6 kg

Maint. Dose: 15.5 mg/kg Adj.BW  
Wt for Vd: 80.6 kg Adj.BW  
(uses Adj.BW unless pt weighs < IBW)  
Wt for CrCl: 77.6 kg IBW  
(uses IBW unless pt weighs < IBW)

Vd factor:   
(uses 0.7 if left blank)  
MIC:   
(uses 1.5 if left blank)

Optimal AUC:MIC ratio 400 or greater.

AUC:MIC 435.8  
EST Peak 37.87 mcg/ml  
EST Trough 18.59 mcg/ml

Loading Dose: 2500 mg  
**Give as 1250 mg Q6 hrs x 2 doses.**

**LD: 29.4 mg/kg TBW**

**Maint. Dose → No changes**

### Vancomycin Int. Dosing

Age	55	yrs
Gender	m	
Height	72	inches
Actual Weight	85	kg TBW
SCr	1.2	
Maint. Dose	1250	mg
Dosing Interval	12	hours
Infusion Length	1.5	hour(s)
CrCl	76.34	ml/min
Vd	56.4	L
Ke	0.0678	
1/2 life	10.23	hours

Name: \_\_\_\_\_  
Acct: \_\_\_\_\_

% Ideal: 109.5 %  
IBW: 77.6 kg  
Adj.BW: 80.6 kg

Maint. Dose: 15.5 mg/kg Adj.BW  
Wt for Load/Vd: 80.6 kg Adj.BW  
(uses Adj.BW unless pt weighs < IBW)  
Wt for CrCl: 77.6 kg IBW  
(uses IBW unless pt weighs < IBW)

Vd factor:   
(uses 0.7 if left blank)  
MIC:   
(uses 1.5 if left blank)

Optimal AUC:MIC ratio 400 or greater.

AUC:MIC 435.8  
EST Peak 37.87 mcg/ml  
EST Trough 18.59 mcg/ml

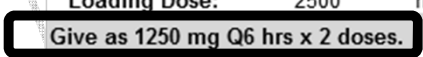
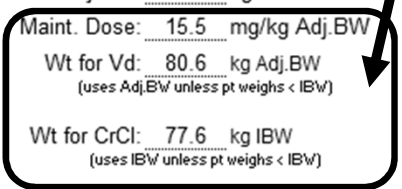
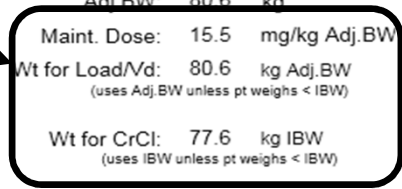
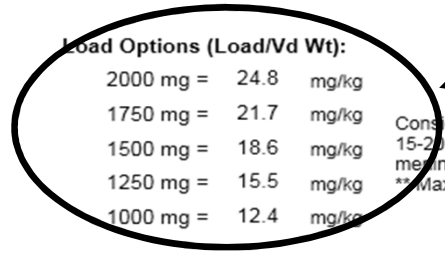
### Load Options (Load/Vd Wt):

2000 mg =	24.8 mg/kg
1750 mg =	21.7 mg/kg
1500 mg =	18.6 mg/kg
1250 mg =	15.5 mg/kg
1000 mg =	12.4 mg/kg

Consider loading dose only for indications requiring a trough 15-20. (bacteremia, osteomyelitis, pneumonia, endocarditis, meningitis).  
\*\*Max recommended load = 2 gm\*\*

**ABW Loading Dose**

**TBW Loading Dose**





# **Vancomycin Dosing** *Changes*

**Questions???**