

Comparison of vancomycin troughs and acute kidney injury in obese patients dosed on a divided-load nomogram versus adjusted body weight-based protocol

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Background

- Vancomycin is the antibiotic of choice for methicillin-resistant *Staphylococcus aureus* infections, and incidence of obesity in the United States is increasing
- Studies have investigated reduced-dosing nomograms for obese patients that may allow for standardized dosing without cumbersome pharmacokinetic calculations
- The divided-load dosing nomogram evaluated herein was first studied by Denetclaw et al. and resulted in 89% therapeutic troughs and 6% supratherapeutic troughs after 12 hours

Outcomes

For the divided-load nomogram versus adjusted body weight-based protocol

- Primary outcome: therapeutic trough attainment
- Secondary outcomes: subtherapeutic and supratherapeutic trough attainment, incidence of acute kidney injury

Methods

In this retrospective observational cohort analysis, patients were/had:

- At least 18 years old
- Receiving intravenous (IV) vancomycin therapy
- Actual body weight >137% ideal body weight (IBW)
- At least one vancomycin trough drawn
- Creatinine clearance (CrCl) ≥21 mL/min
- Excluded for pregnancy, limb amputation, paralysis, nephrectomy, kidney transplant

| Adjusted Body Weight-Based Protocol | |
|-------------------------------------|----------------------|
| Loading | 25-30 mg/kg on AdjBW |
| Maintenance | 15 mg/kg on AdjBW |

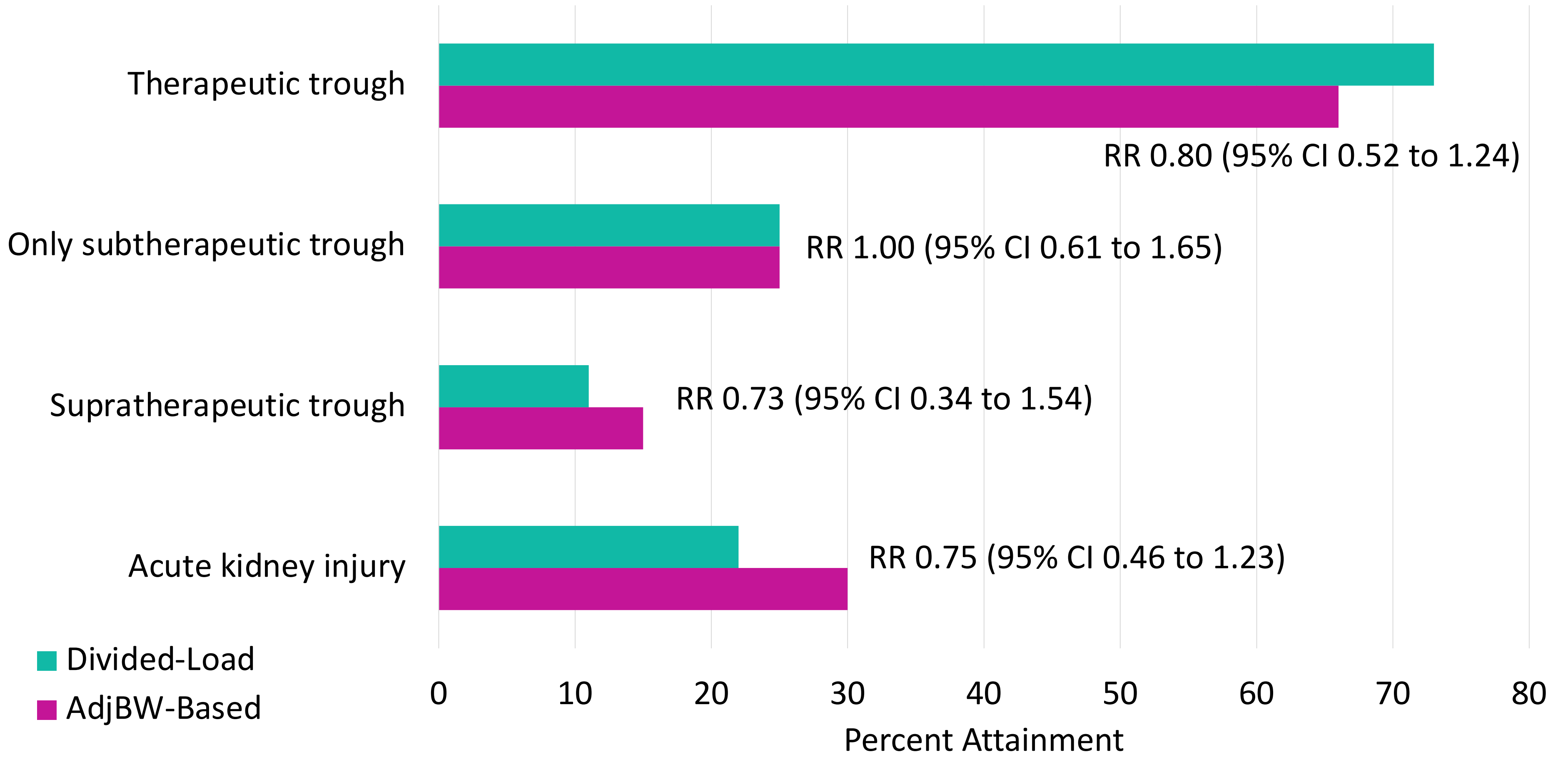
| Divided-Load Nomogram | | | |
|-----------------------|---------------|----------------------------|-------------------------------------|
| IBW (kg) | CrCl (mL/min) | Vancomycin IV loading dose | Notes |
| ≤83 | >60 | 1 g q6h | Not to exceed 20 mg/kg IBW per dose |
| ≤83 | 21-60 | 1 g q6h | Not to exceed 17 mg/kg IBW per dose |
| >83 | ≥21 | 15 mg/kg IBW q6h | Not to exceed 1.5 g per dose |

| Maintenance Frequency | | |
|-----------------------|---|----------|
| CrCl (mL/min) | Characteristics | Interval |
| ≥50 | Age<30 years, IV drug use, burn patient | q8h |
| ≥50 | General population | q12h |
| 21-49 | | q24h |

There was no difference found in vancomycin therapeutic trough attainment between the divided-load nomogram and adjusted body weight-based protocol

Results

| Baseline Characteristics | | | |
|--------------------------------------|------------------------------|------------------------------|---------|
| | Median (IQR) or % (number) | | |
| | Divided-Load Nomogram (n=81) | AdjBW-Based Protocol (n=118) | P-value |
| Sex (male) | 49 (40) | 58 (69) | 0.21 |
| Age (years) | 61 (47-72) | 57 (46-68) | 0.30 |
| Received care in intensive care unit | 25 (20) | 29 (34) | 0.52 |
| Actual body weight (kg) | 113 (97.7-126.8) | 109.4 (99.2-126.6) | 0.99 |
| Ideal body weight (kg) | 63.8 (54.6-73) | 67.3 (59.3-75.2) | 0.01 |
| Body mass index (kg/m²) | 37.5 (34.9-43.4) | 36.3 (33.1-40.6) | 0.03 |
| Duration of therapy (days) | 2.22 (1.19-3.54) | 3.48 (2.45-4.69) | <0.01 |



| Other Select Results | | | |
|---|------------------------------|------------------------------|---------|
| | Median (IQR) | | |
| | Divided-Load Nomogram (n=81) | AdjBW-Based Protocol (n=118) | P-value |
| Value of first trough drawn (mcg/mL) | 12.8 (9.2-15.6) | 12.1 (9.5-16.3) | 0.94 |
| Value of second trough drawn (mcg/mL), n=55 | 11.6 (9.2-15.0) | 18.2 (11.3-21.1) | 0.002 |
| Time to therapeutic trough (hours) | 12.1 (11.5-43.3) | 47.3 (22.4-68.4) | <0.001 |

Limitations

- Median duration of therapy of 2-4 days limits applicability of results to short-term use of vancomycin
- Protocol-driven differences in time to first trough drawn precludes accurate evaluation of time to therapeutic trough between dosing strategies
- Wide range of body mass indices may dilute differences in outcomes among class I, II, and III obesity

Conclusion

- These results add to the conflicting evidence base on the safest and most effective method to dose vancomycin in the obese population
- This study provides a unique perspective of using ‘no difference found’ to fuel use of alternative, less time-intensive strategies for vancomycin dosing