

CADTH RAPID RESPONSE REPORT: REFERENCE LIST

Therapeutic Drug Monitoring of Vancomycin: Clinical Evidence and Cost- Effectiveness

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Research Questions

1. What is the clinical evidence regarding using area under the curve to a minimum inhibitory concentration ratio versus trough level dosing for the administration of vancomycin?
2. What is the cost-effectiveness of therapeutic drug monitoring of vancomycin using area under the curve to a minimum inhibitory concentration ratio versus trough level for people with serious infections?

Key Findings

Two non-randomized studies were identified regarding the clinical effectiveness of therapeutic drug monitoring of vancomycin. No relevant economic evaluations were identified regarding cost-effectiveness of therapeutic drug monitoring of vancomycin.

Methods

A limited literature search was conducted by an information specialist on key resources including Medline and Embase via OVID, the Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were vancomycin and therapeutic drug monitoring focusing on area under the curve/minimum inhibitory concentration-based dosing. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2009 and May 6, 2019. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	People with serious infections caused by Methicillin-resistant Staphylococcus aureus (MRSA) treated with vancomycin (adults, children, neonates) People with serious infections where MRSA or other vancomycin sensitive organisms may be possible pathogens (adult, children, neonates)
Intervention	Therapeutic drug monitoring of vancomycin by area under the curve to a minimum inhibitory concentration ratio
Comparator	Therapeutic drug monitoring of Vancomycin based on trough level
Outcomes	Q1: Clinical effectiveness (mortality, clinical failure, nephrotoxicity) Q2: Comparative cost-effectiveness
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic evaluations

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and economic evaluations.

Two non-randomized studies were identified regarding the clinical effectiveness of therapeutic drug monitoring of vancomycin. No relevant health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, or economic evaluations were identified.

Additional references of potential interest are provided in the appendix.

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

1. Stoessel AM, Hale CM, Seabury RW, Miller CD, Steele JM. The impact of AUC-based monitoring on pharmacist-directed vancomycin dose adjustments in complicated methicillin-resistant *Staphylococcus aureus* infection. *J Pharm Pract.* 2018;897190018764564 [epub ahead of print].
[PubMed: PM29554847](#)
2. Holmes NE, Turnidge JD, Munckhof WJ, et al. Vancomycin AUC/MIC ratio and 30-day mortality in patients with *Staphylococcus aureus* bacteremia. *Antimicrob Agents Chemother.* 2013;57(4):1654-1663.
[PubMed: PM23335735](#)

Economic Evaluations

No literature identified.

Appendix — Further Information

Randomized Controlled Trials – Unspecified Infection

3. Al-Sulaiti FK, Nader AM, Saad MO, et al. Clinical and pharmacokinetic outcomes of peak-trough-based versus trough-based vancomycin therapeutic drug monitoring approaches: a pragmatic randomized controlled trial. *Eur J Drug Metab Pharmacokinet.* 2019;27 [epub ahead of print].
[PubMed: PM30919233](#)

Non-Randomized Studies – Unspecified Infection

4. Neely MN, Kato L, Youn G, et al. Prospective trial on the use of trough concentration versus area under the curve to determine therapeutic vancomycin dosing. *Antimicrob Agents Chemother.* 2018;62(2):e02042-17.
[PubMed: PM29203493](#)
5. Finch NA, Zasowski EJ, Murray KP, et al. A quasi-experiment to study the impact of vancomycin area under the concentration-time curve-guided dosing on vancomycin-associated nephrotoxicity. *Antimicrob Agents Chemother.* 2017;61(12):12.
[PubMed: PM28923869](#)
6. Fukumori S, Tsuji Y, Mizoguchi A, et al. Association of the clinical efficacy of vancomycin with the novel pharmacokinetic parameter area under the trough level (AUTL) in elderly patients with hospital-acquired pneumonia. *J Clin Pharm Ther.* 2016;41(4):399-402.
[PubMed: PM27144370](#)
7. Le J, Bradley JS, Murray W, et al. Improved vancomycin dosing in children using area under the curve exposure. *Pediatr Infect Dis J.* 2013;32(4):e155-e163.
[PubMed: PM23340565](#)

Review Articles

8. Patel K, Crumby AS, Maples HD. Balancing vancomycin efficacy and nephrotoxicity: should we be aiming for trough or AUC/MIC? *Pediatric Drugs.* 2015;17(2):97-103.
[PubMed: PM25644329](#)
9. Brown DL, Lalla CD, Masselink AJ. AUC versus peak-trough dosing of vancomycin: applying new pharmacokinetic paradigms to an old drug. *Ther Drug Monit.* 2013;35(4):443-449.
[PubMed: PM23851909](#)