

## Living Friendly Summaries of the Body of Evidence using Epistemonikos (FRISBEE)

medwave 2015 Jun;15(Suppl 1):e6160 doi: 10.5867/medwave.2015.6160

# Should we add vancomycin antibiotic powder to prevent post operative infection in spine surgery?

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**Citation:** López M, Molina M. Should we add vancomycin antibiotic powder to prevent post operative infection in spine surgery?. *Medwave* 2015 Jun;15(Suppl 1):e6160 doi: 10.5867/medwave.2015.6160

**Publication date:** 12/6/2015

### Abstract

Intravenous antibiotic prophylaxis is routinely administered to prevent surgical site infection in spinal surgery. Adding intrawound vancomycin powder before surgical closure might further decrease infection risk. However, its use is controversial. Searching in Epistemonikos database, which is maintained by screening 30 databases, we identified six systematic reviews that considered 16 studies, including one randomized controlled trial. We combined the evidence using meta-analysis and generated a summary of findings table following the GRADE approach. We concluded vancomycin probably does not decrease the risk of infection in low risk surgery, but there is uncertainty about its effects in populations or surgeries with a higher risk because the certainty of the evidence is very low.

### Problem

The infection rate after spinal surgery ranges from 0.5 to 12 %. For decades, efforts have been made in order to implement different measures to reduce this risk and then to improve surgical outcomes. Adding intrawound vancomycin powder could decrease the risk of infection and associated complications.

### Methods

We used Epistemonikos database, which is maintained by screening more than 30 databases, to identify systematic reviews and their included primary studies. With this information we generated a structured summary using a pre-established format, which includes key messages, a summary of the body of evidence (presented as an evidence matrix in Epistemonikos), meta-analysis of the total of studies, a summary of findings table following the GRADE approach and a table of other considerations for decision-making.

### Key messages

- Vancomycin powder probably does not decrease surgical site infection in low-risk spinal surgery.
- There is uncertainty about the effects of vancomycin powder in populations or surgeries with a higher risk because the certainty of the evidence is very low.

**About the body of evidence for this question**

|   |   |
|---|---|
| <p>What is the evidence.<br/>See evidence matrix in Epistemonikos later</p> | <p>We found six systematic reviews [1-6] that consider 16 primary studies[7-22], including only one randomized controlled trial [21].</p>   |
| <p>What types of patients were included</p>                                 | <p>The 16 studies included adults; three studies included posterior cervical surgery [7],[15],[19], six studies (including the only randomized trial) cervical and posterior thoracolumbar surgery [8],[11],[14],[17],[20],[21], four posterior thoracolumbar surgery [12],[13],[18],[22], one posterior lumbar [16] and two studies did not specify the type of surgery [9],[10]. Three studies (including the only randomized trial) analyzed separately instrumented and non-instrumented surgery [10],[16],[21]</p> |
| <p>What types of interventions were included</p>                            | <p>The intervention was vancomycin powder. Nine studies (including the randomized) administered one gram of vancomycin powder [7-9],[14],[16],[19-22], three studies used two grams [12],[13],[18], two studies 0.5 to two grams [10,11], one study one to two grams [17] and one study 500 mg [15]. All studies compared against standard treatment which corresponds to intravenous cefazolin.</p>  |
| <p>What types of outcomes were measured</p>                                 | <p>Risk of infection, <i>Staphylococcus aureus</i> infection, pseudarthrosis.</p>   |

### Summary of findings

The information on the effects of vancomycin powder on the surgical site is based on one randomised controlled trial including 907 patients. We conducted an evaluation of the certainty of the evidence coming from 15 non-randomised studies, which produced lower certainty than the only randomised trial. So, we considered it for the formulation of key messages and considerations for decision-making, but not for the summary of findings table.

- Vancomycin powder probably does not decrease surgical site infection in low-risk spinal surgery. The certainty of the evidence is moderate.

| <b>Vancomycin powder in spinal surgery</b>   |  |   |                             |   |
|--|--|---|-----------------------------|---|
| <b>Patients</b>  |  | Spinal surgery (low-risk of infection)                    |                             |   |
| <b>Intervention</b>  |  | Vancomycin powder plus intravenous antibiotic prophylaxis |                             |   |
| <b>Comparison</b>  |  | Only intravenous antibiotic prophylaxis                   |                             |   |
| Outcomes   | Absolute effect*   |   | Relative effect<br>(95% CI) | Certainty of<br>the evidence<br>(GRADE) |
|  | WITH<br>intravenous antibiotics                                      | WITH<br>vancomycine powder                                |                             |   |
|  | Difference: patients per 1000  |   |                             |   |
| Surgical site<br>infection   | 17 per 1000  | 16 per 1000   | RR 0.96<br>(0.35 a 2.62)    | ⊕⊕⊕○ <sup>1,2</sup><br>Moderate         |
|  | Difference: 1 less per 1000<br>(Margin of error: 11 less to 27 more) |   |                             |   |
| RR: Risk ratio<br>Margin of error = 95% confidence interval (CI).<br>GRADE: evidence grades of the GRADE Working Group (see later in this article).<br><br>* The risk <b>WITH INTRAVENOUS ANTIBIOTICS</b> is based on the risk in the control group of the trials. The risk <b>WITH ADDED VANCOMYCIN POWDER</b> (and its margin of error) is calculated from relative effect (and its margin of error).<br><sup>1</sup> We downgraded the certainty of the evidence for risk of bias because allocation concealment and blinding were not clear.<br><br><sup>2</sup> Even though the study used generic vancomycin which can be considered as a reason of indirectness we did not downgrade the certainty of the evidence for this issue assuming the appropriate safeguards were taken. |  |   |                             |   |

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## Other considerations for decision-making

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### To whom this evidence does and does not apply

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- This evidence applies to adult patients submitted to a wide range of spinal surgeries. However, given the more reliable information comes from a single randomized trial with a relatively low risk of infection, it must be applied cautiously to patients or surgeries with a higher risk. In patients and surgeries described in the observational studies we cannot tell if vancomycin decreases risk of infection because the certainty of the evidence is very low.
  - This evidence does not apply to pediatric population which constitutes a different group of surgeries, with distinctive characteristics.
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### About the outcomes included in this summary

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- The selected outcome is surgical site infection, which constitutes the critical outcome for decision-making according to the main guideline and the judgment of the authors of this summary.
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### Balance between benefits and risks, and certainty of the evidence

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- Considering there is no benefit with moderate certainty it is unlikely that the benefit/risk ratio for this intervention is favourable.
  - Given the higher risk of infection in some cases, and the relatively low-cost and safety of the intervention, some clinicians might be inclined to use it despite existing uncertainty in immunosuppressed patients, long-term steroid use, associated neuromuscular disease, previous infected surgery, long instrumented arthrodeses, double approach (anterior and posterior), revision surgery and prolonged surgery
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### Resource considerations

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- Considering the probable absence of benefit, it is unlikely it constitutes a cost-effective intervention, but it is not possible to make any inference for patients or surgeries with a higher risk of infection based on the analysed studies
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### Differences between this summary and other sources

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- Our summary is in agreement with the more recent systematic review that warns the evidence is weak and more information is needed before adopting this intervention [2]. The other reviews identified provide a more favourable conclusion because they did not include the randomized study or did not take into consideration the differences in study designs when making conclusions.
  - Our summary is in partial agreement with the main guideline in this area (North American Spine Society) [23] which suggest using vancomycin powder in prolonged surgeries, instrumented surgeries or comorbidities such as diabetes, neuromuscular disease and neurological damage. This guideline does not include the randomized trial, since it incorporated evidence up to June 2011
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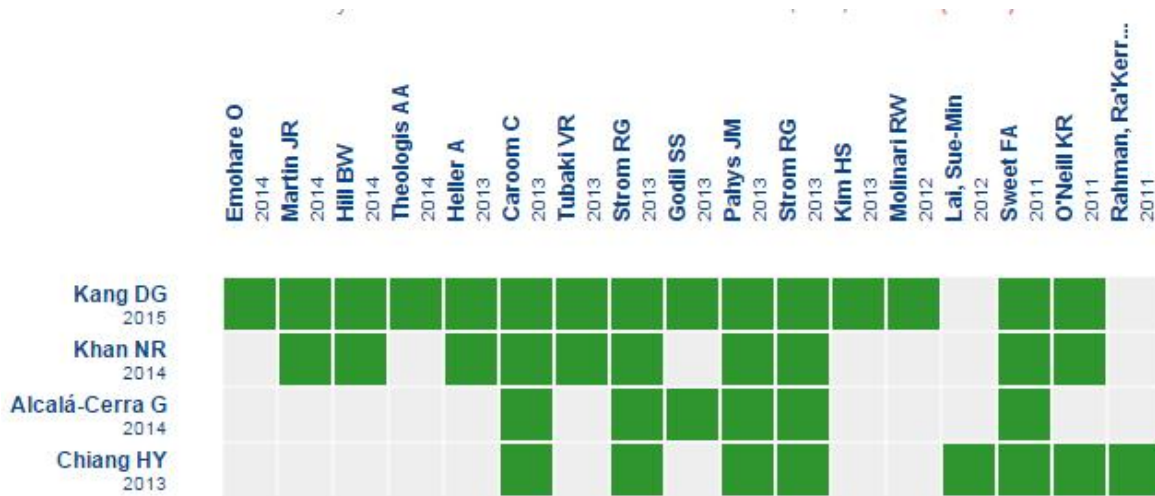
### Could this evidence change in the future?

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- The probability of future evidence changing what we know is low, because of the level of certainty of the evidence.
  - Future controlled studies in patients or surgeries with a higher risk of infection have a high likelihood of changing what we know.
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**How we conducted this summary**

Using automated and collaborative means, we compiled all the relevant evidence for the question of interest and we present it as a matrix of evidence.



Starting from any systematic review, Epistemonikos builds a matrix based on existing connections in the database (the review from which the matrix is built, appears highlighted).  
 The author of the matrix can select relevant information for a specific health question (typically in PICO format) in order to display the information set for the question.  
 The rows represent systematic reviews that share at least one primary study, and columns display the studies.  
 The boxes in green correspond to studies included in the respective reviews.

Follow the link to access the interactive version [Vancomycin powder vs endovenous antibiotic prophylaxis to avoid surgical site infection in patients with spine surgery](#)

**About the certainty of the evidence (GRADE)\***

⊕⊕⊕⊕  
**High:** This research provides a very good indication of the likely effect. The likelihood that the effect will be substantially different† is low.

⊕⊕⊕○  
**Moderate:** This research provides a good indication of the likely effect. The likelihood that the effect will be substantially different† is moderate

⊕⊕○○  
**Low:** This research provides some indication of the likely effect. However, the likelihood that it will be substantially different† is high.

⊕○○○  
**Very low:** This research does not provide a reliable indication of the likely effect. The likelihood that the effect will be substantially different† is very high.

\*This concept is also called 'quality of the evidence' or 'confidence in effect estimates'.  
 † Substantially different = a large enough difference that it might affect a decision.



## Notes

The upper portion of the matrix of evidence will display a warning of “new evidence” if new systematic reviews are published after the publication of this summary. Even though the project considers the periodical update of these summaries, users are invited to comment in *Medwave* or to contact the authors through email if they find new evidence and the summary should be updated earlier. After creating an account in Epistemonikos, users will be able to save the matrixes and to receive automated notifications any time new evidence potentially relevant for the question appears.

The details about the methods used to produce these summaries are described here

<http://dx.doi.org/10.5867/medwave.2014.06.5997>.

Epistemonikos foundation is a non-for-profit organization aiming to bring information closer to health decision-makers with technology. Its main development is Epistemonikos database ([www.epistemonikos.org](http://www.epistemonikos.org)).

These summaries follow a rigorous process of internal peer review.

## Conflicts of interest

The authors do not have relevant interests to declare.

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