# Is There a Role for Intrawound Vancomycin in Neurosurgery Outside of Spinal Procedures? A PRISMA and MOOSE-guided Systematic Review and Meta-Analysis

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## Introduction

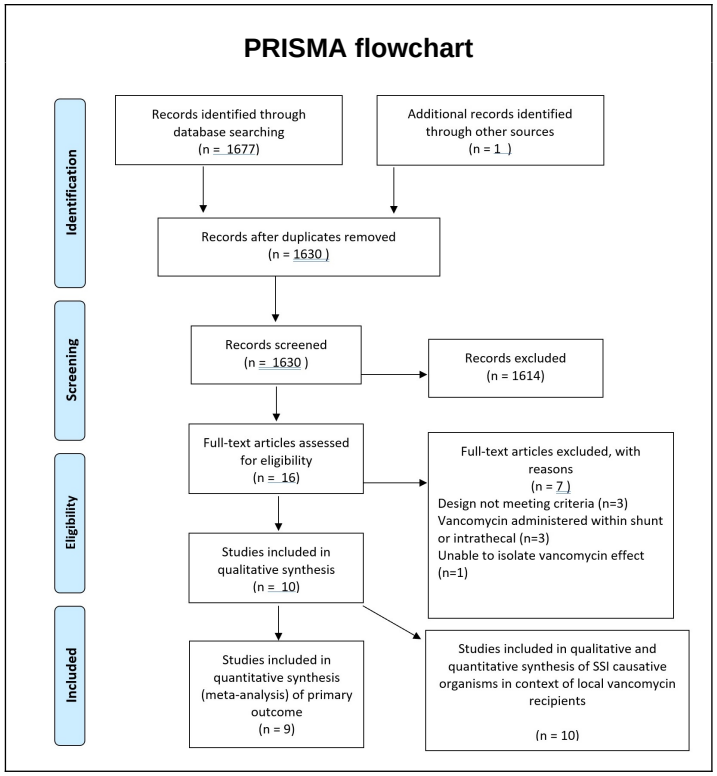
Surgical site infections (SSI) post neurosurgery remain a reality in clinical practice despite attempts at decreasing their incidence. Applying vancomycin into the surgical site is well-described in spinal neurosurgery, with extensive institutional experiences and systematic reviews describing its effectiveness in reducing surgical site infections (SSIs) with an acceptable safety profile. Its use in non-spinal neurosurgical procedures is a logical extension of those findings, but the evidence base supporting it is lacking. Recent studies describing institutional experiences with its utilization have emerged with varying degrees of success.

We are presenting a systematic review to comprehensively assess the effectiveness and safety of locally applying vancomycin into the surgical site of non-spinal surgeries.

## Methods

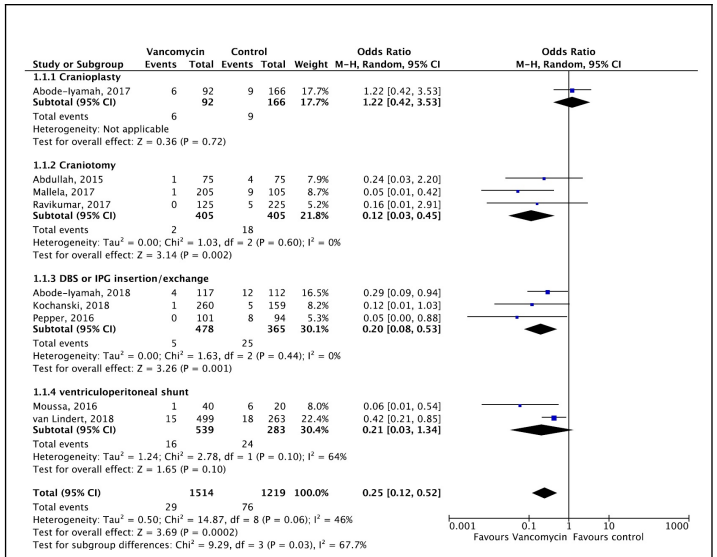
MEDLINE, EMBASE and Google Scholar were searched through February 4th, 2018 using combined search terms for vancomycin powder, topical vancomycin as well as various neurosurgical procedural terms to answer the research question. We included clinical studies that reported on the effect of local vancomycin delivery into

the surgical site on SSI incidence. We allowed for studies on either adult or pediatric patients, as well as for studies where vancomycin was locally administered with another agent. These studies would still provide information on safety and emergence of vancomycin resistance, but these were to be excluded in a sensitivity analysis. Information on study designs, demographics, exposures, and outcomes were extracted.




## Results

Our search retrieved eight studies for quantitative analysis. They assess vancomycin use in craniotomies, cranioplasties, deep brain stimulator-related procedures, as well as ventriculoperitoneal shunt surgeries. The majority of studies have serious methodological shortcomings that introduce confounding. We found an overall beneficial effect on SSI incidence (OR= 0.22; 95%CI, 0.09-0.55) that was seen across all surgeries except for cranioplasties. Retrieved studies reported no complications commonly associated with vancomycin, such as renal failure, skin rash, red man syndrome, anaphylaxis, seromas or other side effects. In addition, out of the 27 reoprted SSIs in the IWV group with reported culture results, no vancomycin-resistant organism was reported.




Forest plot of odds ratios (OR) and 95% confidence interval (CI) of surgical site infections (SSIs) for local vancomycin vs control in non-spinal neurosurgery.

## Conclusions

Intra-wound application of vancomycin (IWV) is a promising SSI prevention measure that warrants evaluation in a randomized fashion. Current enthusiasm should be tempered by the lack of high quality evidence that supports its use. The majority of studies assessing the role of IWV in non-spinal neurosurgery are low quality, unblinded, retrospective studies that use historical controls. Variable doses and delivery methods have been described and thereby limiting the applicability of our meta-analysis beyond highlighting that further studies should focus on improving the quality of available evidence. Future studies should also attempt to adequately evaluate the efficacy of vancomycin across the wide range of neurosurgical scenarios such as traumatic wounds, sinus transgression, cases revised for infection and revision oncology cases in immunosuppressed patients.