

# Antibiotic Therapy for Preventing Infections in People With Acute Stroke

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Infection is a common complication after stroke, affecting between 15% and 30% of the patients. Most common are pneumonia and urinary tract infections. Different studies found that the occurrence of a poststroke infection is associated with poor functional outcome and mortality. Whether functional outcome in patients with acute stroke can be improved by preventive antibiotic therapy remained uncertain.

In the former version of this meta-analysis (2012), we showed that preventive antibiotics did decrease poststroke infection risk; however, the effect on functional outcome remained uncertain because the included studies were rather small and heterogeneous. Large phase-3 randomized controlled trials were needed. Since 2012, 3 large trials were finished, warranting an update of this meta-analysis.<sup>1</sup>

## Objectives

We assessed whether preventive antibiotics in ischemic or hemorrhagic stroke:

1. Reduce the risk of a poor functional outcome (dependency or death);
2. Reduce the overall infection rate;
3. Reduce the rate of urinary tract infections or pneumonia; and
4. Lead to an increased rate of serious adverse events.

## Methods

We searched multiple databases, trials registers, references, and contacted authors in the field. We included randomized controlled trials on preventive antibiotics versus placebo or standard care. Preventive antibiotic therapy should be for systemic use, in any dose or treatment length, started after stroke onset. Two review authors independently selected titles and performed data extraction. An independent observer assessed risk of bias for each individual study and quality of evidence for all outcome parameters.

## Main Results

We included 8 studies with a total of 4488 patients: 2230 patients were randomized to preventive antibiotic therapy

(mean age, 74.2 years; 52% male) and 2258 patients to the control group (mean age, 74.8 years; 52% male). Study intervention differed in all 8 studies. In 2 studies, the choice of antibiotic was made according to the local antibiotic policy with the aim to prevent pneumonia.

Mortality in the preventive antibiotics group did not differ: 17% versus 16% in the control group (relative risk [RR], 1.03; 95% confidence interval [CI], 0.87–1.21), as did the proportion of patients with a poor functional outcome: 53% in the preventive antibiotics group versus 55% in the control group (RR, 0.99; 95% CI, 0.89–1.10; Figure A).

The number of patients with any infection was significantly reduced in the preventive antibiotics group: 19% versus 26% in the control group (RR, 0.71; 95% CI, 0.58–0.88; Figure B).

Regarding the type of infection, this was highly significant for urinary tract infections (4% versus 10%; RR, 0.40; 95% CI, 0.32–0.51), whereas preventive antibiotics did not reduce pneumonia rate (10% versus 11%; RR, 0.95; 95% CI, 0.80–1.13). No major side effects were reported.

In a subanalysis of the studies in which the choice of the antibiotic was made according to local guidelines with the aim to prevent pneumonia, the pneumonia rate did still not decrease nor did functional outcome and mortality.

## Conclusions

Preventive antibiotics do not affect functional outcome after acute stroke. The risk of any overall poststroke infection, however, is significantly reduced. This reduction is highly significant for urinary tract infections, whereas no significant reduction of pneumonia is found. No major side effects have been reported.

## Implications for Clinical Practice and Future Research

Preventive antibiotics should not be applied in standard stroke care in all patients. However, this intervention could

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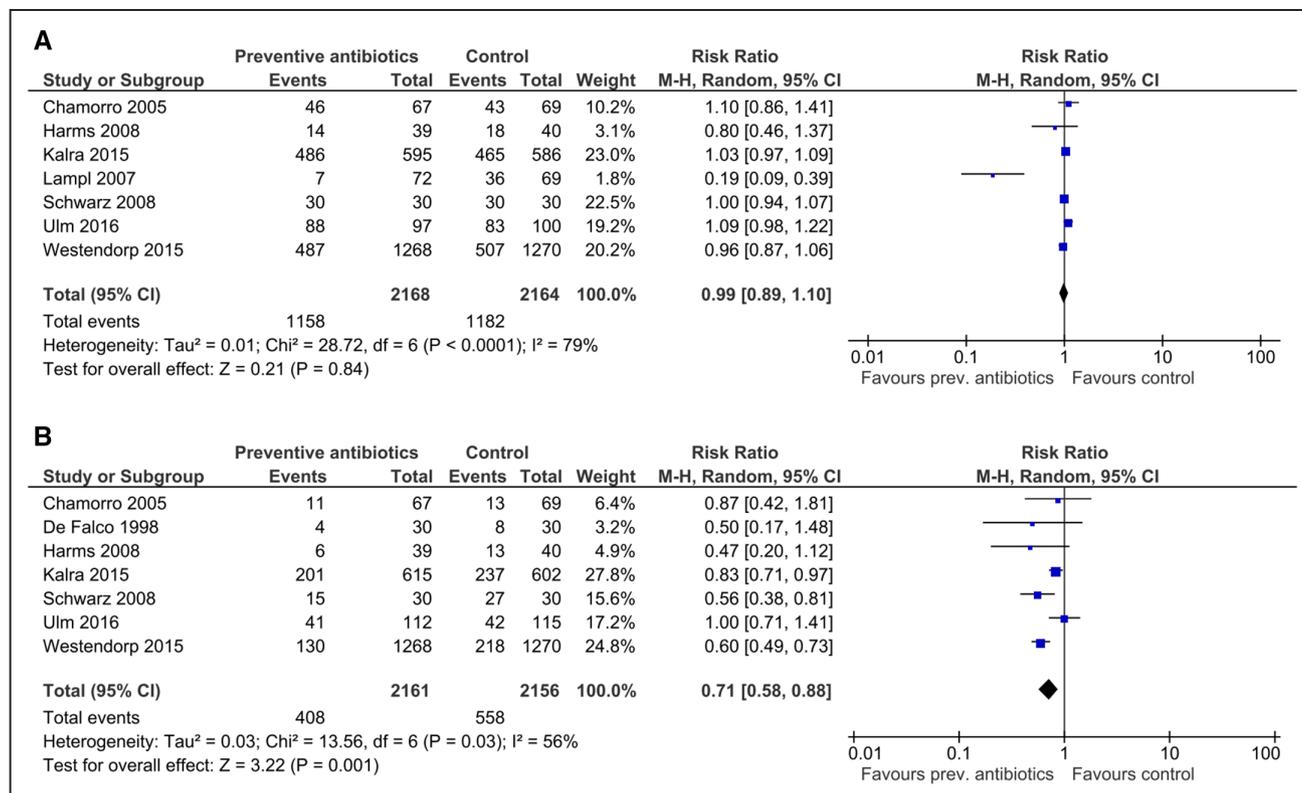
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**Figure.** Forrest plot for (A) pooled functional outcome (death or dependency) and (B) pooled total poststroke infection rate. CI indicates confidence interval; and M-H, the Mantel-Haenszel method has been used for calculating the risk.

potentially still be effective using specific antibiotics or in subgroups of patients with stroke. To answer these questions, a pooled analysis of individual patient data of recent large trials will soon be finished. Another important finding is that pneumonia could not be prevented, even when local antibiotic guidelines were used.

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### Disclosures

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### Reference

1. Vermeij JD, Westendorp WF, Dippel DWJ, van de Beek D, Nederkoom PJ. Antibiotic therapy for preventing infections in people with acute stroke. *Cochrane Database Syst Rev.* 2018;1:CD008530. doi: 10.1002/14651858.CD008530.pub3.

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