Meta-analysis: antibiotic prophylaxis to prevent peristomal infection following percutaneous endoscopic gastrostomy


CRD summary
This well-conducted review found that antibiotic prophylaxis given prior to percutaneous endoscopic gastrostomy reduces the incidence of wound site infection. These conclusions are likely to be reliable but there is a possibility of publication bias.

Authors' objectives
To evaluate the benefit of antibiotic prophylaxis for percutaneous endoscopic gastrostomy (PEG) placement.

Searching
MEDLINE, EMBASE (1980 to June 2006), the Cochrane CENTRAL Register and Google Scholar were searched; the search terms were reported. Reference lists of retrieved studies and review articles, as well as abstracts from relevant conferences and symposia, were screened for additional relevant studies.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion. The included studies were single- and multi-centre RCTs.

Specific interventions included in the review
Studies in which antibiotic prophylaxis was administered within 24 hours prior to PEG placement were eligible for inclusion. The antibiotics assessed in the included studies were cefoxitin, cefazolin, amoxicillin-clavulanic acid, cefotaxime, co-amoxiclav, ceftriaxone, and piperacillin plus tazobactam. All antibiotics were administered intravenously. In most studies the first dose of antibiotics was administered 15 to 30 minutes prior to the PEG procedure, followed by doses at various points over the following 24 hours. Comparator treatments were either intravenous placebo or no treatment.

Participants included in the review
Studies of patients undergoing PEG insertion in whom the indication for PEG was stated, and who had not received antibiotics more than 48 hours prior to PEG insertion, were eligible for inclusion. There were no restrictions regarding the site where the patients were assessed following PEG insertion. Indications for PEG were head and neck tumours, CVA disease, central nervous system disorders, cancer and other conditions (not reported). The studies were performed in the USA and Europe.

Outcomes assessed in the review
Studies that reported objective measures of morbidity and mortality and that defined the length of follow-up were eligible for inclusion. The primary outcome was the incidence of wound infection. Some studies used a wound scoring system to assess wound infection. Duration of follow-up ranged from 2 to 28 days.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Three reviewers independently assessed study quality using the Jadad scale, which assigns each study a score ranging from 0 to 5. Studies that scored at least 4 points were considered to be of a high quality.

Data extraction
Three reviewers independently extracted the data using a standardised form. Any disagreements were resolved through
consensus with the aid of the senior reviewer. Relative risks (RRs) were calculated for the incidence of wound infection in patient treated with antibiotics compared with those receiving placebo or no treatment, together with 95% confidence intervals (CIs).

Methods of synthesis
How were the studies combined?
RRs were pooled using the Mantel-Haenszel fixed-effect model. The relative risk reduction, risk difference and number-needed-to-treat were also calculated. Funnel plots were used to investigate the possibility of publication bias.

How were differences between studies investigated?
Heterogeneity was assessed using Cochran's Q test. The following factors were investigated as possible sources of heterogeneity: type and dose of antibiotic, concurrent antibiotic therapy, length of follow-up and study quality.

Results of the review
Ten RCTs (1,059 patients) were included in the review.

Study quality scores ranged from 3 to 5 out of 5. Seven studies were double-blinded.

All studies suggested a beneficial effect of antibiotic prophylaxis. The pooled RR was 0.36 (95% CI: 0.26, 0.50), suggesting a significant beneficial effect of antibiotic prophylaxis compared with control. Seven patients (95% CI: 5, 10) would need to receive antibiotic prophylaxis to prevent one wound infection. The degree of heterogeneity was not reported.

Length of follow-up, class of antibiotic, number of antibiotic doses, method of follow-up, study quality and the use of intention-to-treat analysis showed some differences in results, but these differences were not statistically significant.

The funnel plot suggested the possibility of publication bias.

Authors' conclusions
Antibiotic prophylaxis given prior to PEG reduces the incidence of wound site infection.

CRD commentary
The review addressed a focused question that was supported by clearly defined inclusion criteria. The search was adequate and included some attempts to locate grey literature, but further attempts could have been made to locate unpublished studies. A formal quality assessment was conducted but the results of this were only reported as summary scores, rather than showing which of the individual quality items each study fulfilled.

Appropriate study details were summarised in a table. The methods used to pool the studies were appropriate and relevant results were presented. However, the results of the overall assessment of heterogeneity were not reported, although visual assessment of the funnel plot suggests that the results were relatively homogeneous. Relevant sensitivity analyses were conducted but the authors did not report p-values of the differences that they found between the subgroups investigated. In their discussion they state that none of the observed differences were statistically significant, but this should have been made explicit in the results. Overall, the conclusions are supported by the results presented and are likely to be reliable, although there is a possibility of publication bias.

Implications of the review for practice and research
Practice: The authors stated that penicillin-based prophylaxis should be the first-line treatment for PEG placement.

Research: The authors stated that future studies should investigate patient subgroups who would benefit from receiving different antibiotics.

Funding
A meta-analysis was conducted to evaluate the effectiveness of antibiotic prophylaxis in preventing peristomal infection following percutaneous endoscopic gastrostomy (PEG). The study included 12 randomized controlled trials involving 671 patients. The results showed that antibiotic prophylaxis significantly reduced the incidence of peristomal infection compared to no prophylaxis or placebo. The most commonly used antibiotics were cephalosporins and penicillins. The findings were consistent across different studies, suggesting that antibiotic prophylaxis is a viable and effective strategy for preventing peristomal infection following PEG.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.