Antibiotic regimens for endometritis after delivery (Review)

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ABSTRACT

Background
Postpartum endometritis, which is more common after cesarean section, occurs when vaginal organisms invade the endometrial cavity during labor and birth. Antibiotic treatment is warranted.

Objectives
The effect of different antibiotic regimens for the treatment of postpartum endometritis on failure of therapy and complications was systematically reviewed.

Search strategy
We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (January 2007).

Selection criteria
Randomized trials of different antibiotic regimens for postpartum endometritis, after cesarean section or vaginal birth, where outcomes of treatment failure or complications were reported were selected.

Data collection and analysis
We abstracted data independently and made comparisons between different types of antibiotic regimen based on type of antibiotic and duration and route of administration. Summary relative risks were calculated.

Main results
Thirty-nine trials with 4221 participants were included. Fifteen studies comparing clindamycin and an aminoglycoside with another regimen showed more treatment failures with the other regimen (relative risk (RR) 1.44; 95% confidence interval (CI) 1.15 to 1.80). Failures of those regimens with poor activity against penicillin resistant anaerobic bacteria were more likely (RR 1.94; 95% CI 1.38 to 2.72). In three studies that compared continued oral antibiotic therapy after intravenous therapy with no oral therapy, no differences were found in recurrent endometritis or other outcomes. In four studies comparing once daily with thrice daily dosing of gentamicin there were fewer failures with once daily dosing. There was no evidence of difference in incidence of allergic reactions. Cephalosporins were associated with less diarrhea.

Authors' conclusions
The combination of gentamicin and clindamycin is appropriate for the treatment of endometritis. Regimens with activity against penicillin-resistant anaerobic bacteria are better than those without. There is no evidence that any one regimen is associated with fewer side-effects. Once uncomplicated endometritis has clinically improved with intravenous therapy, oral therapy is not needed.

PLAIN LANGUAGE SUMMARY

Intravenous gentamicin plus clindamycin more effective than other antibiotics for endometritis after childbirth

Inflammation of the lining of the womb (postpartum endometritis), also known as puereral fever, is caused by infection entering the womb (uterus) during childbirth. It occurs in about 1% to 3% of births, and is up to ten times more common after caesarean section.

Prolonged rupture of membranes and multiple vaginal examinations also appear to increase the risk. Endometritis causes fever, uterine tenderness and unpleasant-smelling lochia, and it can have serious complications such as abscess formation, sepsis and blood clots. It is also an important cause of maternal mortality worldwide, although this is very rare in high-income countries with the use of antibiotics. There can be early-onset form, occurring within 48 hours, or late-onset, up to six weeks after the birth. There are many antibiotic treatments currently in use. The review compared different antibiotics, routes of administration and dosages. The review identified 39 studies involving 4221 women, although overall they were not methodologically strong and often funded by the drug companies. The combination of intravenous gentamicin and clindamycin, and drugs with a broad range of activity against bacteria including certain penicillin-resistant strains, were found to be most effective for treating endometritis after childbirth. There was no evidence that any treatment had fewer adverse effects than others, but no studies looked at outcomes on the baby and there are no data on the possible development drug resistance. If the endometritis was uncomplicated and improved with intravenous antibiotics, there was no need to follow with an oral course of drugs.

BACKGROUND

The diagnosis of postpartum endometritis is based on the presence of fever in the absence of any other cause. Uterine tenderness, purulent or foul-smelling lochia and leukocytosis are common clinical findings used to support the diagnosis of endometritis. The standard definition for puerperal fever used for reporting rates of puerperal morbidity is an oral temperature of 38.0 degrees centigrade or more on any two of the first ten days postpartum or 38.7 degrees centigrade or higher during the first 24 hours postpartum (US Joint Commission on Maternal Welfare). Alternatively, postpartum endometritis has been divided into early-onset disease occurring within 48 hours postpartum, and late-onset disease presenting up to six weeks postpartum (Wager 1980; Williams 1995). Endometritis is diagnosed after 1% to 3% of vaginal births. It is up to 10 times more common after cesarean birth (Calhoun 1995).

The pathogenesis of endometritis is related to contamination of the uterine cavity with vaginal organisms during labor and birth and invasion of the myometrium. The presence of virulent bacteria (e.g. groups A and B streptococci, aerobic gram negative rods, *Neisseria gonorrhoeae*, and certain anaerobic bacteria) or *Mycoplasma hominis* in amniotic fluid cultures at the time of cesarean birth is associated with an increased risk of postpartum endometritis (Newton 1990). For vaginal deliveries, the presence of the organisms associated with bacterial vaginosis (e.g. certain anaerobic bacteria and *Gardnerella vaginalis*) or genital cultures positive for aerobic gram negative organisms predicts for endometritis (Newton 1990). Prolonged rupture of membranes and multiple vaginal examinations have also been identified as potential risk factors. Low birthweight, which is postulated to be due in part to subclinical amniotic fluid infection, has been associated with postpartum endometritis.

Endometritis is usually a polymicrobial infection associated with mixed aerobic and anaerobic flora. Bacteremia may be present in 10% to 20% of cases. Unless a specimen is obtained from the upper genital tract without contamination from the vagina or blood cultures are positive, there is seldom laboratory confirmation of the microbiological etiology of endometritis.

Complications of endometritis include extension of infection to involve the peritoneal cavity with peritonitis, intra-abdominal abscess, or sepsis. Septic pelvic thrombophlebitis, which can be associated with septic pulmonary emboli, can occur rarely as a complication of postpartum endometritis.

Before the advent of the antibiotic era, puerperal fever was an important cause of maternal death. With the use of antibiotics, a sharp decrease in maternal morbidity has been observed and it is now accepted that antibiotic treatment for postpartum endometritis is warranted.

There are many antibiotic treatment regimens currently in use. An empiric regimen active against the mixed aerobic and anaerobic organisms likely to be causing infection is generally selected. Treatment is usually considered successful after the woman is afebrile for 24 to 48 hours. The spectrum of activity of clindamycin with gentamicin make it a popular choice for initial therapy and this combination is widely considered as the gold standard (Monga 1993). However, alternative treatment regimens for endometritis with different antimicrobial activity or pharmacokinetic profiles may be associated with differences in clinical effectiveness, side-effects or cost.

If the initial antibiotic regimen does not result in resolution of fever and other symptoms within three days, the antibiotic regimen is usually changed. Consideration is also given to the possibility that the woman may have complications requiring specific treatment (such as anticoagulation for septic pelvic vein thrombophlebitis).

OBJECTIVES

The objective of this review was to determine, from the best evidence available, the effect of different antibiotic regimens for the treatment of postpartum endometritis on the rate of therapeutic failure, the duration of fever, the rates of complications, and the rates of side-effects of treatment. The effects of different drugs, routes of administration, and duration of therapy were sought. In addition, we sought to compare the effectiveness of regimens

known to be active against the *Bacteroides fragilis* group of anaerobic organisms compared with those that are not active.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

All trials in which the authors described random allocation (by any method) of participants to different treatment regimens for postpartum endometritis were considered.

Types of participants

Women who were diagnosed with endometritis, as defined by the authors of the individual studies, during the first six weeks of the postpartum period.

Types of intervention

We considered trials if a comparison was made between different antibiotic regimens (including but not limited to different drug/drugs, different route of administration, and different duration of therapy).

Types of outcome measures

We considered trials if any one of the following outcomes, as they were defined by the authors of the individual studies, was reported:
(1) duration of fever;
(2) therapeutic failure;
(3) complications (including pelvic abscess and septic pelvic vein thrombophlebitis);
(4) death.

We collected data (where available) on the following additional outcome measures:
(1) any change made to the initial antibiotic regimen;
(2) allergic reactions;
(3) diarrhea;
(4) superinfection or colonization with resistant organisms;
(5) quantity of resources (e.g. length of stay, amount of drug) utilized;
(6) financial costs.

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: methods used in reviews.

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register by contacting the Trials Search Co-ordinator (January 2007).

The Cochrane Pregnancy and Childbirth Group's Trials Register is maintained by the Trials Search Co-ordinator and contains trials identified from:
(1) quarterly searches of the Cochrane Central Register of Controlled Trials (CENTRAL);
(2) monthly searches of MEDLINE;
(3) handsearches of 30 journals and the proceedings of major conferences;
(4) weekly current awareness search of a further 37 journals.

Details of the search strategies for CENTRAL and MEDLINE, the list of handsearched journals and conference proceedings, and the list of journals reviewed via the current awareness service can be found in the 'Search strategies for identification of studies' section within the editorial information about the Cochrane Pregnancy and Childbirth Group.

Trials identified through the searching activities described above are given a code (or codes) depending on the topic. The codes are linked to review topics. The Trials Search Co-ordinator searches the register for each review using these codes rather than keywords.

We did not apply any language restrictions.

METHODS OF THE REVIEW

We selected all potential trials for eligibility according to the criteria specified in the protocol and extracted the data from each publication. We were not blinded to the authors or sources of the articles. We resolved any discrepancies by discussion. In addition to the main outcome measures listed above, we collected information on the setting of the study (country, type of population, socioeconomic status), maternal factors (cesarean delivery, presence of bacterial vaginosis, positive genital tract cultures for virulent organisms, etc), a detailed description of the antibiotic regimen used (drug, dose, route of administration, duration), and definitions of the entry criteria for endometritis and outcomes.

We evaluated trials for methodological quality using the standard Cochrane criteria of adequacy of allocation concealment: adequate (A), unclear (B), inadequate (C) or that allocation concealment was not used (D). We collected information on blinding of outcome assessment, loss to follow up, and reasons for exclusions after enrolment. We did not include studies that reported exclusion of more than 20% of participants after enrollment but we included all other trials, regardless of methodological quality, in the analysis.

We excluded thirty-one studies identified in the search from the analysis for the following reasons: (1) exclusions after randomization more then 20% (n = 7): (2) not a study of postpartum endometritis (n = 5); (3) study not randomized or the described method of allocation to treatment was inadequate, e.g. alternation (n = 5); (4) no clinical outcomes on postpartum women reported or postpartum endometritis not defined (n = 4); (5) actual numbers not provided (n = 4); (6) no outcomes

of interest reported (n = 4); (7) different antibiotic regimens not compared (n = 1); or (8) antibiotic regimen dosing and frequency not described (n = 1). *See* 'Characteristics of excluded studies'.

The main comparisons were between different treatment regimens. Where sufficient trials were available, we made separate comparisons between different types of antibiotic regimens (based on type of antibiotic, spectrum of antimicrobial activity, and duration and route of administration). Where appropriate, we grouped different antibiotics with a similar antimicrobial spectrum of activity.

A priori, we had planned subgroup analyses based on the presence of risk factors such as cesarean section versus vaginal birth and the presence of bacterial vaginosis or genital tract cultures positive for virulent organisms, if there were enough studies. We had also planned a separate subanalysis including only those studies in which all participants had received prophylactic antibiotic treatment during cesarean section. We had also planned subanalyses based on methodological quality if there were sufficient studies. We calculated summary relative risks for dichotomous data using a fixed-effect model and used weighted mean difference to calculate continuous data.

DESCRIPTION OF STUDIES

We identified thirty-nine trials that met the inclusion criteria for this review. For a detailed description of studies, *see* the table of 'Characteristics of included studies'.

All but six studies were conducted in the United States: there was one from France, two from Mexico, and one each from Italy, Peru, and Colombia. One study was a multicentre study conducted in many countries, including the United States.

Several different antibiotic regimens were compared. Nineteen studies compared clindamycin and an aminoglycoside with another regimen. Other comparisons that were made included: an aminoglycoside and penicillin or ampicillin versus any other regimen; a beta-lactamase inhibitor combination versus any other regimen; a second or third generation cephalosporin (excluding the cephamycins) versus any other regimen; a cephamycin (i.e. cefoxitin or cefotetan) versus any other regimen; the combination of aztreonam and clindamycin versus any other regimen; a quinolone (ciprofloxacin) versus any other regimen; and the combination of metronidazole and gentamicin versus any other regimen. Two studies compared cefoxitin with another cephamycin with a longer half-life. Although most regimens selected had activity against a broad range of pathogens, including resistant anaerobic bacteria, there were some specific antibiotics or combination regimens (e.g. ciprofloxacin, ampicillin, penicillin or ampicillin and an aminoglycoside, and certain cephalosporins such as cefamandole and ceftazidime) that have poor activity against the *Bacteroides fragilis* group and other penicillin resistant anaerobes; comparisons using these regimens were made.

Four studies specifically compared once daily versus three times daily administration of gentamicin. Of these, one compared both once daily clindamycin and once daily gentamicin to thrice daily doses of both. There were four studies in which oral therapy was either continued or not after the completion of the parenteral course of therapy.

The clinical criteria listed to define endometritis were consistent across trials. Febrile morbidity is a standard obstetrical outcome and was generally consistently reported although there was some variation in the exact criteria used for height of fever, interval between febrile episodes and interval from the operative procedure. Urinary tract infection was usually defined as a positive urine culture; symptoms related to the urinary tract were rarely required to be present. Wound infection was a clinical diagnosis and generally included induration, erythema, cellulitis or drainage. A positive microbiological diagnosis was rarely required for the diagnosis of either wound infection or endometritis. There was no consistent approach to the definition of serious morbidity. For this review, all episodes of bacteremia have been classified as serious as have other complications such as pelvic thrombophlebitis, pelvic abscess, and peritonitis. Some studies included other outcomes, e.g. need for additional antibiotic use and other infections, e.g. pneumonia. Some provided a measure of the fever as a 'fever index' which incorporated both the height of the fever and its duration.

In twenty studies, only postpartum women who developed endometritis after cesarean section were enrolled; in three studies, the mode of delivery was not reported. In the remainder, a variable proportion of cases followed cesarean section. In women who developed endometritis postcesarean section there was no consistent approach to the use of prophylactic antibiotics. While four studies excluded women who had received prophylaxis, five others stated that all women had received prophylaxis. Cefazolin was the agent selected when prophylaxis was given except in one study (Tuomala 1989) in which cefoxitin was used. Although women who developed endometritis during the first six weeks of the postpartum period were eligible for inclusion in this review, the vast majority appeared to have been enrolled within 48 hours of birth.

METHODOLOGICAL QUALITY

In all of the studies, women were randomly allocated to treatment group as per the inclusion criteria. Allocation concealment was sufficiently described to be considered adequate in only five studies (Del Priore 1996; Filler 1992; Livingston 2003; Mitra 1997; Tuomala 1989). For the remaining studies, the adequacy of allocation of participants to treatment groups was unclear, and although many of these studies did report that a computerized randomization schedule was used, it was unclear how the randomization schedule was actually administered.

Blinding was described in only a few studies. Only four studies used placebo doses and although some studies reported a 'double-blind' design, only three studies (Gibbs 1982; Gibbs 1983; Hillier 1990) described how they attempted to ensure the medications appeared similar in appearance. One other study (MacGregor 1992) stated that they were similar in appearance without describing how it was accomplished. Three studies were described as 'single-blind'. In most trials there was no description of blinding.

Since women were usually hospitalized, loss to follow up was not a significant problem. When drop-outs were reported, the reasons why women who had initially been randomized were eventually excluded from the analysis were usually explained. Frequently, however, the number corresponding to each arm of the study was not given. Where the group allocation of drop-outs was not provided, there was the possibility that there may have been selective withdrawals from one or other of the groups. The most frequent reasons given for drop-outs were protocol violations of various descriptions. For this reason we have provided analysis of available cases (rather than intention-to-treat). To reduce the likelihood of bias, we excluded studies from the analysis when there were more than 20% drop-out or exclusion of participants after randomization.

Side-effects, e.g. diarrhea, nephrotoxicity and allergic reactions, were not consistently sought, and only 21 of the 38 studies specifically mentioned any one of these outcomes. Length of stay was infrequently reported.

RESULTS

Thirty-nine trials with 4221 participants were included.

The tables of comparisons are designed to have the treatment considered to be the control group on the right-hand side. In most studies the control group was clindamycin and an aminoglycoside.

Nineteen studies, involving 1902 women, compared clindamycin and an aminoglycoside (most often gentamicin) with another regimen. Clindamycin and gentamicin were typically used as the control treatment against which newer drugs were compared. Therefore, we have presented the graphs for this comparison with clindamycin and gentamicin on the right-hand side corresponding to the control intervention. The other regimens were associated with more treatment failures compared with the combination of clindamycin and an aminoglycoside. The relative risk (RR) was 1.44, 95% confidence interval (CI) 1.15 to 1.80. Overall, the failure rate of the combination of clindamycin and an aminoglycoside was 11.4% (106/928). There were more wound infections with the other regimens (eight trials, n = 1055; RR 1.94; 95% CI 1.25 to 3.01) and a trend towards more serious complications, although the difference was not statistically significant (seven trials, n = 1120; RR 1.29; 95% CI 0.54 to 3.07). The incidence of diarrhea was less with the other regimens compared with the clindamycin containing regimen, although this did not reach statistical significance (10 trials, n = 1362; RR 0.66; 95% CI 0.35 to 1.25). Length of stay did not differ, neither was there any difference in the incidence of allergic reactions.

Two trials (DiZerega 1979; Figueroa-Damian 1996) compared an aminoglycoside and penicillin or ampicillin with other regimens, either clindamycin/gentamicin or piperacillin/tazobactam. Treatment failures were greater with the aminoglycoside and penicillin or ampicillin combination (n = 256; RR 2.08; 95% CI 1.27 to 3.40). The numbers of severe complications (RR 9.00; 95% CI 0.49 to 165.00) and wound infections (RR 2.04; 95% CI 0.94 to 4.43) were also higher with the aminoglycoside and penicillin or ampicillin combination, although the differences were not statistically significant.

Of the five studies identified that compared an extended spectrum penicillin with any other regimen, none met methodological criteria for inclusion in this review.

Twelve trials (n = 1007) compared a beta-lactam/beta-lactamase inhibitor combination with any other regimen. There was no difference in treatment failures (RR 1.00; 95% CI 0.89 to 1.14) or any other outcome. For all but the outcome of treatment failure, however, the number of participants who were assessed for a given outcome was small. All of the 95% CIs in this category were wide.

Seven trials (n = 741) compared any second or third generation cephalosporin (excluding the cephamycins) with another regimen (usually clindamycin and gentamicin). There was no difference in treatment failures between the cephalosporin regimen and any other regimen (RR 1.39; 95% CI 0.90 to 2.15). The incidence of wound infections was greater in the cephalosporin group (four trials, n = 500, RR 1.88; 95% CI 1.08 to 3.28). The incidence of diarrhea was less in the cephalosporin group (seven trials, n = 741; RR 0.35; 95% CI 0.12 to 1.01). Five trials (n = 276) compared a cephamycin (either cefoxitin or cefotetan) with a variety of regimens. There was no evidence of a difference between the cephamycin and any other regimen for any of the outcomes measured.

Four trials (n = 603) compared aztreonam plus clindamycin with other regimens. Two of these (Gibbs 1985; Greenberg 1987) were comparisons with clindamycin and gentamicin as the control arm. In the other two trials (Chatwani 1997; Filler 1992) clindamycin and aztreonam were used as the control arm in comparison with trospectomycin. There was no evidence of a difference between these regimens for any of the outcomes.

Two trials (Chatwani 1995; MacGregor 1992) compared agents with a longer half-life to a drug in the same class with a shorter half-life. All regimens were cephamycins: cefoxitin administered every six hours was compared with either cefmetazole administered every eight hours or cefotetan administered every 12 hours. Treatment with an agent with a longer half life that is administered less frequently was associated with fewer treatment failures (two

trials, n = 484; RR 0.61; 95% CI 0.40 to 0.92) than cefoxitin. No significant differences were found in the frequency of severe complications (one trial, n = 355; RR 0.27; 95% CI 0.02 to 2.89) or wound infections (two trials, n = 484; RR 0.70; 95% CI 0.13 to 3.68).

One small trial (Maccato 1991) compared ciprofloxacin, a quinolone to clindamycin and gentamicin. There were more treatment failures in the ciprofloxacin group, although this did not reach statistical significance (n = 97; RR 1.96; 95% CI 0.87 to 4.43). One small trial (Martens 1989) of 67 participants compared metronidazole and gentamicin with ampicillin/sulbactam. There was no evidence of a difference in treatment failures between the two regimens (RR 0.91; 95% CI 0.20 to 4.21).

The comparisons of once daily versus thrice daily administration of gentamicin revealed a trend toward fewer treatment failures with once daily dosing (four trials, n = 463; RR 0.70; 95% CI 0.49 to 1.00). Once daily dosing was also associated with a shorter length of hospital stay (three trials, n = 322; weighted mean difference -0.73; 95% CI -1.27 to -0.20). There was no evidence of a difference in the incidence of nephrotoxicity.

Three trials (n = 253) compared continued oral antibiotic therapy with no treatment after intravenous therapy. No differences were found in recurrence of endometritis or other outcomes (wound infection, allergic reaction, diarrhea, urinary tract infection, length of stay) and the incidence of recurrent endometritis was exceptionally low in both groups (only one episode in 253 women).

Seven trials (n = 774) compared a regimen with poor activity against penicillin resistant anaerobic bacteria (e.g. the *Bacteroides fragilis* group) with a regimen with good activity. Poor activity against penicillin resistant anaerobes was associated with failure of the regimen (RR 1.94; 95% CI 1.38 to 2.72), with similar trends for wound infections and serious complications.

Among all the comparisons reported, there was no evidence that any particular regimen was associated with a different rate of allergic reactions.

Despite the large number of trials and different antibiotic regimens, there was no statistically significant heterogeneity among regimens. Given that in all but three of the studies treatment allocation was inadequately described, a sensitivity analysis incorporating allocation concealment as a measure of study quality was not appropriate.

DISCUSSION

Overall the studies were not methodologically strong. There were opportunities for systematic bias: allocation concealment was usually inadequately described and only rarely was there any attempt at 'blinding'. Often the study was sponsored by the manufacturer of a new drug and this drug was compared with the control regimen of clindamycin and gentamicin. But despite all these potential biases, which would most likely work against the control arm, the combination of clindamycin and an aminoglycoside was more effective than other regimens. There is weak evidence that cefoxitin with a shorter half-life is less effective than the cephamycins that are administered less frequently. For all the other outcomes, apart from comparisons involving those regimens without broad anaerobic activity, there was no evidence that there was any difference in treatment regimens. For many of these comparisons, however, the numbers studied were small and, although unlikely, significant differences may not have been detected.

If the improved response with clindamycin and gentamicin compared with any other regimen is expressed as the number needed to treat (NNT), 20 women (95% confidence interval (CI) 12 to 56) would need to be treated with clindamycin and gentamicin, rather than any other regimen, to prevent one additional failure. What is missing from these studies, however, and what is needed to use the NNT to help make treatment decisions, is a better assessment of side-effects of the regimens and reporting of the cost of the different therapies. Although there was a trend towards less diarrhea with the other regimens compared with clindamycin and an aminoglycoside, this was not statistically significant. No study looked at the effect of treatment on the infant of a breastfeeding mother and any maternal renal toxicity was not systematically described. Very rarely were drug costs collected and overall no attempt was made to collect and compare all costs of treatment, including length of stay.

For the other regimens that were compared, where there was no evidence of differences in efficacy, it is unfortunate that there are so little data on other outcomes. These factors might determine whether a regimen, equally effective, had some other advantage. Drug costs at a minimum should have been consistently reported.

Although there may be differences in the expected response of women who developed endometritis after cesarean section compared with those who developed infection after a vaginal birth, insufficient data were provided to allow a subgroup analysis to be performed. Neither could subgroup analyses be performed based on the presence of bacterial vaginosis or genital tract cultures positive for virulent organisms, as the data were not available. There were too few studies to detect whether there are differences in outcomes between regimens when prophylactic antibiotics for cesarean section have been given. Many of the studies performed extensive bacteriological work-up on endometrial cultures, but this could not be systematically approached nor incorporated into this review. The interested reader is referred to the relevant papers.

Very few studies have been conducted outside of the United States with only four studies (from Central and South America) performed in the developing world. Since postpartum endometritis is an important cause of maternal morbidity and mortality in low-

income countries the lack of studies conducted in such environments is a lamentable gap in our knowledge.

AUTHORS' CONCLUSIONS

Implications for practice

It can be concluded from this review that the combination of clindamycin and an aminoglycoside (such as gentamicin) is appropriate for the treatment of endometritis and that a regimen with activity against the *Bacteroides fragilis* group and other penicillin resistant anaerobic bacteria is better than one without. There is no evidence that any one regimen is associated with fewer side-effects, with the exception of cephalosporins associated with less diarrhea. No specific recommendations can be made for the treatment of women who develop endometritis after receiving antibiotic prophylaxis for cesarean section. When uncomplicated endometritis has clinically improved with intravenous therapy, there is no advantage to further oral therapy. Once daily administration of aminoglycosides appears safe and equally effective in the treatment of endometritis. Barza 1996 performed a meta-analysis of single versus multiple doses of aminoglycosides for the treatment of various infections and their conclusions support a once daily regimen.

Implications for research

The majority of these studies took a traditional approach to the treatment of endometritis and compared new regimens to the standard of care in North America. Any further studies that compare clindamycin and an aminoglycoside with an alternative regimen, with efficacy as the primary outcome, should include regimens that are routinely used outside of North America and consider alternatives suitable for use in low-income countries.

With the availability of new antibiotics with improved oral bioavailability, novel ways of managing endometritis should be explored and more creative study designs should evaluate early switching to the oral route. Although the new quinolones have a broader spectrum of activity than ciprofloxacin and excellent oral bioavailability, and are used widely to treat intra-abdominal infections, because their safety in breastfeeding has not been established, it is generally recommended that they be avoided if a woman is breastfeeding. But as more information on the safety of these agents in infants and children is known, their usefulness in treating women with endometritis should be studied.

Any study of a new drug for the treatment of endometritis should, rather than have as its only objective the demonstration of equivalence between the regimens, be designed to incorporate other relevant outcomes in the analyses, and ideally should incorporate some form of cost-benefit analysis. While concern about ototoxicity and nephrotoxicity are identified as contraindications to the routine use of an aminoglycoside in community-acquired intra-abdominal infections (Solomkin 2003), healthy women with postpartum endometritis, whose treatment course is usually short, could be assumed to have less toxicity from aminoglycosides compared with other women who are more likely to have significant co-morbid illness. Although the studies included in this review did not systematically collect information on renal toxicity, there is no evidence that using an aminoglycoside in the clinical setting of postpartum endometritis should not be recommended because of toxicity. It is, however, important that any new regimen compared with clindamycin and an animoglycoside include ototoxicity and nephrotoxicity as outcomes.

There is evidence of increasing resistance in the *Bacteroides fragilis* group of organisms to clindamycin (Aldridge 2002). While there are no data to suggest that this is having an impact on treatment outcome in women with endometritis, whose infections are generally uncomplicated, there should be ongoing surveillance of the effect of changing antibiotic resistance patterns. Although overall a regimen with activity against the *Bacteroides fragilis* group is better than one without, 80% of women treated with the latter regimen were cured, raising the question in what type of women is a broad spectrum regimen necessary. Traditionally an empiric regimen active against the mixed aerobic and anaerobic organisms likely to be causing infection is selected, but with increasing concern about the appropriate utilization of antibiotics and developing antimicrobial resistance, this approach may no longer be appropriate. The question should be asked whether the use of endometrial cultures, collected under conditions where contamination is avoided, has a role for targeting antibiotic therapy more specifically to individual women. Studies should be designed comparing different strategies for selecting an antibiotic regimen.

POTENTIAL CONFLICT OF INTEREST

None known.

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* *Indicates the major publication for the study*

TABLES

Characteristics of included studies

Study	Apuzzio 1985a
Methods	Allocation: "randomly assigned" without further description. Blinding: not stated. Study period: March 1983 through January 1984.
Participants	Inclusion criteria: postcesarean section women with temperature of 100.4 F or higher on 2 occasions after the first 24 hours after delivery, with uterine tenderness and no other foci of infection. Setting: urban university hospital, New Jersey. Number of participants: n = 47.
Interventions	Ticarcillin/clavulanic acid 3 g/100 g iv every 4 hours (n = 23) vs clindamycin 600 mg iv every 6 hours with gentamicin 60-80 mg im every 8 hours (n = 24).
Outcomes	Treatment failure. Allergic reactions. Diarrhea.
Notes	Participants receiving antibiotic prophylaxis were excluded. Pharmaceutical sponsorship - probable. Drop-outs - none.
Allocation concealment	B – Unclear

Study	Apuzzio 1985b
Methods	Allocation: "randomly assigned" without further description. Blinding: not stated. Study period: February 1981 through December 1982.
Participants	Inclusion criteria: diagnosis of postcesarean endometritis based on oral temperature of at least 100.4 F after the first 24 hours postpartum, uterine tenderness and absence of other foci of infection. Setting: urban university hospital, New Jersey. Number of participants: n = 124.
Interventions	Ceftizoxime 2-3 g iv every 8-12 hours (n = 68) vs cefoxitin 2 g every 12 hours iv (n = 24) versus clindamycin 600 mg iv every 6 hours with gentamicin 60-80 mg iv every 8 hours (n = 32).
Outcomes	Treatment failure. Diarrhea. Septic pelvic thrombophlebitis. Thrombophlebitis.
Notes	It is not stated whether any of these women received prophylactic antibiotic treatment during surgery. Pharmaceutical sponsorship - probable. 12 women initially randomized excluded from analysis with excessive loss in cefoxitin group. Cefoxitin group not included in analysis.
Allocation concealment	B – Unclear

Study	Blanco 1983
Methods	Allocation: random schedule provided by pharmaceutical sponsor. Blinding: not used. Study period: April through October 1982.

Characteristics of included studies (*Continued*)

Participants	Inclusion criteria: clinical diagnosis of postpartum endometritis, salpingitis, or pelvic cellulitis after hysterectomy, all with oral temperature of 38 C or higher leukocytosis and local tenderness. Setting: county hospital, San Antonio, Texas. Number of participants: n = 77 (69 postcesarean section).
Interventions	Ceftazidime 2 g iv every 8 hours vs clindamycin 600 mg iv every 8 hours plus gentamicin 1.5 mg/kg iv every 8 hours.
Outcomes	Treatment failure. Complications including wound infections, allergic reactions, and diarrhea. Mean length of stay.
Notes	For the outcome of allergy, postcesarean section participants were not analyzed separately. Pharmaceutical sponsorship - explicit. Drop-outs - none.
Allocation concealment	B – Unclear

Study	**Chatwani 1995**
Methods	Allocation: computer-generated randomization table provided by pharmaceutical sponsor. Blinding: "single-blind" without further explanation. Study period: not stated.
Participants	Inclusion criteria: women with postcesarean endometritis defined as temperature of at least 38.3 C during the first 24 hours after surgery or at least 38 C after 24 hours with fundal tenderness, adnexal tenderness, and purulent lochia, and no other evident focus of infection. Initially women with other gynecologic infections were to be included. There were 22 women randomized, but later excluded because they were not postcesarean section women. Setting: multicenter, USA. Number of participants: n = 382.
Interventions	Cefmetazole 2 g iv every 8 hours (n = 232) vs cefoxitin 2 g iv every 6 hours (n = 123).
Outcomes	Treatment failure. Septic thrombophlebitis (serious complication). Wound infections. Allergic reactions. Mean length of stay. Standard deviation for mean length of stay was not given (5.0 days for cefmetazole; 5.4 days for cefoxitin).
Notes	5 women initially randomized did not receive medication. Drop-outs were otherwise adequately explained, most were excluded due to protocol change that excluded women who were not postcesarean. These 22 participants are included in the analysis of allergic reactions. Pharmaceutical sponsorship - explicit. Drop-outs > 5%.
Allocation concealment	B – Unclear

Study	**Chatwani 1997**
Methods	Allocation: computer-generated by pharmaceutical sponsor. Blinding: "double-blind" without further description. Study period: not stated.
Participants	Inclusion criteria: women with pelvic cellulitis after hysterectomy or postpartum endometritis (defined as temperature of at least 38.3 C after the first 24 hours and after cesarean section, and fundal tenderness, parametrial tenderness, and purulent lochia). Setting: multicenter, USA. Number of participants: n = 579 (404 with postpartum endometritis).

Characteristics of included studies (*Continued*)

Interventions	Clindamycin 900 mg iv every 8 hours (n = 242; 202 postcesarean section) vs trospectomycin 500 mg iv every 8 hours (n = 243; 200 postcesarean section) both with aztreonam 1 gm iv every 8 hours.
Outcomes	Treatment failure (postcesarean section endometritis women provided separately). For other outcomes (wound infection, serious complications, diarrhea) the results for postcesarean section endometritis participants were not reported separately and have not been included. The 1 serious complication observed was septic thrombophlebitis in the trospectomycin group.
Notes	Pharmaceutical sponsorship - explicit. Drop-outs > 5%.
Allocation concealment	B – Unclear

Study	**Del Priore 1996**
Methods	Allocation: by computer-generated random numbers table via sealed envelopes. Blinding: placebo doses of antibiotic used as needed. Study period: February 1991 through March 1993.
Participants	Inclusion criteria: clinical diagnosis of postpartum endometritis (defined as temperature of at least 38 C orally on 2 occasions or at least 39 C on 1 occasion, uterine tenderness, absence of any other source of infection), serum creatinine less than 1.4 mg/dl. Setting: Chicago, Illinois. Number of participants: n = 142.
Interventions	Gentamicin 5 mg/kg of body weight iv once daily (n = 62) vs every 8 hour dosing with adjustments based on peak and trough blood levels (n = 65). Other antibiotics allowed.
Outcomes	Duration of fever (20.8 vs 23.7 hrs); post-treatment serum creatinine levels; nephrotoxicity (not defined further). Change of initial regimen (14/62 vs 17/65). Pharmacy ($16.12 vs $41.75) and nurse labor costs; length of stay.
Notes	15 enrolled women were excluded for protocol violations; administrative errors, misdiagnosis, concomitant infection; no data on treatment allocation to include study in intent-to-treat analysis. Cesarean deliveries = 78. Pharmaceutical sponsorship - none apparent. Drop-outs < 5%.
Allocation concealment	A – Adequate

Study	**DiZerega 1979**
Methods	Allocation: “random basis” not further described. Blinding: not stated. Study period: February 1976 through October 1977.
Participants	Inclusion criteria: women with diagnosis of postpartum endometritis based on fever and uterine tenderness. Setting: urban county hospital, Los Angeles, California. Number of participants: n = 200.
Interventions	Clindamycin 600 mg iv every 6 hours plus gentamicin 80 mg iv every 8 hours (n = 100) vs penicillin 5 million units iv every 6 hours plus gentamicin 80 mg iv every 8 hours (n = 100).
Outcomes	Treatment failure (defined as those women whose therapy was not completed without problems). Serious complications including pelvic abscess and need for addition of heparin. Wound infections. Rash (allergic reaction). Diarrhea.

Characteristics of included studies (*Continued*)

	Mean length of stay 7.4 days for clindamycin-gentamicin vs 8.7 days for penicillin-gentamicin (variance not given).
Notes	All participants were postcesarean section women without prophylactic antibiotic treatment. Endometritis was defined vaguely. Pharmaceutical sponsorship - none apparent. Drop-outs - none.
Allocation concealment	B – Unclear

Study	**Faro 1989**
Methods	Allocation: "randomized" without further description. Blinding: providers - no, participants - not stated. Study period: not stated.
Participants	Inclusion criteria: women with a diagnosis of postpartum endometritis defined as temperature of at least 38.3 C occurring 24 hours after the administration the last dose of cefazolin, tachycardia, a white blood count of at least 14,000 or immature polymorphonuclear leukocytes, and marked uterine tenderness. Setting: Houston, TX, USA. Number of participants: n = 170.
Interventions	Ticarcillin/clavulanic acid 3.1 g iv every 6 hours (n = 85) vs clindamycin 900 mg iv every 8 hours and gentamicin iv dosed by body weight every 8 hours (n = 85).
Outcomes	Therapeutic failure (lack of resolution of all signs and symptoms of infection resolved within 72 hours). Length of hospital stay.
Notes	All participants had cesarean sections with prophylactic cefazolin for 3 doses. 18 women were excluded after enrollment for protocol violations. Pharmaceutical sponsorship - explicit. Drop-outs > 5%. All participants without clinical cure at 72 hours responded with the addition of ampicillin iv. Bacteriologic studies were performed.
Allocation concealment	B – Unclear

Study	**Fernandez 1990**
Methods	Allocation: random-numbers table. Blinding: not stated. Study period: March 1985 through March 1986.
Participants	Inclusion criteria: fever (defined as more than 37.8 C in the first 24 hours postpartum), with pelvic tenderness or malodorous lochia, or both, without other obvious diagnosis. Participants were classified as having mild (temperature 37.8 C - 38.4) or severe (temperature greater than 38.4 C) forms. Setting: Clamart, France. Number of participants: n = 101 ("severe form": n = 26, "mild form": n = 73).
Interventions	'Severe' disease: amoxicillin/clavulanic acid 1.2 g iv every 8 hours (n = 14) versus ampicillin 2 g iv every 8 hours and gentamicin iv by body weight every 12 hours (n = 12) changing to oral amoxicillin/clavulanic acid or amoxicillin to complete 8 days treatment once afebrile. "Mild" disease: oral treatment only amoxicillin/clavulanate (n = 36) vs ampicillin/metronidazole (n = 37).
Outcomes	Treatment failure. Mean time to defervescence (3.5 vs 2.7 days N.S.). Mean time to resolution of clinical signs of endometritis (2.3 vs 1.7 days P < 0.05); Duration of treatment. Incidence of urticaria (allergic reaction).
Notes	2 women were excluded after enrollment (1 in each group) with culture demonstrating resistant S. aureus.

Characteristics of included studies (*Continued*)

	Vaginal deliveries = 62. Participants receiving both the iv and oral form of amoxicillin/clavulinic acid (Augmentin) have been combined. Pharmaceutical sponsorship - probable. Drop-outs < 5%.
Allocation concealment	B – Unclear

Study	**Figueroa-Damian 1996**
Methods	Allocation: "random" 3:1, without further description. Blinding: not stated. Study period: March 1993 through May 1994.
Participants	Inclusion criteria: women with postcesarean endometritis defined as fever, presence of foul smelling lochia, and pain on fundal palpation. Setting: Mexico. Number of participants: n = 56.
Interventions	Piperacillin/tazobactam 500 mg iv every 6 hours for 5 days vs ampicillin 1 g iv every 6 hours plus gentamicin 80 mg iv every 8 hours for 5 days followed by oral ampicillin and im gentamicin for 5 additional days.
Outcomes	Therapeutic failure. Wound infection. Mean length of stay 7 days vs 6 days (standard deviations not given).
Notes	All postcesarean section women. Pharmaceutical sponsorship - none apparent. Drop-outs unclear.
Allocation concealment	B – Unclear

Study	**Filler 1992**
Methods	Allocation: code prepared by pharmaceutical company and carried out by hospital pharmacy. Blinding: "double blind" without further description. Study period: not given.
Participants	Inclusion criteria: postcesarean section women with endometritis diagnosed based on elevated temperatures and white count and abnormal uterine tenderness. Setting: South Carolina, USA. Number of participants: n = 21.
Interventions	Trospectomycin 500 mg iv every 8 hours (n = 12) vs clindamycin 900 g iv every 8 hours each with aztreonam 1 gm iv every 8 hours (n = 8).
Outcomes	Therapeutic failure (defined as lack of resolution of fever, uterine tenderness, and high white blood count).
Notes	All participants were postcesarean women. Pharmaceutical sponsorship - probable. There were no drop-outs.
Allocation concealment	A – Adequate

Study	**Gaitan 1995**
Methods	Allocation: table of random numbers. Blinding: no. Study period: September 1993 through August 1994.
Participants	Inclusion criteria: women with postpartum endometritis after emergency cesarean section. Setting: Tertiary care center, Bogota, Colombia.

Characteristics of included studies (*Continued*)

	Number of participants: n = 71.
Interventions	Pefloxacine 400 mg iv every 12 hours plus metronidazole 500 mg iv every 8 hours (n = 35) vs clindamycin 600 mg iv every 6 hours plus gentamicin 2 mg/kg/d iv divided into doses every 12 hours (n = 36).
Outcomes	Clinical cure or improvement. Allergic reactions. Antibiotic associated diarrhea.
Notes	All women had undergone emergency cesarean sections. Use of prophylactic antibiotics not described. Women with cultures demonstrating microorganisms resistant to the antibiotics used were excluded from the study. Pharmaceutical sponsorship - probable. Drop-outs > 5%.
Allocation concealment	B – Unclear

Study	**Gall 1996**
Methods	Allocation: "randomized" without further description. Blinding: not stated. Study period: not stated.
Participants	Inclusion criteria: women with a diagnosis of postpartum endometritis by temperature elevation of 39 C on 1 occasion or 38.5 C on 2 occasions after delivery. Setting: Louisville, Kentucky. Number of participants: n = 129.
Interventions	Ampicillin 2 g plus sulbactam 1 g iv (n = 64) every 6 hours vs clindamycin 900 mg plus gentamicin by body weight iv every 8 hours (n = 65).
Outcomes	Cure (disappearance of presenting signs and symptoms). Improvement (partial alleviation of presenting signs and symptoms). Failure (no significant effect of study drug therapy on presenting signs and symptoms). Indeterminate (does not fit into any other category or unable to evaluate (n = 1 in clindamycin/gentamicin group). Diarrhea (9 vs 8). Length of hospital stay (9 vs 10 days; no variance given).
Notes	13 women were excluded after enrollment for numerous reasons, protocol violations in general. The number of women who underwent cesarean section versus vaginal delivery is not described. Endometritis was poorly defined. Pharmaceutical sponsorship - explicit. Drop-outs > 5%.
Allocation concealment	B – Unclear

Study	**Gibbs 1982**
Methods	Allocation: "randomized" without further description. Blinding: "double-blind". Study period: January 1980 through June 1981.
Participants	Inclusion criteria: women who had undergone cesarean section with clinical diagnosis of postpartum endometritis (based on fever > 101 F, uterine tenderness, and leukocytosis). Setting: San Antonio, Texas. Number of participants: n = 198.
Interventions	Clindamycin 600 g every 6 hours plus gentamicin by body weight every 8 hours both iv (n = 106) vs cefamandole 2 gm iv every 6 hours plus placebo doses every 8 hours (n = 92).
Outcomes	Therapeutic failure (persistent fever > 3 days), wound infection, serious complication.

Characteristics of included studies (*Continued*)

	Complications including rash (allergic reaction) and diarrhea. Mean length of stay. Culture results.
Notes	All cesarean section women, without antibiotic prophylaxis. Pharmaceutical sponsorship - explicit. 11 women randomized but excluded from analysis. Drop-outs > 5%.
Allocation concealment	B – Unclear

Study	**Gibbs 1983**
Methods	Allocation: randomization "provided by the sponsor". Blinding: double-blind. Study period: July 1981 through March 1982.
Participants	Inclusion criteria: women with postcesarean endomyometritis defined as oral temperature of at least 38.4 C, uterine tenderness, and leukocytosis. Setting: urban medical center hospital, San Antonio, Texas. Number of participants: n = 113.
Interventions	Moxalactam 2 g iv every 8 hours (n = 56) vs clindamycin 600 mg iv every 8 hours and gentamicin 1 mg/kg iv every 8 hours (n = 57).
Outcomes	Treatment failure. Wound infection. Allergic reactions. Diarrhea. Length of stay.
Notes	All participants were postcesarean section women. Pharmaceutical sponsorship - explicit. Drop-outs - none.
Allocation concealment	B – Unclear

Study	**Gibbs 1985**
Methods	Allocation: randomization schedule provided by pharmaceutical sponsor. Blinding: not stated. Study period: November 1982 through December 1983.
Participants	Inclusion criteria: women with postcesarean section endometritis defined as an oral temperature of at least 38 C, uterine tenderness and without other sources of fever. Setting: San Antonio, Texas. Number of participants: n = 119.
Interventions	Aztreonam 2 g every 8 hours (n = 58) vs gentamicin iv dosed by body weight every 8 hours each with clindamycin 600 mg iv every 6 hours (n = 61).
Outcomes	Therapeutic failure (lack of resolution of signs and symptoms within 72 hours). Side-effects (diarrhea, allergy) leading to discontinuation of treatment. Length of hospital stay.
Notes	All participants were cesarean section women. Pharmaceutical sponsorship - explicit. Drop-outs - none.
Allocation concealment	B – Unclear

Characteristics of included studies (*Continued*)

Study	**Greenberg 1987**
Methods	Allocation: "randomly assigned" according to a schedule provided by the sponsoring company, not further described. Blinding: not stated. Study period: December 1984 through April 1986.
Participants	Inclusion criteria: postpartum women with temperature of 100.4 F or greater, uterine tenderness, no other source of fever identified. Setting: St Louis, Missouri. Number of participants: n = 62.
Interventions	Aztreonam 1-2 g iv every 8 hours (n = 31) vs gentamicin ("per manufacturer's instructions") every 8 hours, each with clindamycin 900 mg iv every 8 hours (n = 31).
Outcomes	Cure (defined as defervescence and complete resolution of signs and symptoms) or partial response (defined as "substantial or temporary improvement") or therapeutic failure. Mortality. Side-effects including abnormal laboratory findings, pruritus following drug administration, pain and phlebitis at infusion site.
Notes	45 women had cesarean sections and 17 had vaginal deliveries. All women given oral antibiotics to complete a 10-14 day course. Pharmaceutical sponsorship - explicit. Drop-outs - none.
Allocation concealment	B – Unclear

Study	**Gutierrez 1994**
Methods	Allocation: "random", not further described. Blinding: "single blind". Study period: not stated.
Participants	Inclusion criteria: diagnosis of postpartum endometritis (temperature at least 38 C, uterine tenderness, and leokocytosis). Setting: Lima, Peru. Number of participants: n = 65.
Interventions	Penicillin 3 million units iv every 4 hours plus gentamicin 1.5 mg/kg iv every 8 hours plus chloramphenicol 1 g iv every 8 hours (n = 33) vs clindamycin 600 mg iv every 8 hours plus gentamicin 1.5 mg/kg every 8 hours (n = 32).
Outcomes	Clinical cure or improvement. Abscess. Antibiotic associated diarrhea. Phlebitis, anemia and wound infections.
Notes	Mode of delivery not provided. 1 woman from each group withdrew from the study. 1 exclusion for wrong diagnosis. Drop-outs < 5%. Pharmaceutical sponsorship not apparent.
Allocation concealment	B – Unclear

Study	**Hager 1989**
Methods	Allocation: "random" without further description. Blinding: not used. Study period: not given.

Characteristics of included studies (*Continued*)

Participants	Inclusion criteria: women treated for chorioamnionitis, postpartum endometritis (defined as temperature of at least 38.1 C, leukocytosis 15,000/ml, and uterine tenderness), or posthysterectomy cellulitis. All had received standard parenteral antibiotics until 48-72 hours afebrile and clinically well. Setting: Lexington, Kentucky. Number of participants: n = 163 total, n = 81 with postpartum endometritis.
Interventions	Oral antibiotic treatment with ampicillin 500 mg every 6 hours or tetracycline 500 mg every 6 hours to complete 10 days total of antibiotic therapy (n = 38) vs no treatment after iv antibiotics (n = 43).
Outcomes	Further treatment with antibiotics by the time of follow up at 2-4 weeks after hospital discharge. Postdischarge infections (wound or urinary tract infection) classified as failures.
Notes	Information on route of delivery was not given. Pharmaceutical sponsorship - none apparent. Drop-outs not clear. Charts were reviewed for the women not contacted directly.
Allocation concealment	B – Unclear

Study	**Hemsell 1983**
Methods	Allocation: randomized by computer-generated list, 2:1. Blinding: not stated. Study period: May 1980 through March 1981.
Participants	Inclusion criteria: women with postcesarean section endometritis defined as temperature of at least 38.3 C on 2 occasions 4 hours or more apart, abdominal pain with abdominal, uterine and perhaps parametrial tenderness. Setting: university hospital, Dallas, Texas. Number of participants: n = 120.
Interventions	Cefotaxime 2 g iv every 8 hours (n = 81) vs clindamycin 600 mg iv every 6 hours plus gentamicin 1 mg/kg every 8 hours (n = 39).
Outcomes	Treatment failure. Complications including pelvic abscess (severe complication), wound infection, and diarrhea. Length of treatment was 5.5 +/- SD 2.1 days versus 5.6 +/- SD 1.9 days.
Notes	All participants were postcesarean section women. Although not specifically stated, the earlier citation appears to include women included in the later citation. Pharmaceutical sponsorship - probable. Drop-outs < 5%.
Allocation concealment	B – Unclear

Study	**Herman 1986**
Methods	Allocation: computer-generated random sequence. Blinding: not stated. Study period: not stated.
Participants	Inclusion criteria: postpartum endometritis defined as postoperative fever of 38.3 C orally or higher, uterine tenderness, and absence of other infectious foci. Setting: University hospital, Philadelphia, Pennsylvania. Number of participants: n = 98.
Interventions	Cefoxitin 2 g iv every 6 hours (n = 48) vs clindamycin 600 mg iv every 8 hours plus gentamicin 1.5 mg/kg iv every 8 hours (n = 50).
Outcomes	Therapeutic failure, serious complication, diarrhea, rash. Follow up at 6 weeks included skin wound breakdown, pelvic infection and urinary tract infection.

Characteristics of included studies (*Continued*)

Notes	All participants were postcesarean women. Women with and without antibiotic prophylaxis were included. Pharmaceutical sponsorship - explicit. Drop-outs > 5%; insufficient information provided on drop-outs to include in intent-to-treat analysis.
Allocation concealment	B – Unclear

Study	**Hillier 1990**
Methods	Allocation: computer-generated randomization schedule. Blinding: "double-blind". Study period: August 1986 through August 1989.
Participants	Inclusion criteria: women with a temperature elevation of at least 38.5 C within 24 hours after cesarean section or at least 38 C for 4 consecutive hours more than 24 hours postoperatively, uterine tenderness, and no other apparent source of fever. Setting: Seattle, Washington. Number of participants: 27.
Interventions	Ticarcillin/clavulanic acid 3/1 g iv every 8 hours 9 (n = 13) vs cefoxitin 2 g iv every 8 hours (n = 14).
Outcomes	Cure (defined as resolution of fever and tenderness and no further signs of infection during follow-up period). Therapeutic failure (defined as fever after 48 hours of antibiotic therapy).
Notes	All but 1 woman received antibiotic prophylaxis with a cephalosporin at the time of surgery. Pharmaceutical sponsorship - explicit. No drop-outs are described.
Allocation concealment	B – Unclear

Study	**Knodel 1988**
Methods	Allocation: by randomization schedule. Blinding: not stated. Study period: January through December 1984.
Participants	Inclusion criteria: postcesarean section endometritis (oral temperature at least 38 C and uterine tenderness). Setting: Bethesda, Mariland, USA. Number of participants: n = 114.
Interventions	Moxalactam 2 g iv every 8 hours (n = 58) vs clindamycin 600 mg every 6 hours plus gentamicin 1.5 mg/kg iv every 8 hours (n = 56).
Outcomes	Clinical cure or improvement. Allergic reactions. Length of stay.
Notes	All postcesarean section women with or without antibiotic prophylaxis at surgery. Pharmaceutical sponsorship - probable. Drop-outs not described.
Allocation concealment	B – Unclear

Study	**Livingston 2003**
Methods	Allocation: concealed. Blinding: double-blind. Study period: December 1998 through December 2000.
Participants	Inclusion criteria: temperature of at least 100.4 F on at least 2 occasions 6 hours apart after the first 12 hours postpartum or greater than 101.5 F at any time, no other evident source of infection, uterine tenderness or diagnosis of chorioamnionitis before birth thought to require antibiotics postpartum.

Characteristics of included studies (*Continued*)

	Setting: University of Tennessee Health Science Center. Number of participants: n = 110.
Interventions	Gentamicin 5 mg/kg plus clindamycin 2700 mg iv once daily n = 56) vs gentamicin 1.5 mg/kg plus clindamycin 900 mg every 8 hours (n = 55).
Outcomes	Treatment failure. Length of hospital stay.
Notes	Cesarean section women were 40 in thrice daily dosing group and 46 in the once daily group
Allocation concealment	A – Adequate

Study	**MacGregor 1992**
Methods	Allocation: computerized randomization schedule. Blinding: double-blind, with "all doses identical". Study period: not stated.
Participants	Inclusion criteria: postcesarean women at least 12 hours postoperative who had received 3 doses of cefazolin as prophylaxis, and who presented with uterine tenderness, temperature at least 38.3 C on 1 occasion or at least 38 C on 2 occasions at least 6 hours apart, and no other obvious source of infection. Setting: Philadelphia, Pennsylvania. Number of participants: n = 140.
Interventions	Cefotetan 2 g iv every 12 hours (plus placebo doses) (n = 66) vs cefoxitin 2 g iv every 6 hours (n = 63).
Outcomes	Therapeutic failure (defined as a lack of decrease in temperature and uterine tenderness within 48 hours of therapy). Incidence of enterococcal bacteremia (considered automatically as a treatment failure): cefotetan n = 3; cefoxitin n = 1. Relapse (defined as those women meeting criteria for cure with subsequent wound infection, abscess, recurrent endometritis within 6 weeks) - 1 in each group. Complications (wound infection). Diarrhea.
Notes	11 women were excluded due to protocol violations (4 from cefotetan group, 7 from the cefoxitin group). Pharmaceutical sponsorship - probable. Drop-outs > 5%. All participants were postcesarean section.
Allocation concealment	B – Unclear

Study	**Maccato 1991**
Methods	Allocation: "randomized" without further description. Blinding: "open". Study period: not stated.
Participants	Inclusion criteria: postpartum women with oral temperature > 38 C, tachycardia, uterine tenderness, and white blood count > 14,000 or an increase > 10% in immature leukocytes. Setting: Houston, Texas. Number of subjects: n = 99.
Interventions	Ciprofloxacin 200 mg iv every 12 hours (n = 50) vs clindamycin 900 mg iv every 8 hours and gentamicin 120 mg iv loading followed by dosage adjustment based on peak and trough blood levels (n = 49).
Outcomes	Therapeutic failure (defined as persistence of fever, elevated white blood count, lack of bowel sounds, signs of peritonitis, wound tenderness or infection leading to wound breakdown after 48 hours of therapy). Complications (abscess, septic pelvic thrombophlebitis).
Notes	2 women (1 from each group) were considered to be not evaluable due to administration of other antibiotics < 48 hours after enrollment.

Characteristics of included studies (*Continued*)

	Only 3 women had vaginal deliveries. Pharmaceutical sponsorship - probable. Drop-outs < 5%.
Allocation concealment	B – Unclear

Study	**Martens 1989**
Methods	Allocation: "randomized" without further description. Blinding: not stated. Study period: not stated.
Participants	Inclusion criteria: postcesarean women who had received prophylactic cefazolin (3 doses) with temperature of at least 38.3 C that occurred 24 hours after the last dose of cefazolin, marked uterine tenderness, and at least 1 of the following; tachycardia, white blood count of at least 14,000 or at least 10% increase in immature polymorphonuclear leukocytes. Setting: Houston, Texas. Number of participants: n = 70.
Interventions	Sulbactam 1 g with ampicillin 2 g iv every 6 hours (n = 34) vs metronidazole 500 mg iv every 6 hours with gentamicin every 8 hours adjusted by peak and trough levels (n = 36).
Outcomes	Therapeutic failure (defined as lack of resolution of all signs and symptoms of infection within 72 hours).
Notes	All participants were postcesarean women who had received 3 doses of cefazolin as prophylaxis. Oral antibiotics were not given. Pharmaceutical sponsorship - probable. 3 women excluded because they had vaginal deliveries (2 in sulbactam/ampicillin group; one in metronidazole/gentamicin group). Drop-outs < 5%.
Allocation concealment	B – Unclear

Study	**Martens 1990**
Methods	Allocation: 2:1 computer-generated randomization provided by the pharmaceutical sponsor. Blinding: not stated. Study period: not stated.
Participants	Inclusion criteria: women with diagnosis of postpartum endomyometritis defined as temperature of at least 38.3 C within 24 hours after the last dose of prophylactic antibiotic, tachycardia, white blood cell count of at least 14,000/ml or at least 10% increase in immature polymorphonuclear leukocytes, and marked uterine tenderness. Study setting: Houston, Texas. Number of participants: n = 68 (75 with 7 excluded due to protocol violations).
Interventions	Ampicillin/sulbactam 2 g/1 g iv every 6 hours (n = 42) vs clindamycin 900 mg iv every 8 hours (n = 26).
Outcomes	Treatment failure.
Notes	All participants were postcesarean section women. Pharmaceutical sponsorship - explicit. Drop-outs > 5%; insufficient information provided on women excluded to include study in intent-to-treat analysis.
Allocation concealment	B – Unclear

Study	**McGregor 1989**
Methods	Allocation: "randomized" stated in abstract only. Blinding: not stated.

Characteristics of included studies (*Continued*)

	Study period: September 1987 through July 1988.
Participants	Inclusion criteria: women with clinical findings of upper genital tract infection in the puerperium. Setting: university hospital, Denver, Colorado. Number of participants: n = 36.
Interventions	Ampicillin/sulbactam 2 g/1 g iv every 6 hours (n = 18) vs clindamycin 900 mg iv every 8 hours and gentamicin 1.5 mg/kg every 8 hours (n = 18).
Outcomes	Therapeutic failure. Adverse reactions. Calculated daily costs (drug and pharmacy). Sulbactam/ampicillin $91.20 vs clindamycin/gentamicin $116.97.
Notes	There were 23 participants with endometritis following cesarean section and 13 with endometritis following vaginal delivery. Pharmaceutical sponsorship - probable. No drop-outs described.
Allocation concealment	B – Unclear

Study	**Mitra 1997**
Methods	Allocation: computer-generated schedule, sequentially-numbered sealed envelopes. Blinding: not blinded. Study period: July 1994 through July 1996.
Participants	Inclusion criteria: women with 1 of the following; (1) 2 temperatures of at least 100.4 F more than 12 hours postpartum, (2) a single temperature of at least 102 F in the first 12 postpartum hours, (3) diagnosis of chorioamnionitis in labor thought to require prophylactic antibiotic therapy, (4) diagnosis of postpartum endometritis after initial discharge from the hospital. Women with criteria 1 or 4 were considered to have endometritis. Setting: Charlotte, North Carolina. Number of participants: n = 299 (endometritis participants only n = 141).
Interventions	Clindamycin 800 mg iv plus gentamicin 1.33 mg/kg body weight iv every 8 hours (n = 71) vs clindamycin 1200 mg iv every 12 hours and gentamicin 4 mg/kg body weight every iv 24 hours (n = 70).
Outcomes	Cure (average temperature not more than 99 F and resolution of symptoms). Failure (elevated temperature after 72 hours of treatment, clinical deterioration, or the need for additional antibiotic or heparin treatment). Relapse (cure with subsequent wound infection, abscess or endometritis up to 6 weeks postpartum). Time to resolution of infection (time from first dose to last dose of antibiotic administered). This was 2.8 +/- 2.4 days versus 2.3 +/- 2.0 days for the conventional tid vs once daily gentamicin groups respectively, P = .02. Patient charges for antibiotic treatment (medication and administration): total charges for antibiotic treatment was $442.49 per patient in the conventional tid dosing group and $250.79 for the once daily gentamicin group. Nephrotoxicity (0.5 mg/dl increase in serum creatinine over the baseline). One participant (once daily group) had a serum creatinine level of 2.3 after therapy which resolved spontaneously.
Notes	27 women were excluded after enrollment for protocol violations; insufficient information on drop-outs to include study in intent-to-treat analysis. There were 102 cesarean section and 39 vaginal delivery participants in the endometritis categories. The conventional thrice daily dosing treatment group had more cesarean section women (56/71) than the once daily gentamicin treatment group (46/70) which could confound results such as length of treatment which favored the once daily group. Multiple logistic regression demonstrated that the experimental dosing was not more efficacious when mode of delivery was accounted for.

Characteristics of included studies (*Continued*)

	Pharmaceutical sponsorship - none apparent. Drop-outs - none.
Allocation concealment	A – Adequate

Study	**Morales 1989**
Methods	Allocation: "randomized" 2:1, not further described. Blinding: not used. Study period: July 1987 through April 1988.
Participants	Inclusion criteria: women with diagnosis of postpartum endomyometritis defined as temperature greater than 100.4 F on 2 occasions at least 6 hours apart or 101 F once excluding the first postpartum day, uterine tenderness, leukocytosis, and absence of other foci of infection. Women with bacteremia were excluded. Setting: urban hospital, Tampa, Florida. Number of participants: n = 109.
Interventions	Oral ampicillin/clavulanic acid for 7 days following iv antibiotic therapy (clindamycin/tobramycin until afebrile for at least 24 hours) (n = 37) vs no treatment following iv antibiotics (n = 72).
Outcomes	Treatment failure. Need for additional antibiotic treatment (recurrent endometritis). Costs were calculated was also evaluated and was a mean of $412 more in the oral antibiotic group.
Notes	There were 81 postcesarean section women in this study. There were 2 control groups, 1 receiving iv antibiotics until 24 hours afebrile, the other receiving them until 48 hours afebrile. There was no difference between these 2 groups, and they are combined in this analysis. Pharmaceutical sponsorship - explicit. Drop-outs > 5%.
Allocation concealment	B – Unclear

Study	**Pastorek 1987**
Methods	Allocation: randomized by computer-generated number table. Blinding: not stated. Study period: not stated.
Participants	Inclusion criteria: women with puerperal infection based on standard febrile morbidity; uterine, parametrial, or vaginal cuff tenderness; and leukocytosis. Setting: New Orleans, Louisiana. Number of participants: n = 60.
Interventions	Moxalactam 2 g iv every 8 hours (n = 29) vs clindamycin 600 mg iv every 6 hours plus tobramycin 1 to 1.5 mg/kg iv every 8 hours (n = 31).
Outcomes	Treatment failure. Pelvic abscess (severe complication). Wound abscess. Diarrhea.
Notes	Diarrhea was a complication regarded as clinical failure with change of antibiotic regimen. This case not included in our analysis of therapeutic failure. Pharmaceutical sponsorship - probable. Drop-outs < 5%. Information on number of cesarean section and vaginal delivery women was not given.
Allocation concealment	B – Unclear

Study	**Perry 1997**
Methods	Allocation: "randomized" without further explanation.

Characteristics of included studies (*Continued*)

	Blinding: not stated. Study period: not stated.
Participants	Inclusion criteria: women with clinical diagnosis of postcesarean endometritis. Setting: not stated (presumably university hospital Jackson, Mississippi). Number of participants: n = 100.
Interventions	Gentamicin 1.5 mg/kg iv every 8 hours (n = 44) vs gentamicin 5 mg/kg iv every 24 hours both with clindamycin 900 mg iv every 8 hours (n = 41).
Outcomes	Therapeutic failure. Nephrotoxicity. Mean length of stay.
Notes	All participants were postcesarean section women. This is a published abstract; insufficient information provided on excluded women to perform intent-to-treat analysis. Pharmaceutical sponsorship - probable. Drop-outs - none.
Allocation concealment	B – Unclear

Study	**Rodriguez-Ba 1996**
Methods	Allocation:"randomized" without further description. Blinding: not stated. Study period: November 1993 through May 1994.
Participants	Inclusion criteria: women with postpartum endometritis defined as temperature of at least 38 C on 2 occasions separated by at least 4 hours after the first 24 hours postpartum without evidence of other foci of infection. All were postcesarean section. Setting: military hospital, Mexico. Number of participants: n = 77.
Interventions	Penicillin 10 million units iv every 4 hours plus amikacin 500 mg iv every 12 hours until afebrile for 24 hours then oral and im to complete 10 days (n = 31) vs same iv regimen until afebrile 48 hours with no further treatment (n = 32).
Outcomes	Therapeutic failure. Mean length of stay. Amount of drug utilized.
Notes	All participants were postcesarean section. Pharmaceutical sponsorship - none apparent. Drop-outs unclear.
Allocation concealment	B – Unclear

Study	**Roy 2003**
Methods	Computer-generated randomization. Blinding: double-blinded.
Participants	Inclusion criteria: women with acute pelvic infection including postpartum endometritis defined as temperture > 38 degrees C, white blood cell count > 10,500/microliter or > 10% immature granulocytes, and at least 1 of the following: pelvic pain or tenderness or imaging suggesting infection. Setting: 47 sites in multiple countries. Number of participants: n = 412 of which 238 had postpartum endometritis.
Interventions	Ertapenem 1 g iv daily (n = 120) and 3 placebo doses daily for blinding vs piperacillin-tazobactam 3.375 g iv every 6 hours.

Characteristics of included studies (*Continued*)

Outcomes	Clinical cure or improvement.
Notes	128 women had cesarean and 110 vaginal delivery.
Allocation concealment	A – Adequate

Study	**Scalambrino 1989**
Methods	Allocation: "randomized" stated in the abstract only. Blinding: not used. Study period: January through December 1987.
Participants	Inclusion criteria: women with infections or febrile morbidity defined as temperature of at least 38 C on 2 successive measurements 24 hours apart after abortion or delivery for postpartum endometritis participants. Setting: Italy (at least 2 sites). Number of participants: n = 95 of which 25 were cases of postpartum endometritis.
Interventions	Sulbactam/ampicillin 1 g/2 g iv every 8 hours (n = 12) vs cefotetan 2 g iv every 12 hours (n = 13).
Outcomes	Therapeutic failure.
Notes	Outcomes for postpartum women are identified. There were 19 vaginal deliveries and 6 cesarean section women. Pharmaceutical sponsorship - explicit. Drop-outs - none.
Allocation concealment	B – Unclear

Study	**Soper 1992**
Methods	Allocation: "random" not further described. Blinding: blinded to provider. Study period: not given.
Participants	Inclusion criteria: women with postpartum endometritis based on 2 temperatures of more than 38.6 C at least 4 hours apart or a single temperature of more than 38.6 C during the first 24 hours after delivery; uterine tenderness; and no other apparent source of fever. Setting: university hospital, Richmond, Virginia. Number of participants: n = 81.
Interventions	Ceftizoxime 2 g iv every 12 hours (n = 43) vs cefoxitin 2 g every 6 hours (n = 6).
Outcomes	Treatment failure. Complications including phlebitis, wound infection, allergic reactions, and diarrhea.
Notes	Cesarean section women could have received cefazolin antibiotic prophylaxis during surgery (n = 73). Vaginal deliveries (n = 8). Pharmaceutical sponsorship - explicit. Drop-outs unclear.
Allocation concealment	B – Unclear

Study	**Stovall 1993**
Methods	Allocation: computerized randomization schedule. Blinding: not stated. Study period: January 1989 through November 1989.
Participants	Inclusion criteria: postcesarean section women who had received a single 1 g dose of cefazolin during surgery with diagnosis of postpartum endometritis (defined as oral temperature of at least 101 F > 24 postoperative hours and concomitant tachycardia, white blood count of at least 14,000 or a > 10% increase in immature leukocytes, and abnormal uterine tenderness). Setting: Winston-Salem, North Carolina.

	Number of participants: n = 77.
Interventions	Ampicillin 2 g plus sulbactam 1 g iv every 6 hours (n = 37) vs clindamycin 900 mg plus gentamicin 80 mg iv every 8 hours (n = 40).
Outcomes	Therapeutic failure (defined as fever and no improvement in uterine tenderness after 72 hours treatment). Diarrhea. Severe complications (septic pelvic thrombophlebitis, abscess).
Notes	No oral antibiotics were given after discharge. There was a 6 week follow-up period. All women were postcesarean section with prophylactic antibiotics. Pharmaceutical sponsorship - explicit. Drop-outs - none.
Allocation concealment	B – Unclear

Study	**Tuomala 1989**
Methods	Allocation: "random", not further described. Blinding: double blind. Study period: January 1982 through November 1984.
Participants	Inclusion criteria: women with postpartum endometritis (meeting 2 of the following criteria: temperature at least 101 F, uterine tenderness, foul-smelling lochia). Setting: Boston, Massachusetts, USA. Number of participants: n = 50.
Interventions	Ampicillin 3 g iv every (n = 25) vs cefotaxime 2 g iv every 6 hours (n = 25).
Outcomes	Clinical cure or improvement. Pelvic abscess. Length of stay.
Notes	13 vaginal deliveries evenly distributed between groups. 5 of the 7 women who failed treatment had received cefoxitin prophylaxis at the time of cesarean section. Pharmaceutical sponsorship - probable. Drop-outs > 5%.
Allocation concealment	B – Unclear

hrs: hours
im: intramuscular
iv: intravenous
N.S.: not statistically significant
sd: standard deviation
tid: three times a day
vs: versus

Characteristics of excluded studies

Study	**Reason for exclusion**
Alvarez 1988	Pseudorandomization methodology based on odd or even year of birth.
Berkeley 1986	Postpartum women not identified, postpartum endometritis not defined.
Briggs 1989	This study compared 2 approaches to tid dosing for gentamycin, based on calculated body mass versus adjustments based on peak and trough serum measurements. 2 different dosing regimens were compared. Although outcomes measured included nephrotoxicity, hospital stay, duration of treatment and costs, treatment failures were not reported.

Characteristics of excluded studies (*Continued*)

Crombleholme 1987	Of the 44 women enrolled in this study, only 5 women had endomyometritis; the results for this group are not given separately.
Cunningham 1978	Pseudorandomization methodology based on last digit of medical record number.
Dinsmoor 1991	Exclusions after randomization were more than 20%.
Duff 1982	Pseudorandomization methodology based on odd or even medical record number.
Faro 1987a	Exclusions after randomization were more than 20%.
Faro 1987b	Exclusions after randomization were more than 20% in the control group.
Fernandez 1993	This is not a study of treatment of postpartum endometritis. It is rather a study of antibiotic prophylaxis for vaginal delivery to prevent postpartum endometritis.
Gall 1981	Eligible women included postpartum endometritis (31/47) as well as pelvic inflammatory disease and postoperative infection; outcomes, however, were not given for the endometritis group separately.
Gonik 1992	Antibiotic regimens' dose and frequency were not described.
Hemsell 1988	This study included postpartum women. However, endometritis was not defined, and women treated for endometritis were not analyzed separately.
Hemsell 1997	Exclusions were more than 20% after randomization.
Knuppel 1988	Participants not identified as postpartum. Postpartum endometritis not defined.
Kreutner 1979	Study of prophylaxis rather than treatment of postpartum endometritis.
Lancheros 1997	This is a published abstract. The number of women in each treatment group was not given.
Ledger 1974	No outcomes of interest.
Malik 1996	This study looked at rates of endometritis in women with premature rupture of membranes, rather than treatment of postpartum endometritis.
Marshall 1982	Postpartum women not identified.
Pastorek 1987a	No outcomes of interest. Study of serum levels of tobramycin in puerperal women.
Pastorfide 1987	Not a study of treatment of postpartum endometritis.
Perry 1999	Participants were randomized to receive either high- or low-dose ampicillin/sulbactam; this study has not been included because of the similarity of these regimens.
Pond 1979	Pseudorandomization methodology based on odd or even medical record number.
Resnik 1994	Exclusions after randomization were more than 20% in the control group.
Rosene 1986	Actual numbers not provided.
Sen 1980	Exclusions after randomization were more than 20%.
Sorrell 1981	Exclusions after randomization were more than 20%.
Turnquest 1998	Study of prevention (prophylaxis) rather than treatment.
Wager 1980	Not randomized.
Watts 1989	No outcomes of interest were reported. This study focused on bacteriological results.

tid = three times a day

ANALYSES

Comparison 01. Any other regimen versus clindamycin and aminoglycoside

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	19	1902	Relative Risk (Fixed) 95% CI	1.44 [1.15, 1.80]
03 Severe complication	12	1120	Relative Risk (Fixed) 95% CI	1.29 [0.54, 3.07]
04 Wound infection	9	1055	Relative Risk (Fixed) 95% CI	1.94 [1.25, 3.01]
05 Allergic reaction	12	1268	Relative Risk (Fixed) 95% CI	0.94 [0.41, 2.15]
06 Diarrhea	14	1362	Relative Risk (Fixed) 95% CI	0.66 [0.35, 1.25]
07 Length of stay	5	613	Weighted Mean Difference (Fixed) 95% CI	0.15 [-0.12, 0.43]
08 Treatment failure postcesarean with prophylaxis	2	229	Relative Risk (Fixed) 95% CI	0.90 [0.51, 1.59]

Comparison 02. Aminoglycoside and penicillin or ampicillin versus any other regimen

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	2	256	Relative Risk (Fixed) 95% CI	2.08 [1.27, 3.40]
03 Severe complication	2	256	Relative Risk (Fixed) 95% CI	9.00 [0.49, 165.00]
04 Wound infection	2	256	Relative Risk (Fixed) 95% CI	2.04 [0.94, 4.43]
05 Allergic reaction	2	256	Relative Risk (Fixed) 95% CI	1.00 [0.14, 6.96]
06 Diarrhea	2	256	Relative Risk (Fixed) 95% CI	0.20 [0.01, 4.11]

Comparison 04. Beta-lactamase inhibitor combination versus any other regimen

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	12	1007	Relative Risk (Fixed) 95% CI	1.00 [0.89, 1.14]
03 Severe complication	4	216	Relative Risk (Fixed) 95% CI	4.32 [0.51, 36.95]
04 Wound infection	2	133	Relative Risk (Fixed) 95% CI	0.41 [0.02, 7.47]
05 Allergic reaction	4	279	Relative Risk (Fixed) 95% CI	0.98 [0.06, 15.23]
06 Diarrhea	5	243	Relative Risk (Fixed) 95% CI	0.90 [0.29, 2.77]
07 Length of stay	1	99	Weighted Mean Difference (Fixed) 95% CI	0.80 [-0.09, 1.69]

Comparison 05. 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	7	741	Relative Risk (Fixed) 95% CI	1.39 [0.90, 2.15]
03 Severe complication	3	378	Relative Risk (Fixed) 95% CI	0.42 [0.05, 3.32]
04 Wound infection	4	500	Relative Risk (Fixed) 95% CI	1.88 [1.08, 3.28]
05 Allergic reaction	4	469	Relative Risk (Fixed) 95% CI	0.79 [0.18, 3.49]
06 Diarrhea	7	741	Relative Risk (Fixed) 95% CI	0.35 [0.12, 1.01]
07 Length of stay	3	380	Weighted Mean Difference (Fixed) 95% CI	0.31 [-0.02, 0.64]

Comparison 06. Cephamycin versus any other regimen

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	5	276	Relative Risk (Fixed) 95% CI	1.09 [0.67, 1.78]
03 Severe complication	2	143	Relative Risk (Fixed) 95% CI	0.52 [0.11, 2.57]
05 Allergic reaction	2	179	Relative Risk (Fixed) 95% CI	1.04 [0.07, 16.19]
06 Diarrhea	3	206	Relative Risk (Fixed) 95% CI	2.53 [0.52, 12.38]
07 Length of stay	1	45	Weighted Mean Difference (Fixed) 95% CI	-0.88 [-2.76, 1.00]

Comparison 07. Aztreonam and clindamycin versus any other regimen

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	4	603	Relative Risk (Fixed) 95% CI	1.14 [0.65, 2.01]
03 Severe complication	1	62	Relative Risk (Fixed) 95% CI	Not estimable
04 Wound infection	1	117	Relative Risk (Fixed) 95% CI	1.09 [0.07, 17.00]
05 Allergic reaction	2	181	Relative Risk (Fixed) 95% CI	1.71 [0.23, 12.54]
06 Diarrhea	1	119	Relative Risk (Fixed) 95% CI	2.10 [0.20, 22.58]
07 Length of stay	1	119	Weighted Mean Difference (Fixed) 95% CI	-0.45 [-1.15, 0.25]

Comparison 08. Agent with longer half life versus similar agent with shorter half life

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	2	484	Relative Risk (Fixed) 95% CI	0.61 [0.40, 0.92]
03 Severe complication	1	355	Relative Risk (Fixed) 95% CI	0.27 [0.02, 2.89]
04 Wound infection	2	484	Relative Risk (Fixed) 95% CI	0.70 [0.13, 3.68]
05 Allergic reaction	1	377	Relative Risk (Fixed) 95% CI	0.78 [0.22, 2.72]
06 Diarrhea	1	129	Relative Risk (Fixed) 95% CI	1.43 [0.42, 4.84]
07 Length of stay	1	129	Weighted Mean Difference (Fixed) 95% CI	-0.60 [-1.45, 0.25]

Comparison 09. Quinolone versus any other regimen

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	1	97	Relative Risk (Fixed) 95% CI	1.96 [0.87, 4.43]
03 Severe complication	1	97	Relative Risk (Fixed) 95% CI	0.33 [0.01, 7.83]
04 Wound infection	1	97	Relative Risk (Fixed) 95% CI	1.96 [0.18, 20.90]
05 Allergic reaction	1	97	Relative Risk (Fixed) 95% CI	Not estimable

Comparison 10. Metronidazole and gentamicin versus any other regimen

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	1	67	Relative Risk (Fixed) 95% CI	0.91 [0.20, 4.21]

Comparison 11. Once daily versus every 8 hours gentamicin dosing

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	4	463	Relative Risk (Fixed) 95% CI	0.70 [0.49, 1.00]
05 Nephrotoxicity	3	353	Relative Risk (Fixed) 95% CI	3.04 [0.13, 73.43]
06 Length of stay	3	322	Weighted Mean Difference (Fixed) 95% CI	-0.73 [-1.27, -0.20]

Comparison 12. Continued oral versus no treatment after intravenous antibiotic course

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	1	109	Odds Ratio (Fixed) 95% CI	1.50 [0.32, 7.09]
03 Severe complication	2	144	Relative Risk (Fixed) 95% CI	Not estimable
04 Wound infection	1	81	Relative Risk (Fixed) 95% CI	3.38 [0.14, 80.70]
05 Urinary tract infection	1	81	Relative Risk (Fixed) 95% CI	1.13 [0.07, 17.48]
06 Recurrent endometritis	3	253	Relative Risk (Fixed) 95% CI	2.91 [0.12, 68.81]
07 Length of stay	1	63	Weighted Mean Difference (Fixed) 95% CI	-0.21 [-1.44, 1.02]

Comparison 13. Poor activity against penicillin resistant anaerobic bacteria versus good activity

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure	7	774	Relative Risk (Fixed) 95% CI	1.94 [1.38, 2.72]
03 Severe complication	5	671	Relative Risk (Fixed) 95% CI	1.68 [0.45, 6.29]
04 Wound infection	6	740	Relative Risk (Fixed) 95% CI	1.88 [1.17, 3.02]
05 Allergic reaction	5	628	Relative Risk (Fixed) 95% CI	1.34 [0.34, 5.36]
06 Diarrhea	6	743	Relative Risk (Fixed) 95% CI	0.29 [0.08, 1.04]
07 Length of stay	2	267	Weighted Mean Difference (Fixed) 95% CI	0.37 [-0.00, 0.73]

INDEX TERMS

Medical Subject Headings (MeSH)

*Anti-Bacterial Agents; Drug Therapy, Combination [*therapeutic use]; Endometritis [*drug therapy]; Postpartum Period; Puerperal Infection [*drug therapy]; Randomized Controlled Trials

MeSH check words

Female; Humans

COVER SHEET

Title	Antibiotic regimens for endometritis after delivery
Authors	French LM, Smaill FM
Contribution of author(s)	Linda French: protocol development, abstract form development, abstraction, data entry, data analysis, writing of review. Fiona Smaill: protocol development, abstraction, data table development, data entry, data analysis, writing of review. Linda French is the guarantor of the review.
Issue protocol first published	1998/2
Review first published	2000/2

Date of most recent amendment	19 February 2007
Date of most recent SUBSTANTIVE amendment	22 July 2004
What's New	January 2007: Search updated. One new study included (Roy 2003). The conclusions have not changed. January 2004: Two new studies have been included (Hemsell 1997; Livingston 2003) and one has been excluded (Pastorek 1987a). November 2001: Eight additional studies were evaluated for inclusion in the review. Six were added to the review and two were excluded. The conclusions drawn from the meta-analysis were not changed.
Date new studies sought but none found	Information not supplied by author
Date new studies found but not yet included/excluded	Information not supplied by author
Date new studies found and included/excluded	25 January 2007
Date authors' conclusions section amended	Information not supplied by author
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GRAPHS AND OTHER TABLES

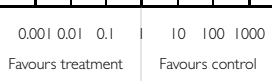
Analysis 01.01. Comparison 01 Any other regimen versus clindamycin and aminoglycoside, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 01 Any other regimen versus clindamycin and aminoglycoside

Outcome: 01 Treatment failure

Study	Any other regimen n/N	Clyndamycin-gent n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Apuzzio 1985a	2/23	0/24		0.5	5.21 [0.26, 102.98]
Apuzzio 1985b	19/68	4/32		5.1	2.24 [0.83, 6.03]
Blanco 1983	4/34	5/35		4.6	0.82 [0.24, 2.81]
DiZerega 1979	36/100	14/100		13.1	2.57 [1.48, 4.46]
Faro 1989	11/75	14/77		12.9	0.81 [0.39, 1.66]
Gaitan 1995	2/30	3/33		2.7	0.73 [0.13, 4.09]
Gall 1996	9/55	9/60		8.0	1.09 [0.47, 2.55]
Gibbs 1982	13/92	6/106		5.2	2.50 [0.99, 6.30]
Gibbs 1983	4/56	2/57		1.9	2.04 [0.39, 10.67]
Gibbs 1985	2/58	6/61		5.5	0.35 [0.07, 1.67]
Greenberg 1987	1/31	1/31		0.9	1.00 [0.07, 15.28]
Gutierrez 1994	5/32	2/30		1.9	2.34 [0.49, 11.18]
Hemsell 1983	2/81	2/39		2.5	0.48 [0.07, 3.29]
Herman 1986	12/48	12/50		11.0	1.04 [0.52, 2.09]
Knodel 1988	13/58	9/56		8.6	1.39 [0.65, 3.00]
Maccato 1991	14/49	7/48		6.6	1.96 [0.87, 4.43]
McGregor 1989	1/18	1/18		0.9	1.00 [0.07, 14.79]
Pastorek 1987	2/29	2/31		1.8	1.07 [0.16, 7.10]
Stovall 1993	7/37	7/40		6.3	1.08 [0.42, 2.79]
Total (95% CI)	974	928		100.0	1.44 [1.15, 1.80]
Total events: 159 (Any other regimen), 106 (Clyndamycin-gent)					
Test for heterogeneity chi-square=18.25 df=18 p=0.44 I^2 =1.4%					
Test for overall effect z=3.13 p=0.002					



Analysis 01.03. Comparison 01 Any other regimen versus clindamycin and aminoglycoside, Outcome 03 Severe complication

Review: Antibiotic regimens for endometritis after delivery

Comparison: 01 Any other regimen versus clindamycin and aminoglycoside

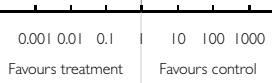
Outcome: 03 Severe complication

Study	Any other regimen n/N	Clyndamycin-gent n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Apuzzio 1985a	0/23	0/24		0.0	Not estimable
DiZerega 1979	4/100	0/100		5.7	9.00 [0.49, 165.00]
Gaitan 1995	0/30	1/33		16.3	0.37 [0.02, 8.65]
× Gibbs 1982	0/92	0/106		0.0	Not estimable
× Greenberg 1987	0/31	0/31		0.0	Not estimable
Gutierrez 1994	0/32	1/30		17.7	0.31 [0.01, 7.40]
Hemsell 1983	1/81	1/39		15.4	0.48 [0.03, 7.50]
× Herman 1986	0/48	0/50		0.0	Not estimable
Maccato 1991	0/49	1/48		17.3	0.33 [0.01, 7.83]
× McGregor 1989	0/18	0/18		0.0	Not estimable
Pastorek 1987	0/29	1/31		16.6	0.36 [0.02, 8.39]
Stovall 1993	4/37	1/40		11.0	4.32 [0.51, 36.95]
Total (95% CI)	570	550		100.0	1.29 [0.54, 3.07]

Total events: 9 (Any other regimen), 6 (Clyndamycin-gent)

Test for heterogeneity chi-square=6.17 df=6 p=0.40 I^2 =2.8%

Test for overall effect z=0.58 p=0.6



Analysis 01.04. Comparison 01 Any other regimen versus clindamycin and aminoglycoside, Outcome 04 Wound infection

Review: Antibiotic regimens for endometritis after delivery

Comparison: 01 Any other regimen versus clindamycin and aminoglycoside

Outcome: 04 Wound infection

Study	Any other regimen n/N	Clyndamycin-gent n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Blanco 1983	4/34	2/35		7.3	2.06 [0.40, 10.51]
DiZerega 1979	16/100	8/100		29.6	2.00 [0.90, 4.46]
Gibbs 1982	18/92	11/106		37.8	1.89 [0.94, 3.78]
Gibbs 1983	7/56	3/57		11.0	2.38 [0.65, 8.73]
Gibbs 1985	1/58	1/61		3.6	1.05 [0.07, 16.43]
Gutierrez 1994	2/32	0/30		1.9	4.70 [0.23, 94.01]
Hemsell 1983	1/81	1/39		5.0	0.48 [0.03, 7.50]
Maccato 1991	2/49	1/48		3.7	1.96 [0.18, 20.90]
× Stovall 1993	0/37	0/40		0.0	Not estimable
Total (95% CI)	539	516		100.0	1.94 [1.25, 3.01]

Total events: 51 (Any other regimen), 27 (Clyndamycin-gent)

Test for heterogeneity chi-square=1.63 df=7 p=0.98 I^2 =0.0%

Test for overall effect z=2.97 p=0.003

Analysis 01.05. Comparison 01 Any other regimen versus clindamycin and aminoglycoside, Outcome 05 Allergic reaction

Review: Antibiotic regimens for endometritis after delivery

Comparison: 01 Any other regimen versus clindamycin and aminoglycoside

Outcome: 05 Allergic reaction

Study	Any other regimen n/N	Clyndamycin-gent n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Apuzzio 1985a	0/23	0/24		0.0	Not estimable
Blanco 1983	1/38	0/39		4.3	3.08 [0.13, 73.26]
DiZerega 1979	2/100	2/100		17.6	1.00 [0.14, 6.96]
Gaitan 1995	1/30	1/33		8.4	1.10 [0.07, 16.82]
Gibbs 1982	1/92	1/106		8.2	1.15 [0.07, 18.16]
Gibbs 1983	0/56	2/57		21.8	0.20 [0.01, 4.15]
Gibbs 1985	1/58	0/61		4.3	3.15 [0.13, 75.86]
Greenberg 1987	1/31	1/31		8.8	1.00 [0.07, 15.28]
Herman 1986	1/48	1/50		8.6	1.04 [0.07, 16.19]
Knodel 1988	1/58	2/56		17.9	0.48 [0.05, 5.18]
× Maccato 1991	0/49	0/48		0.0	Not estimable
× Stovall 1993	0/37	0/43		0.0	Not estimable
Total (95% CI)	620	648		100.0	0.94 [0.41, 2.15]

Total events: 9 (Any other regimen), 10 (Clyndamycin-gent)

Test for heterogeneity chi-square=2.43 df=8 p=0.96 I^2 =0.0%

Test for overall effect z=0.15 p=0.9

Analysis 01.06. Comparison 01 Any other regimen versus clindamycin and aminoglycoside, Outcome 06 Diarrhea

Review: Antibiotic regimens for endometritis after delivery

Comparison: 01 Any other regimen versus clindamycin and aminoglycoside

Outcome: 06 Diarrhea

Study	Any other regimen n/N	Clyndamycin-gent n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Apuzzio 1985a	0/23	0/24		0.0	Not estimable
Apuzzio 1985b	0/68	1/32		8.9	0.16 [0.01, 3.81]
× Blanco 1983	0/34	0/35		0.0	Not estimable
DiZerega 1979	0/100	2/100		10.9	0.20 [0.01, 4.11]
Gaitan 1995	1/30	1/33		4.2	1.10 [0.07, 16.82]
Gibbs 1982	2/92	6/106		24.4	0.38 [0.08, 1.86]
Gibbs 1983	1/56	2/57		8.7	0.51 [0.05, 5.45]
Gibbs 1985	2/58	1/61		4.3	2.10 [0.20, 22.58]
Gutierrez 1994	2/32	3/30		13.5	0.63 [0.11, 3.48]
× Hemsell 1983	0/81	0/39		0.0	Not estimable
Herman 1986	1/48	0/50		2.1	3.12 [0.13, 74.82]
× McGregor 1989	0/18	0/18		0.0	Not estimable
Pastorek 1987	0/29	1/31		6.3	0.36 [0.02, 8.39]
Stovall 1993	4/37	4/40		16.8	1.08 [0.29, 4.01]
Total (95% CI)	706	656		100.0	0.66 [0.35, 1.25]

Total events: 13 (Any other regimen), 21 (Clyndamycin-gent)

Test for heterogeneity chi-square=4.53 df=9 p=0.87 I^2 =0.0%

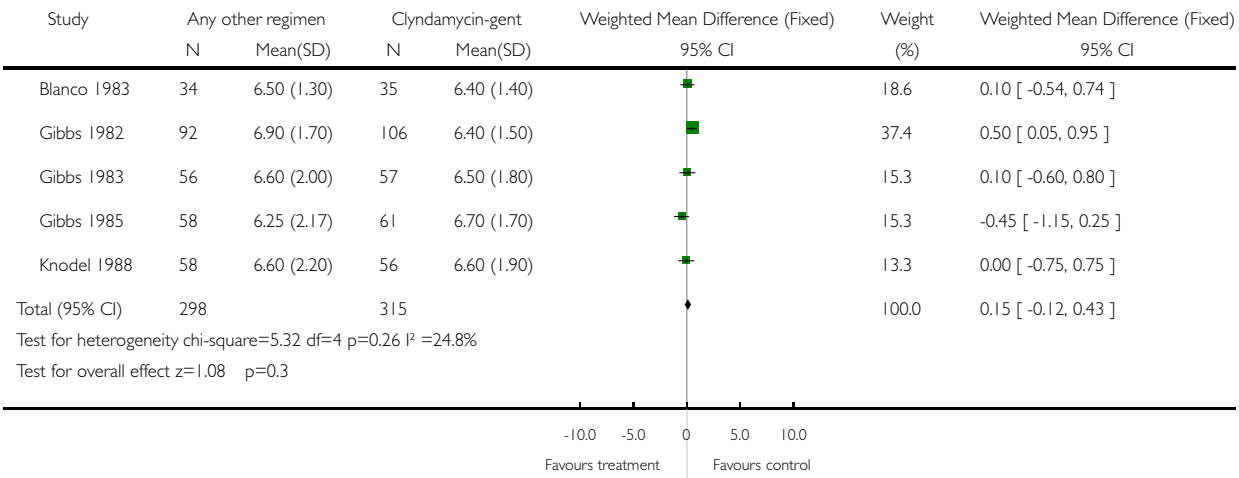
Test for overall effect z=1.27 p=0.2

Analysis 01.07. Comparison 01 Any other regimen versus clindamycin and aminoglycoside, Outcome 07 Length of stay

Review: Antibiotic regimens for endometritis after delivery

Comparison: 01 Any other regimen versus clindamycin and aminoglycoside

Outcome: 07 Length of stay

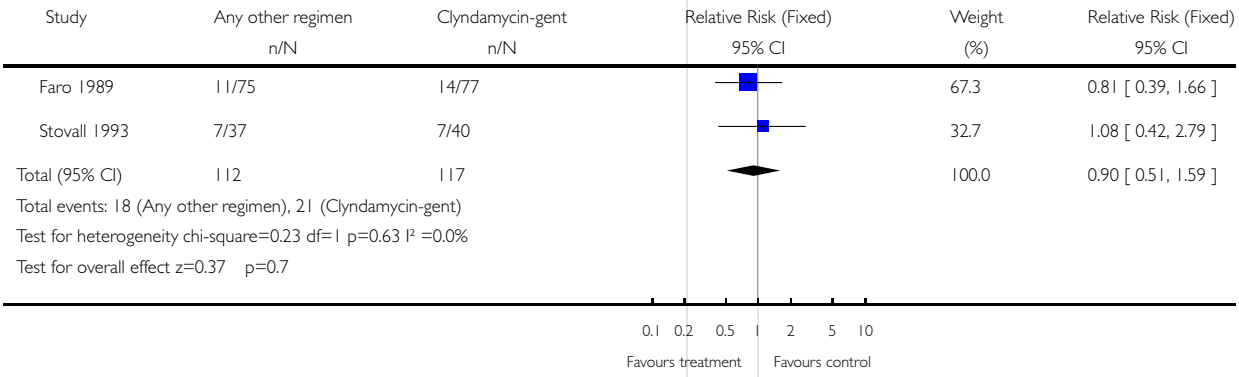


Analysis 01.08. Comparison 01 Any other regimen versus clindamycin and aminoglycoside, Outcome 08 Treatment failure postcesarean with prophylaxis

Review: Antibiotic regimens for endometritis after delivery

Comparison: 01 Any other regimen versus clindamycin and aminoglycoside

Outcome: 08 Treatment failure postcesarean with prophylaxis

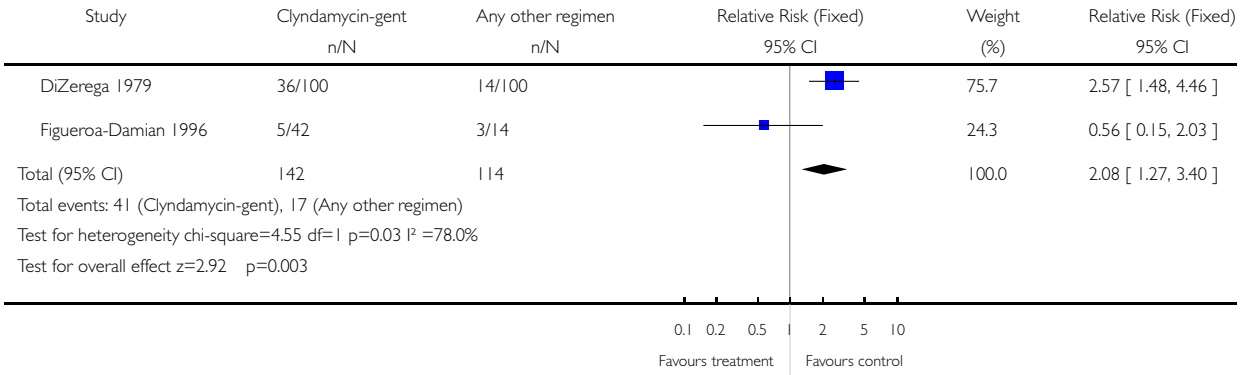


Analysis 02.01. Comparison 02 Aminoglycoside and penicillin or ampicillin versus any other regimen, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 02 Aminoglycoside and penicillin or ampicillin versus any other regimen

Outcome: 01 Treatment failure

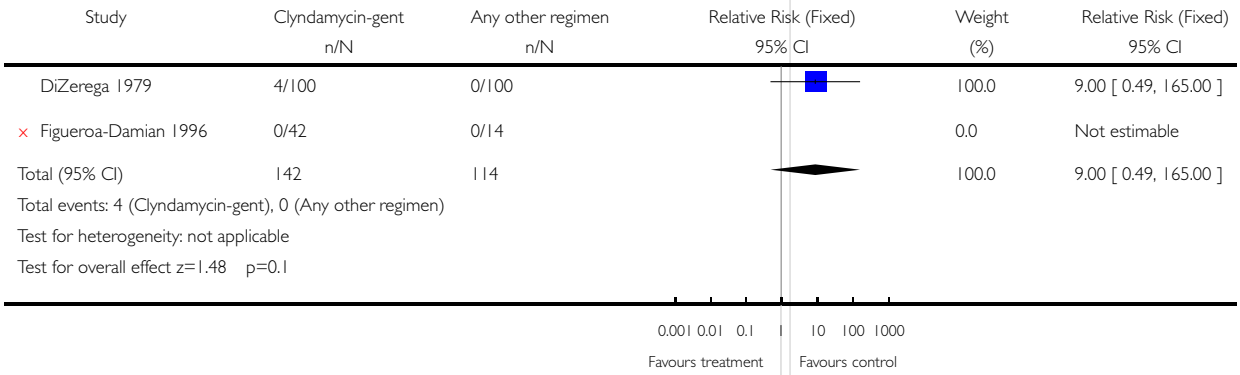


Analysis 02.03. Comparison 02 Aminoglycoside and penicillin or ampicillin versus any other regimen, Outcome 03 Severe complication

Review: Antibiotic regimens for endometritis after delivery

Comparison: 02 Aminoglycoside and penicillin or ampicillin versus any other regimen

Outcome: 03 Severe complication



Analysis 02.04. Comparison 02 Aminoglycoside and penicillin or ampicillin versus any other regimen, Outcome 04 Wound infection

Review: Antibiotic regimens for endometritis after delivery

Comparison: 02 Aminoglycoside and penicillin or ampicillin versus any other regimen

Outcome: 04 Wound infection

Study	Clyndamycin-gent n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
DiZerega 1979	16/100	8/100		91.5	2.00 [0.90, 4.46]
Figueroa-Damian 1996	3/42	0/14		8.5	2.44 [0.13, 44.57]
Total (95% CI)	142	114		100.0	2.04 [0.94, 4.43]

Total events: 19 (Clyndamycin-gent), 8 (Any other regimen)

Test for heterogeneity chi-square=0.02 df=1 p=0.90 I^2 =0.0%

Test for overall effect z=1.80 p=0.07

Analysis 02.05. Comparison 02 Aminoglycoside and penicillin or ampicillin versus any other regimen, Outcome 05 Allergic reaction

Review: Antibiotic regimens for endometritis after delivery

Comparison: 02 Aminoglycoside and penicillin or ampicillin versus any other regimen

Outcome: 05 Allergic reaction

Study	Clyndamycin-gent n/N	Any other treatment n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
DiZerega 1979	2/100	2/100		100.0	1.00 [0.14, 6.96]
× Figueroa-Damian 1996	0/42	0/14		0.0	Not estimable
Total (95% CI)	142	114		100.0	1.00 [0.14, 6.96]

Total events: 2 (Clyndamycin-gent), 2 (Any other treatment)

Test for heterogeneity: not applicable

Test for overall effect z=0.00 p=1

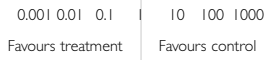
Analysis 02.06. Comparison 02 Aminoglycoside and penicillin or ampicillin versus any other regimen, Outcome 06 Diarrhea

Review: Antibiotic regimens for endometritis after delivery

Comparison: 02 Aminoglycoside and penicillin or ampicillin versus any other regimen

Outcome: 06 Diarrhea

Study	Clyndamycin-gent n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
DiZerega 1979	0/100	2/100		100.0	0.20 [0.01, 4.11]
× Figueroa-Damian 1996	0/42	0/14		0.0	Not estimable
Total (95% CI)	142	114		100.0	0.20 [0.01, 4.11]
Total events: 0 (Clyndamycin-gent), 2 (Any other regimen)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.04 p=0.3					



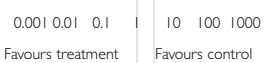
Analysis 04.01. Comparison 04 Beta-lactamase inhibitor combination versus any other regimen, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 04 Beta-lactamase inhibitor combination versus any other regimen

Outcome: 01 Treatment failure

Study	Beta-lactamase n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Apuzzio 1985a	2/23	0/24		0.3	5.21 [0.26, 102.98]
Faro 1989	11/75	14/77		8.9	0.81 [0.39, 1.66]
Fernandez 1990	0/50	1/49		1.0	0.33 [0.01, 7.83]
Figueroa-Damian 1996	3/14	5/42		1.6	1.80 [0.49, 6.59]
Gall 1996	9/55	9/60		5.5	1.09 [0.47, 2.55]
Hillier 1990	3/13	3/14		1.9	1.08 [0.26, 4.42]
Martens 1989	3/32	3/35		1.8	1.09 [0.24, 5.04]
Martens 1990	7/42	3/26		2.4	1.44 [0.41, 5.10]
McGregor 1989	1/18	1/18		0.6	1.00 [0.07, 14.79]
Roy 2003	107/118	112/120		71.6	0.97 [0.90, 1.05]
× Scalambrino 1989	0/12	0/13		0.0	Not estimable
Stovall 1993	7/37	7/40		4.3	1.08 [0.42, 2.79]
Total (95% CI)	489	518		100.0	1.00 [0.89, 1.14]
Total events: 153 (Beta-lactamase), 158 (Any other regimen)					
Test for heterogeneity chi-square=3.93 df=10 p=0.95 I^2 =0.0%					
Test for overall effect z=0.07 p=0.9					



Analysis 04.03. Comparison 04 Beta-lactamase inhibitor combination versus any other regimen, Outcome 03 Severe complication

Review: Antibiotic regimens for endometritis after delivery

Comparison: 04 Beta-lactamase inhibitor combination versus any other regimen

Outcome: 03 Severe complication

Study	Beta-lactamase n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Apuzzio 1985a	0/23	0/24		0.0	Not estimable
× Figueroa-Damian 1996	0/14	0/42		0.0	Not estimable
× McGregor 1989	0/18	0/18		0.0	Not estimable
Stovall 1993	4/37	1/40		100.0	4.32 [0.51, 36.95]
Total (95% CI)	92	124		100.0	4.32 [0.51, 36.95]

Total events: 4 (Beta-lactamase), 1 (Any other regimen)

Test for heterogeneity: not applicable

Test for overall effect z=1.34 p=0.2

Analysis 04.04. Comparison 04 Beta-lactamase inhibitor combination versus any other regimen, Outcome 04 Wound infection

Review: Antibiotic regimens for endometritis after delivery

Comparison: 04 Beta-lactamase inhibitor combination versus any other regimen

Outcome: 04 Wound infection

Study	Beta-lactamase n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Figueroa-Damian 1996	0/14	3/42		100.0	0.41 [0.02, 7.47]
× Stovall 1993	0/37	0/40		0.0	Not estimable
Total (95% CI)	51	82		100.0	0.41 [0.02, 7.47]

Total events: 0 (Beta-lactamase), 3 (Any other regimen)

Test for heterogeneity: not applicable

Test for overall effect z=0.60 p=0.5

Analysis 04.05. Comparison 04 Beta-lactamase inhibitor combination versus any other regimen, Outcome 05 Allergic reaction

Review: Antibiotic regimens for endometritis after delivery

Comparison: 04 Beta-lactamase inhibitor combination versus any other regimen

Outcome: 05 Allergic reaction

Study	Beta-lactamase n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Apuzzio 1985a	0/23	0/24		0.0	Not estimable
Fernandez 1990	1/50	1/49		100.0	0.98 [0.06, 15.23]
× Figueroa-Damian 1996	0/14	0/42		0.0	Not estimable
× Stovall 1993	0/37	0/40		0.0	Not estimable
Total (95% CI)	124	155		100.0	0.98 [0.06, 15.23]

Total events: 1 (Beta-lactamase), 1 (Any other regimen)

Test for heterogeneity: not applicable

Test for overall effect z=0.01 p=1

Analysis 04.06. Comparison 04 Beta-lactamase inhibitor combination versus any other regimen, Outcome 06 Diarrhea

Review: Antibiotic regimens for endometritis after delivery

Comparison: 04 Beta-lactamase inhibitor combination versus any other regimen

Outcome: 06 Diarrhea

Study	Beta-lactamase n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Apuzzio 1985a	0/23	0/24		0.0	Not estimable
× Figueroa-Damian 1996	0/14	0/42		0.0	Not estimable
Hillier 1990	1/13	2/14		33.4	0.54 [0.06, 5.26]
× McGregor 1989	0/18	0/18		0.0	Not estimable
Stovall 1993	4/37	4/40		66.6	1.08 [0.29, 4.01]
Total (95% CI)	105	138		100.0	0.90 [0.29, 2.77]

Total events: 5 (Beta-lactamase), 6 (Any other regimen)

Test for heterogeneity chi-square=0.27 df=1 p=0.60 I^2 =0.0%

Test for overall effect z=0.18 p=0.9

Analysis 04.07. Comparison 04 Beta-lactamase inhibitor combination versus any other regimen, Outcome 07 Length of stay

Review: Antibiotic regimens for endometritis after delivery

Comparison: 04 Beta-lactamase inhibitor combination versus any other regimen

Outcome: 07 Length of stay

Study	Beta-lactamase N	Beta-lactamase Mean(SD)	Any other regimen N	Any other regimen Mean(SD)	Weighted Mean Difference (Fixed) 95% CI	Weight (%)	Weighted Mean Difference (Fixed) 95% CI
Fernandez 1990	50	3.50 (2.50)	49	2.70 (2.00)		100.0	0.80 [-0.09, 1.69]
Total (95% CI)	50		49			100.0	0.80 [-0.09, 1.69]
Test for heterogeneity: not applicable							
Test for overall effect z=1.76 p=0.08							

Analysis 05.01. Comparison 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen

Outcome: 01 Treatment failure

Study	Cephalosporin n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Apuzzio 1985b	19/68	4/32		17.5	2.24 [0.83, 6.03]
Blanco 1983	4/34	5/35		15.9	0.82 [0.24, 2.81]
Gibbs 1982	13/92	6/106		18.0	2.50 [0.99, 6.30]
Gibbs 1983	4/56	2/57		6.4	2.04 [0.39, 10.67]
Hemsell 1983	2/81	2/39		8.7	0.48 [0.07, 3.29]
Pastorek 1987	2/29	2/31		6.2	1.07 [0.16, 7.10]
Soper 1992	6/43	8/38		27.4	0.66 [0.25, 1.74]
Total (95% CI)	403	338		100.0	1.39 [0.90, 2.15]
Total events: 50 (Cephalosporin), 29 (Any other regimen)					
Test for heterogeneity chi-square=6.83 df=6 p=0.34 I^2 =12.1%					
Test for overall effect z=1.48 p=0.1					

Analysis 05.03. Comparison 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen, Outcome 03 Severe complication

Review: Antibiotic regimens for endometritis after delivery

Comparison: 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen

Outcome: 03 Severe complication

Study	Cephalosporin n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Gibbs 1982	0/92	0/106		0.0	Not estimable
Hemsell 1983	1/81	1/39		48.2	0.48 [0.03, 7.50]
Pastorek 1987	0/29	1/31		51.8	0.36 [0.02, 8.39]
Total (95% CI)	202	176		100.0	0.42 [0.05, 3.32]

Total events: 1 (Cephalosporin), 2 (Any other regimen)

Test for heterogeneity chi-square=0.02 df=1 p=0.89 I^2 =0.0%

Test for overall effect z=0.83 p=0.4

Analysis 05.04. Comparison 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen, Outcome 04 Wound infection

Review: Antibiotic regimens for endometritis after delivery

Comparison: 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen

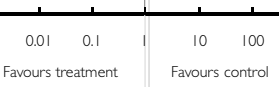
Outcome: 04 Wound infection

Study	Cephalosporin n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Blanco 1983	4/34	2/35		11.9	2.06 [0.40, 10.51]
Gibbs 1982	18/92	11/106		61.9	1.89 [0.94, 3.78]
Gibbs 1983	7/56	3/57		18.0	2.38 [0.65, 8.73]
Hemsell 1983	1/81	1/39		8.2	0.48 [0.03, 7.50]
Total (95% CI)	263	237		100.0	1.88 [1.08, 3.28]

Total events: 30 (Cephalosporin), 17 (Any other regimen)

Test for heterogeneity chi-square=1.08 df=3 p=0.78 I^2 =0.0%

Test for overall effect z=2.22 p=0.03



Analysis 05.05. Comparison 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen, Outcome 05 Allergic reaction

Review: Antibiotic regimens for endometritis after delivery

Comparison: 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen

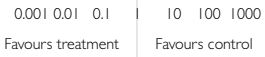
Outcome: 05 Allergic reaction

Study	Cephalosporin n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Blanco 1983	1/38	0/39		12.7	3.08 [0.13, 73.26]
Gibbs 1982	1/92	1/106		23.8	1.15 [0.07, 18.16]
Gibbs 1983	0/56	2/57		63.5	0.20 [0.01, 4.15]
× Soper 1992	0/43	0/38		0.0	Not estimable
Total (95% CI)	229	240		100.0	0.79 [0.18, 3.49]

Total events: 2 (Cephalosporin), 3 (Any other regimen)

Test for heterogeneity chi-square=1.56 df=2 p=0.46 I^2 =0.0%

Test for overall effect z=0.31 p=0.8



Analysis 05.06. Comparison 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen, Outcome 06 Diarrhea

Review: Antibiotic regimens for endometritis after delivery

Comparison: 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen

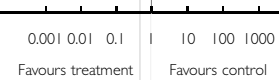
Outcome: 06 Diarrhea

Study	Cephalosporin n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Apuzzio 1985b	0/68	1/32		16.1	0.16 [0.01, 3.81]
× Blanco 1983	0/34	0/35		0.0	Not estimable
Gibbs 1982	2/92	6/106		44.1	0.38 [0.08, 1.86]
Gibbs 1983	1/56	2/57		15.7	0.51 [0.05, 5.45]
× Hemsell 1983	0/81	0/39		0.0	Not estimable
Pastorek 1987	0/29	1/31		11.5	0.36 [0.02, 8.39]
Soper 1992	0/43	1/38		12.6	0.30 [0.01, 7.04]
Total (95% CI)	403	338		100.0	0.35 [0.12, 1.01]

Total events: 3 (Cephalosporin), 11 (Any other regimen)

Test for heterogeneity chi-square=0.36 df=4 p=0.99 I^2 =0.0%

Test for overall effect z=1.94 p=0.05



Analysis 05.07. Comparison 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen, Outcome 07 Length of stay

Review: Antibiotic regimens for endometritis after delivery

Comparison: 05 2nd or 3rd generation cephalosporin (excluding cephamycins) versus any other regimen

Outcome: 07 Length of stay

Study	Cephalosporin N	Cephalosporin Mean(SD)	Any other regimen N	Any other regimen Mean(SD)	Weighted Mean Difference (Fixed) 95% CI	Weight (%)	Weighted Mean Difference (Fixed) 95% CI
Blanco 1983	34	6.50 (1.30)	35	6.40 (1.40)		26.1	0.10 [-0.54, 0.74]
Gibbs 1982	92	6.90 (1.70)	106	6.40 (1.50)		52.4	0.50 [0.05, 0.95]
Gibbs 1983	56	6.60 (2.00)	57	6.50 (1.80)		21.5	0.10 [-0.60, 0.80]
Total (95% CI)	182		198			100.0	0.31 [-0.02, 0.64]

Test for heterogeneity chi-square=1.45 df=2 p=0.49 I^2 =0.0%

Test for overall effect z=1.86 p=0.06

Analysis 06.01. Comparison 06 Cephamycin versus any other regimen, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 06 Cephamycin versus any other regimen

Outcome: 01 Treatment failure

Study	Aztreonam-clinda n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Herman 1986	12/48	12/50		48.2	1.04 [0.52, 2.09]
Hillier 1990	3/14	3/13		12.7	0.93 [0.23, 3.81]
× Scalambrino 1989	0/13	0/12		0.0	Not estimable
Soper 1992	8/38	6/43		23.1	1.51 [0.58, 3.96]
Tuomala 1989	3/22	4/23		16.0	0.78 [0.20, 3.11]
Total (95% CI)	135	141		100.0	1.09 [0.67, 1.78]

Total events: 26 (Aztreonam-clinda), 25 (Any other regimen)

Test for heterogeneity chi-square=0.72 df=3 p=0.87 I^2 =0.0%

Test for overall effect z=0.36 p=0.7

Analysis 06.03. Comparison 06 Cephamycin versus any other regimen, Outcome 03 Severe complication

Review: Antibiotic regimens for endometritis after delivery

Comparison: 06 Cephamycin versus any other regimen

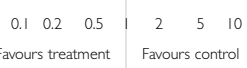
Outcome: 03 Severe complication

Study	Aztreonam-clinda n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Herman 1986	0/48	0/50		0.0	Not estimable
Tuomala 1989	2/22	4/23		100.0	0.52 [0.11, 2.57]
Total (95% CI)	70	73		100.0	0.52 [0.11, 2.57]

Total events: 2 (Aztreonam-clinda), 4 (Any other regimen)

Test for heterogeneity: not applicable

Test for overall effect z=0.80 p=0.4



Analysis 06.05. Comparison 06 Cephamycin versus any other regimen, Outcome 05 Allergic reaction

Review: Antibiotic regimens for endometritis after delivery

Comparison: 06 Cephamycin versus any other regimen

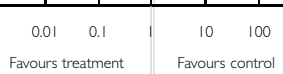
Outcome: 05 Allergic reaction

Study	Aztreonam-clinda n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Herman 1986	1/48	1/50		100.0	1.04 [0.07, 16.19]
× Soper 1992	0/38	0/43		0.0	Not estimable
Total (95% CI)	86	93		100.0	1.04 [0.07, 16.19]

Total events: 1 (Aztreonam-clinda), 1 (Any other regimen)

Test for heterogeneity: not applicable

Test for overall effect z=0.03 p=1



Analysis 06.06. Comparison 06 Cephamycin versus any other regimen, Outcome 06 Diarrhea

Review: Antibiotic regimens for endometritis after delivery

Comparison: 06 Cephamycin versus any other regimen

Outcome: 06 Diarrhea

Study	Aztreonam-clinda n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Herman 1986	1/48	0/50		24.5	3.12 [0.13, 74.82]
Hillier 1990	2/14	1/13		51.9	1.86 [0.19, 18.13]
Soper 1992	1/38	0/43		23.5	3.38 [0.14, 80.70]
Total (95% CI)	100	106		100.0	2.53 [0.52, 12.38]

Total events: 4 (Aztreonam-clinda), 1 (Any other regimen)

Test for heterogeneity chi-square=0.12 df=2 p=0.94 I^2 =0.0%

Test for overall effect z=1.14 p=0.3

Analysis 06.07. Comparison 06 Cephamycin versus any other regimen, Outcome 07 Length of stay

Review: Antibiotic regimens for endometritis after delivery

Comparison: 06 Cephamycin versus any other regimen

Outcome: 07 Length of stay

Study	Aztreonam-clinda N	Aztreonam-clinda Mean(SD)	Any other regimen N	Any other regimen Mean(SD)	Weighted Mean Difference (Fixed) 95% CI	Weight (%)	Weighted Mean Difference (Fixed) 95% CI
Tuomala 1989	22	5.68 (2.34)	23	6.56 (3.93)		100.0	-0.88 [-2.76, 1.00]
Total (95% CI)	22		23			100.0	-0.88 [-2.76, 1.00]

Test for heterogeneity: not applicable

Test for overall effect z=0.92 p=0.4

Analysis 07.01. Comparison 07 Aztreonam and clindamycin versus any other regimen, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 07 Aztreonam and clindamycin versus any other regimen

Outcome: 01 Treatment failure

Study	Aztreonam-clinda n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Chatwani 1997	21/202	14/200		67.3	1.49 [0.78, 2.84]
× Filler 1992	0/8	0/12		0.0	Not estimable
Gibbs 1985	2/58	6/61		28.0	0.35 [0.07, 1.67]
Greenberg 1987	1/31	1/31		4.8	1.00 [0.07, 15.28]
Total (95% CI)	299	304		100.0	1.14 [0.65, 2.01]

Total events: 24 (Aztreonam-clinda), 21 (Any other regimen)

Test for heterogeneity chi-square=2.84 df=2 p=0.24 I^2 =29.6%

Test for overall effect z=0.47 p=0.6

Analysis 07.03. Comparison 07 Aztreonam and clindamycin versus any other regimen, Outcome 03 Severe complication

Review: Antibiotic regimens for endometritis after delivery

Comparison: 07 Aztreonam and clindamycin versus any other regimen

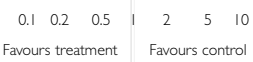
Outcome: 03 Severe complication

Study	Aztreonam-clinda n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Greenberg 1987	0/31	0/31		0.0	Not estimable
Total (95% CI)	31	31		0.0	Not estimable

Total events: 0 (Aztreonam-clinda), 0 (Any other regimen)

Test for heterogeneity: not applicable

Test for overall effect: not applicable



Analysis 07.04. Comparison 07 Aztreonam and clindamycin versus any other regimen, Outcome 04 Wound infection

Review: Antibiotic regimens for endometritis after delivery

Comparison: 07 Aztreonam and clindamycin versus any other regimen

Outcome: 04 Wound infection

Study	Aztreonam-clinda n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Gibbs 1985	1/56	1/61		100.0	1.09 [0.07, 17.00]
Total (95% CI)	56	61		100.0	1.09 [0.07, 17.00]

Total events: 1 (Aztreonam-clinda), 1 (Any other regimen)

Test for heterogeneity: not applicable

Test for overall effect z=0.06 p=1

Analysis 07.05. Comparison 07 Aztreonam and clindamycin versus any other regimen, Outcome 05 Allergic reaction

Review: Antibiotic regimens for endometritis after delivery

Comparison: 07 Aztreonam and clindamycin versus any other regimen

Outcome: 05 Allergic reaction

Study	Aztreonam-clinda n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Gibbs 1985	1/58	0/61		32.8	3.15 [0.13, 75.86]
Greenberg 1987	1/31	1/31		67.2	1.00 [0.07, 15.28]
Total (95% CI)	89	92		100.0	1.71 [0.23, 12.54]

Total events: 2 (Aztreonam-clinda), 1 (Any other regimen)

Test for heterogeneity chi-square=0.29 df=1 p=0.59 I^2 =0.0%

Test for overall effect z=0.52 p=0.6

Analysis 07.06. Comparison 07 Aztreonam and clindamycin versus any other regimen, Outcome 06 Diarrhea

Review: Antibiotic regimens for endometritis after delivery

Comparison: 07 Aztreonam and clindamycin versus any other regimen

Outcome: 06 Diarrhea

Study	Aztreonam-clinda n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Gibbs 1985	2/58	1/61		100.0	2.10 [0.20, 22.58]
Total (95% CI)	58	61		100.0	2.10 [0.20, 22.58]
Total events: 2 (Aztreonam-clinda), 1 (Any other regimen)					
Test for heterogeneity: not applicable					
Test for overall effect z=0.61 p=0.5					

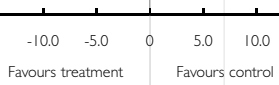
Analysis 07.07. Comparison 07 Aztreonam and clindamycin versus any other regimen, Outcome 07 Length of stay

Review: Antibiotic regimens for endometritis after delivery

Comparison: 07 Aztreonam and clindamycin versus any other regimen

Outcome: 07 Length of stay

Study	Aztreonam-clinda N	Aztreonam-clinda Mean(SD)	Any other regimen N	Any other regimen Mean(SD)	Weighted Mean Difference (Fixed) 95% CI	Weight (%)	Weighted Mean Difference (Fixed) 95% CI
Gibbs 1985	58	6.25 (2.17)	61	6.70 (1.70)		100.0	-0.45 [-1.15, 0.25]
Total (95% CI)	58		61			100.0	-0.45 [-1.15, 0.25]
Test for heterogeneity: not applicable							
Test for overall effect z=1.26 p=0.2							

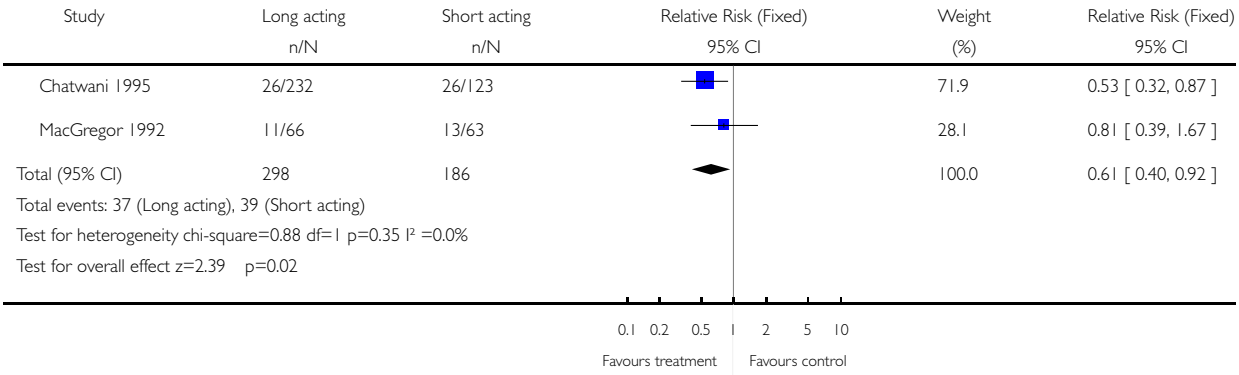


Analysis 08.01. Comparison 08 Agent with longer half life versus similar agent with shorter half life, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 08 Agent with longer half life versus similar agent with shorter half life

Outcome: 01 Treatment failure

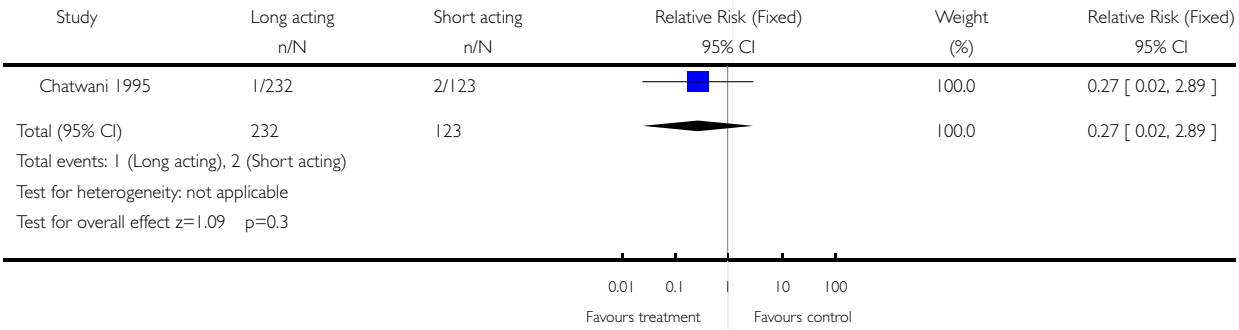


Analysis 08.03. Comparison 08 Agent with longer half life versus similar agent with shorter half life, Outcome 03 Severe complication

Review: Antibiotic regimens for endometritis after delivery

Comparison: 08 Agent with longer half life versus similar agent with shorter half life

Outcome: 03 Severe complication

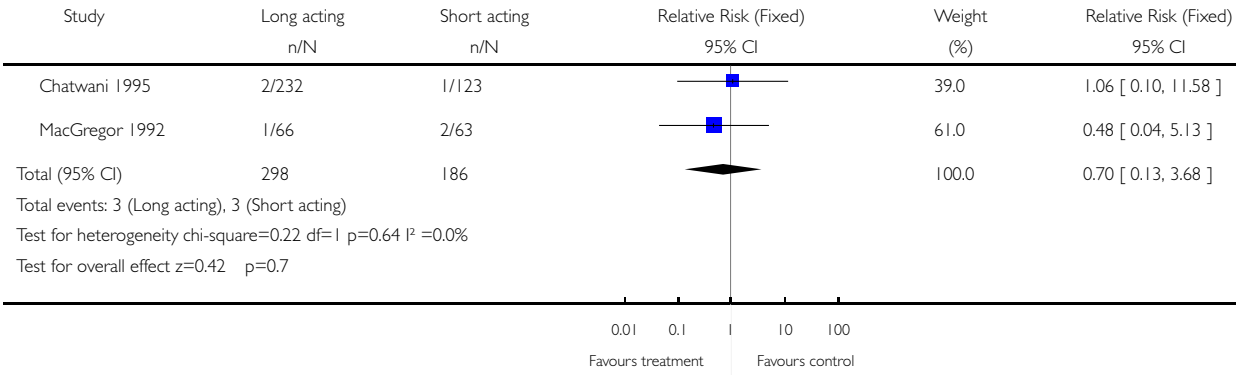


Analysis 08.04. Comparison 08 Agent with longer half life versus similar agent with shorter half life, Outcome 04 Wound infection

Review: Antibiotic regimens for endometritis after delivery

Comparison: 08 Agent with longer half life versus similar agent with shorter half life

Outcome: 04 Wound infection

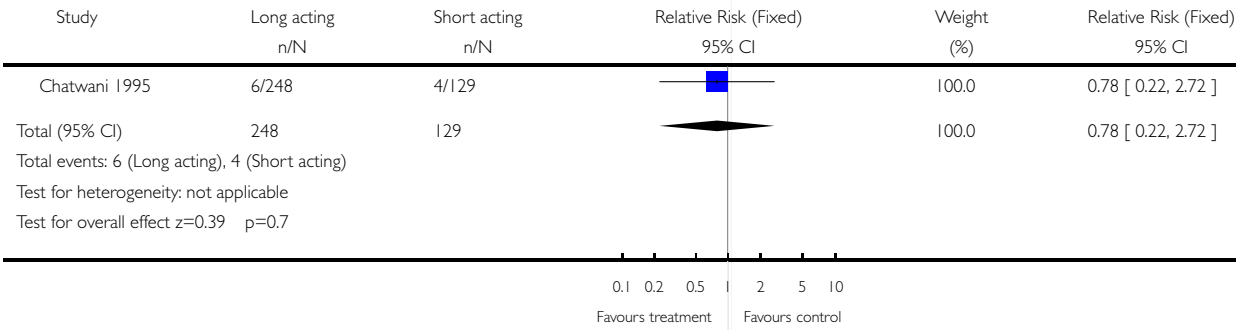


Analysis 08.05. Comparison 08 Agent with longer half life versus similar agent with shorter half life, Outcome 05 Allergic reaction

Review: Antibiotic regimens for endometritis after delivery

Comparison: 08 Agent with longer half life versus similar agent with shorter half life

Outcome: 05 Allergic reaction

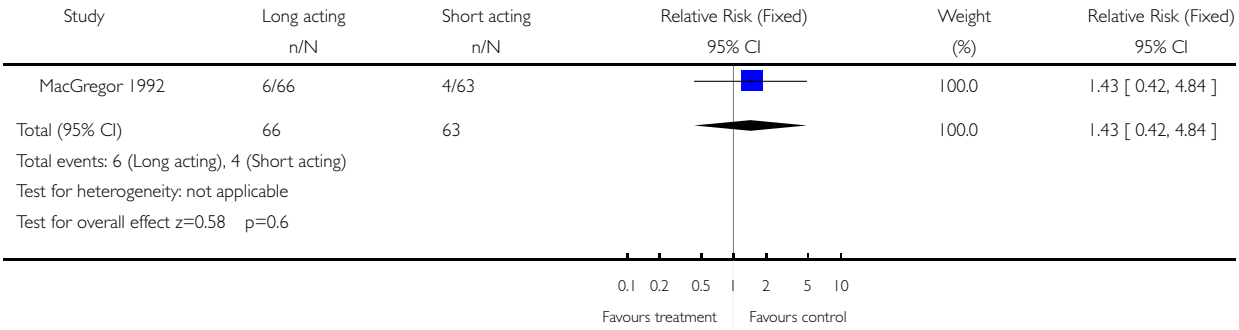


Analysis 08.06. Comparison 08 Agent with longer half life versus similar agent with shorter half life, Outcome 06 Diarrhea

Review: Antibiotic regimens for endometritis after delivery

Comparison: 08 Agent with longer half life versus similar agent with shorter half life

Outcome: 06 Diarrhea

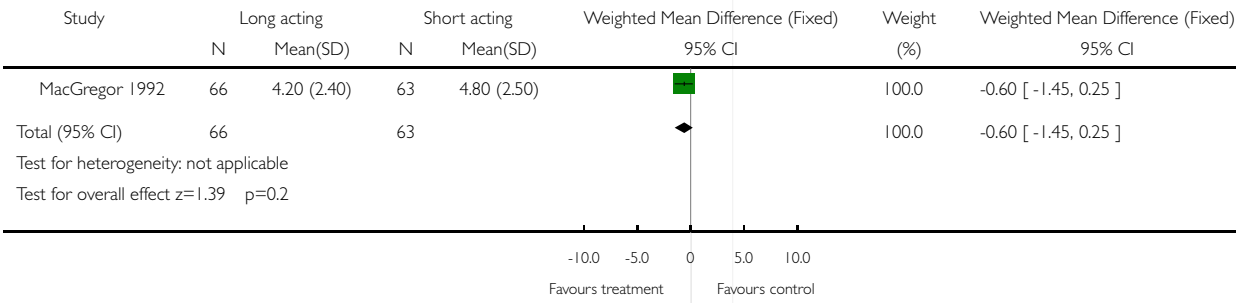


Analysis 08.07. Comparison 08 Agent with longer half life versus similar agent with shorter half life, Outcome 07 Length of stay

Review: Antibiotic regimens for endometritis after delivery

Comparison: 08 Agent with longer half life versus similar agent with shorter half life

Outcome: 07 Length of stay



Analysis 09.01. Comparison 09 Quinolone versus any other regimen, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 09 Quinolone versus any other regimen

Outcome: 01 Treatment failure

Study	Quinolone n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Maccato 1991	14/49	7/48		100.0	1.96 [0.87, 4.43]
Total (95% CI)	49	48		100.0	1.96 [0.87, 4.43]
Total events: 14 (Quinolone), 7 (Any other regimen)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.62 p=0.1					

Analysis 09.03. Comparison 09 Quinolone versus any other regimen, Outcome 03 Severe complication

Review: Antibiotic regimens for endometritis after delivery

Comparison: 09 Quinolone versus any other regimen

Outcome: 03 Severe complication

Study	Quinolone n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Maccato 1991	0/49	1/48		100.0	0.33 [0.01, 7.83]
Total (95% CI)	49	48		100.0	0.33 [0.01, 7.83]
Total events: 0 (Quinolone), 1 (Any other regimen)					
Test for heterogeneity: not applicable					
Test for overall effect z=0.69 p=0.5					

Analysis 09.04. Comparison 09 Quinolone versus any other regimen, Outcome 04 Wound infection

Review: Antibiotic regimens for endometritis after delivery

Comparison: 09 Quinolone versus any other regimen

Outcome: 04 Wound infection

Study	Quinolone n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Maccato 1991	2/49	1/48		100.0	1.96 [0.18, 20.90]
Total (95% CI)	49	48		100.0	1.96 [0.18, 20.90]

Total events: 2 (Quinolone), 1 (Any other regimen)

Test for heterogeneity: not applicable

Test for overall effect z=0.56 p=0.6

Analysis 09.05. Comparison 09 Quinolone versus any other regimen, Outcome 05 Allergic reaction

Review: Antibiotic regimens for endometritis after delivery

Comparison: 09 Quinolone versus any other regimen

Outcome: 05 Allergic reaction

Study	Quinolone n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Maccato 1991	0/49	0/48		0.0	Not estimable
Total (95% CI)	49	48		0.0	Not estimable

Total events: 0 (Quinolone), 0 (Any other regimen)

Test for heterogeneity: not applicable

Test for overall effect: not applicable

Analysis 10.01. Comparison 10 Metronidazole and gentamicin versus any other regimen, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 10 Metronidazole and gentamicin versus any other regimen

Outcome: 01 Treatment failure

Study	Metronidazole-gent n/N	Any other regimen n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Martens 1989	3/35	3/32		100.0	0.91 [0.20, 4.21]
Total (95% CI)	35	32		100.0	0.91 [0.20, 4.21]

Total events: 3 (Metronidazole-gent), 3 (Any other regimen)

Test for heterogeneity: not applicable

Test for overall effect z=0.12 p=0.9

Analysis 11.01. Comparison 11 Once daily versus every 8 hours gentamicin dosing, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 11 Once daily versus every 8 hours gentamicin dosing

Outcome: 01 Treatment failure

Study	Once daily gent n/N	Thrice daily gent n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Del Priore 1996	14/62	17/65		29.1	0.86 [0.47, 1.60]
Livingston 2003	10/55	17/55		29.8	0.59 [0.30, 1.17]
Mitra 1997	4/70	13/71		22.6	0.31 [0.11, 0.91]
Perry 1997	11/41	11/44		18.6	1.07 [0.52, 2.20]
Total (95% CI)	228	235		100.0	0.70 [0.49, 1.00]

Total events: 39 (Once daily gent), 58 (Thrice daily gent)

Test for heterogeneity chi-square=4.25 df=3 p=0.24 I^2 =29.4%

Test for overall effect z=1.98 p=0.05

Analysis 11.05. Comparison 11 Once daily versus every 8 hours gentamicin dosing, Outcome 05 Nephrotoxicity

Review: Antibiotic regimens for endometritis after delivery

Comparison: 11 Once daily versus every 8 hours gentamicin dosing

Outcome: 05 Nephrotoxicity

Study	Once daily gent n/N	Thrice daily gent n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Del Priore 1996	0/62	0/65		0.0	Not estimable
Mitra 1997	1/70	0/71		100.0	3.04 [0.13, 73.43]
× Perry 1997	0/41	0/44		0.0	Not estimable
Total (95% CI)	173	180		100.0	3.04 [0.13, 73.43]

Total events: 1 (Once daily gent), 0 (Thrice daily gent)

Test for heterogeneity: not applicable

Test for overall effect z=0.68 p=0.5

Analysis 11.06. Comparison 11 Once daily versus every 8 hours gentamicin dosing, Outcome 06 Length of stay

Review: Antibiotic regimens for endometritis after delivery

Comparison: 11 Once daily versus every 8 hours gentamicin dosing

Outcome: 06 Length of stay

Study	Once daily gent N	Once daily gent Mean(SD)	Thrice daily gent N	Thrice daily gent Mean(SD)	Weighted Mean Difference (Fixed) 95% CI	Weight (%)	Weighted Mean Difference (Fixed) 95% CI
Del Priore 1996	62	4.83 (1.67)	65	5.67 (2.83)		43.6	-0.84 [-1.64, -0.04]
Livingston 2003	55	4.10 (2.90)	55	5.10 (2.40)		28.5	-1.00 [-1.99, -0.01]
Perry 1997	41	5.40 (2.50)	44	5.70 (2.20)		27.9	-0.30 [-1.30, 0.70]
Total (95% CI)	158		164			100.0	-0.73 [-1.27, -0.20]

Test for heterogeneity chi-square=1.06 df=2 p=0.59 I^2 =0.0%

Test for overall effect z=2.71 p=0.007

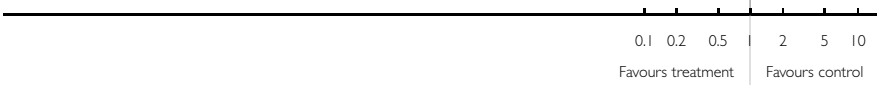
Analysis 12.01. Comparison 12 Continued oral versus no treatment after intravenous antibiotic course, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 12 Continued oral versus no treatment after intravenous antibiotic course

Outcome: 01 Treatment failure

Study	Continued oral tx n/N	No further tx n/N	Odds Ratio (Fixed) 95% CI	Weight (%)	Odds Ratio (Fixed) 95% CI
Morales 1989	3/37	4/72		100.0	1.50 [0.32, 7.09]
Total (95% CI)	37	72		100.0	1.50 [0.32, 7.09]
Total events: 3 (Continued oral tx), 4 (No further tx)					
Test for heterogeneity: not applicable					
Test for overall effect z=0.51 p=0.6					



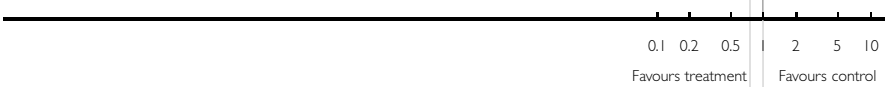
Analysis 12.03. Comparison 12 Continued oral versus no treatment after intravenous antibiotic course, Outcome 03 Severe complication

Review: Antibiotic regimens for endometritis after delivery

Comparison: 12 Continued oral versus no treatment after intravenous antibiotic course

Outcome: 03 Severe complication

Study	Continued oral tx n/N	No further tx n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Hager 1989	0/38	0/43		0.0	Not estimable
× Rodriguez-Ba 1996	0/32	0/31		0.0	Not estimable
Total (95% CI)	70	74		0.0	Not estimable
Total events: 0 (Continued oral tx), 0 (No further tx)					
Test for heterogeneity: not applicable					
Test for overall effect: not applicable					

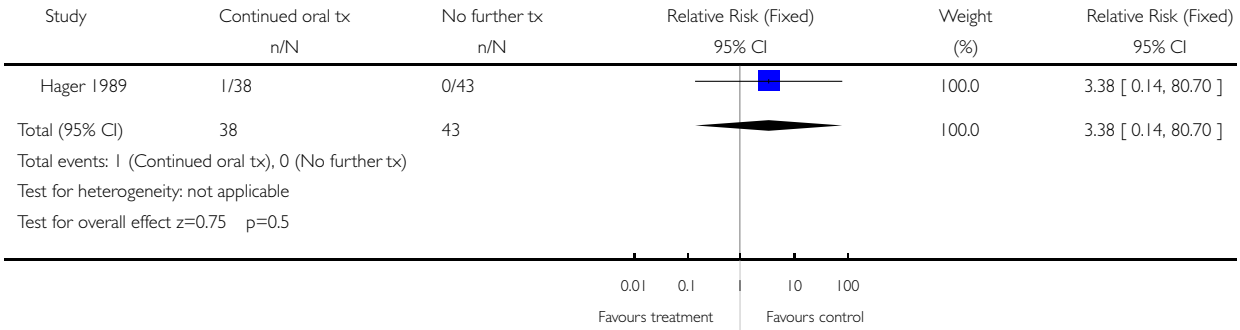


Analysis 12.04. Comparison 12 Continued oral versus no treatment after intravenous antibiotic course, Outcome 04 Wound infection

Review: Antibiotic regimens for endometritis after delivery

Comparison: 12 Continued oral versus no treatment after intravenous antibiotic course

Outcome: 04 Wound infection

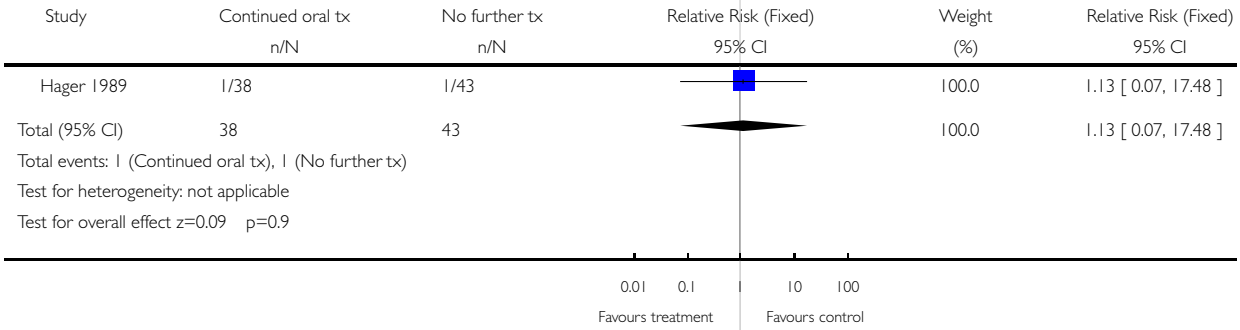


Analysis 12.05. Comparison 12 Continued oral versus no treatment after intravenous antibiotic course, Outcome 05 Urinary tract infection

Review: Antibiotic regimens for endometritis after delivery

Comparison: 12 Continued oral versus no treatment after intravenous antibiotic course

Outcome: 05 Urinary tract infection



Analysis 12.06. Comparison 12 Continued oral versus no treatment after intravenous antibiotic course, Outcome 06 Recurrent endometritis

Review: Antibiotic regimens for endometritis after delivery

Comparison: 12 Continued oral versus no treatment after intravenous antibiotic course

Outcome: 06 Recurrent endometritis

Study	Continued oral tx n/N	No further tx n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
× Hager 1989	0/38	0/43		0.0	Not estimable
× Morales 1989	0/37	0/72		0.0	Not estimable
Rodriguez-Ba 1996	1/32	0/31		100.0	2.91 [0.12, 68.81]
Total (95% CI)	107	146		100.0	2.91 [0.12, 68.81]

Total events: 1 (Continued oral tx), 0 (No further tx)

Test for heterogeneity: not applicable

Test for overall effect z=0.66 p=0.5

Analysis 12.07. Comparison 12 Continued oral versus no treatment after intravenous antibiotic course, Outcome 07 Length of stay

Review: Antibiotic regimens for endometritis after delivery

Comparison: 12 Continued oral versus no treatment after intravenous antibiotic course

Outcome: 07 Length of stay

Study	Continued oral tx N	Mean(SD)	No further tx N	Mean(SD)	Weighted Mean Difference (Fixed) 95% CI	Weight (%)	Weighted Mean Difference (Fixed) 95% CI
Rodriguez-Ba 1996	32	5.27 (1.88)	31	5.48 (2.96)		100.0	-0.21 [-1.44, 1.02]
Total (95% CI)	32		31			100.0	-0.21 [-1.44, 1.02]

Test for heterogeneity: not applicable

Test for overall effect z=0.33 p=0.7

Analysis 13.01. Comparison 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity, Outcome 01 Treatment failure

Review: Antibiotic regimens for endometritis after delivery

Comparison: 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity

Outcome: 01 Treatment failure

Study	Poor anaerobic tx n/N	Good anaerobic tx n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Apuzzio 1985b	19/68	4/32		12.7	2.24 [0.83, 6.03]
Blanco 1983	4/34	5/35		11.5	0.82 [0.24, 2.81]
DiZerega 1979	36/100	14/100		32.7	2.57 [1.48, 4.46]
Figueroa-Damian 1996	5/42	3/14		10.5	0.56 [0.15, 2.03]
Gibbs 1982	13/92	6/106		13.0	2.50 [0.99, 6.30]
Hemsell 1983	1/36	1/18		3.1	0.50 [0.03, 7.54]
Maccato 1991	14/49	7/48		16.5	1.96 [0.87, 4.43]
Total (95% CI)	421	353		100.0	1.94 [1.38, 2.72]
Total events: 92 (Poor anaerobic tx), 40 (Good anaerobic tx)					
Test for heterogeneity chi-square=7.77 df=6 p=0.26 I^2 =22.8%					
Test for overall effect z=3.85 p=0.0001					

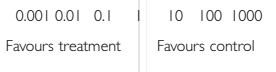
Analysis 13.03. Comparison 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity, Outcome 03 Severe complication

Review: Antibiotic regimens for endometritis after delivery

Comparison: 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity

Outcome: 03 Severe complication

Study	Poor anaerobic tx n/N	Good anaerobic tx n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
DiZerega 1979	4/100	0/100		14.9	9.00 [0.49, 165.00]
× Figueroa-Damian 1996	0/42	0/14		0.0	Not estimable
× Gibbs 1982	0/92	0/106		0.0	Not estimable
Hemsell 1983	1/81	1/39		40.1	0.48 [0.03, 7.50]
Maccato 1991	0/49	1/48		45.0	0.33 [0.01, 7.83]
Total (95% CI)	364	307		100.0	1.68 [0.45, 6.29]
Total events: 5 (Poor anaerobic tx), 2 (Good anaerobic tx)					
Test for heterogeneity chi-square=3.09 df=2 p=0.21 I^2 =35.4%					
Test for overall effect z=0.77 p=0.4					



Analysis 13.04. Comparison 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity, Outcome 04 Wound infection

Review: Antibiotic regimens for endometritis after delivery

Comparison: 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity

Outcome: 04 Wound infection

Study	Poor anaerobic tx n/N	Good anaerobic tx n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Blanco 1983	4/34	2/35		8.5	2.06 [0.40, 10.51]
DiZerega 1979	16/100	8/100		34.3	2.00 [0.90, 4.46]
Figueroa-Damian 1996	3/42	0/14		3.2	2.44 [0.13, 44.57]
Gibbs 1982	18/92	11/106		43.9	1.89 [0.94, 3.78]
Hemsell 1983	1/81	1/39		5.8	0.48 [0.03, 7.50]
Maccato 1991	2/49	1/48		4.3	1.96 [0.18, 20.90]
Total (95% CI)	398	342		100.0	1.88 [1.17, 3.02]

Total events: 44 (Poor anaerobic tx), 23 (Good anaerobic tx)

Test for heterogeneity chi-square=1.01 df=5 p=0.96 I^2 =0.0%

Test for overall effect z=2.61 p=0.009

Analysis 13.05. Comparison 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity, Outcome 05 Allergic reaction

Review: Antibiotic regimens for endometritis after delivery

Comparison: 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity

Outcome: 05 Allergic reaction

Study	Poor anaerobic tx n/N	Good anaerobic tx n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Blanco 1983	1/38	0/39		14.4	3.08 [0.13, 73.26]
DiZerega 1979	2/100	2/100		58.4	1.00 [0.14, 6.96]
× Figueroa-Damian 1996	0/42	0/14		0.0	Not estimable
Gibbs 1982	1/92	1/106		27.1	1.15 [0.07, 18.16]
× Maccato 1991	0/49	0/48		0.0	Not estimable
Total (95% CI)	321	307		100.0	1.34 [0.34, 5.36]

Total events: 4 (Poor anaerobic tx), 3 (Good anaerobic tx)

Test for heterogeneity chi-square=0.36 df=2 p=0.83 I^2 =0.0%

Test for overall effect z=0.41 p=0.7

Analysis 13.06. Comparison 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity, Outcome 06 Diarrhea

Review: Antibiotic regimens for endometritis after delivery

Comparison: 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity

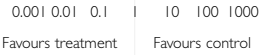
Outcome: 06 Diarrhea

Study	Poor anaerobic tx n/N	Good anaerobic tx n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Apuzzio 1985b	0/68	1/32		20.1	0.16 [0.01, 3.81]
× Blanco 1983	0/34	0/35		0.0	Not estimable
DiZerega 1979	0/100	2/100		24.7	0.20 [0.01, 4.11]
× Figueroa-Damian 1996	0/42	0/14		0.0	Not estimable
Gibbs 1982	2/92	6/106		55.2	0.38 [0.08, 1.86]
× Hemsell 1983	0/81	0/39		0.0	Not estimable
Total (95% CI)	417	326		100.0	0.29 [0.08, 1.04]

Total events: 2 (Poor anaerobic tx), 9 (Good anaerobic tx)

Test for heterogeneity chi-square=0.32 df=2 p=0.85 I^2 =0.0%

Test for overall effect z=1.90 p=0.06



Analysis 13.07. Comparison 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity, Outcome 07 Length of stay

Review: Antibiotic regimens for endometritis after delivery

Comparison: 13 Poor activity against penicillin resistant anaerobic bacteria versus good activity

Outcome: 07 Length of stay

Study	Poor anaerobic tx N	Mean(SD)	Good anaerobic tx N	Mean(SD)	Weighted Mean Difference (Fixed) 95% CI	Weight (%)	Weighted Mean Difference (Fixed) 95% CI
Blanco 1983	34	6.50 (1.30)	35	6.40 (1.40)		33.2	0.10 [-0.54, 0.74]
Gibbs 1982	92	6.90 (1.70)	106	6.40 (1.50)		66.8	0.50 [0.05, 0.95]
Total (95% CI)	126		141			100.0	0.37 [0.00, 0.73]

Test for heterogeneity chi-square=1.01 df=1 p=0.31 I^2 =1.0%

Test for overall effect z=1.96 p=0.05