# Obstetrics – Antibiotics guideline

**CROSS HEALTH CARE BOUNDARIES MATERNITY CLINICAL GUIDELINE**

**Full Title of Guideline:** GUIDELINE FOR THE TREATMENT OF INFECTION IN OBSTETRIC PATIENTS

**Author (include email and role):**
- Miss G Wright Consultant O&G (gemma.wright3@nuh.nhs.uk)
- Dr K Webb, Microbiology Registrar (Karmel.webb@nuh.nhs.uk)
- Annette Clarkson Specialist Clinical Pharmacist antimicrobials
- Annie Joseph Consultant microbiologist

**Division & Speciality:** Family Health, Obstetrics & Maternity

**Scope (Target audience, state if Trust wide):** Medical, pharmacy and midwifery staff involved in the management of pregnant or post natal women with infection.

**Review date (when this version goes out of date):** May 2021

**Explicit definition of patient group to which it applies (e.g. inclusion and exclusion criteria, diagnosis):** Obstetrics patients with suspected or proven infection. Excludes neutropenic patients.

**Changes from previous version (not applicable if this is a new guideline, enter below if extensive):** Change to pyrexia in labour, chorioamnionitis and GBS prophylaxis due to rising clindamycin resistance. Updated high risk endocarditis definition

**Summary of evidence base this guideline has been created from:**
- Dinsmore MJ; Newton ER; Gibbs RS (1991) Randomized, double blind, placebo-controlled trial of oral antibiotic therapy following intravenous antibiotic therapy for post-partum endometritis
- NICE caesarean section August 2012 update
- RCOG Guideline: Green-top Guideline No. 64b. 1st edition | April 2012. Bacterial Sepsis following Pregnancy
- UK Teratology Information Service: Use of Pivmecillinam in Pregnancy http://www.uktis.org/docs/Pivmecillinam.pdf?search=%22pivmecillinam%22
- Recommended best practice based on clinical experience of guideline developers

---

*This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date or outside of the Trust.*
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptomatic lower UTI (cystitis) in pregnancy</td>
<td>3-4</td>
</tr>
<tr>
<td>Upper UTI (pyelonephritis) in pregnancy</td>
<td>4</td>
</tr>
<tr>
<td>Asymptomatic bacteriuria</td>
<td>5</td>
</tr>
<tr>
<td>Pyrexia in labour</td>
<td>5</td>
</tr>
<tr>
<td>Chorioamnionitis</td>
<td>6</td>
</tr>
<tr>
<td>Intrapartum prophylaxis for Group B Strep</td>
<td>6</td>
</tr>
<tr>
<td>Caesarean section prophylaxis</td>
<td>7</td>
</tr>
<tr>
<td>Endocarditis Prophylaxis for Obstetric Surgical Procedures</td>
<td>8</td>
</tr>
<tr>
<td>Endometritis</td>
<td>9-10</td>
</tr>
<tr>
<td>Infected caesarean wounds/perineal tear or episiotomy</td>
<td>10</td>
</tr>
<tr>
<td>Group A Streptococci (GAS) infections</td>
<td>11-12</td>
</tr>
<tr>
<td>Appendix 1: Gentamicin dosing in pregnancy</td>
<td>13</td>
</tr>
<tr>
<td>Table 1: Recommended oral alternatives</td>
<td>14</td>
</tr>
</tbody>
</table>
SYMPTOMATIC LOWER URINARY TRACT INFECTION (CYSTITIS) IN PREGNANCY

Before starting treatment, review the previous microbiology reports and discuss choice of agent if previous resistant organisms isolated.

In patients with symptoms of uncomplicated lower UTI (dysuria, frequency or suprapubic discomfort) send a pre-treatment mid-stream urine (MSU) for culture and sensitivity, and start empirical therapy. Choice of antibiotic should be reviewed when culture and sensitivity results are available.

The treatments listed below are not suitable for patients who are systemically unwell or with features of pyelonephritis (see the guidance for pyelonephritis).

<table>
<thead>
<tr>
<th>Empirical Therapy</th>
<th>Dose and duration</th>
<th>Important Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First line:</strong> Oral Nitrofurantoin</td>
<td>100mg m/r bd for 7 days</td>
<td>Avoid at term or if delivery is imminent. In patients with a creatinine clearance &lt;45ml/min (see Intranet for creatinine clearance calculator) see the antibiotic website for dosing information.</td>
</tr>
<tr>
<td><strong>Second line:</strong> Oral Pivmecillinam</td>
<td>400mg immediately, then 200mg tds for 7 days</td>
<td>Not in penicillin allergy. Pivmecillinam is not known to be harmful in pregnancy. Long courses (&gt;7 days) or repeated courses should be avoided.</td>
</tr>
<tr>
<td><strong>Third line:</strong> Oral Cefalexin</td>
<td>500mg tds for 7 days</td>
<td>Not in severe penicillin allergy or cephalosporin allergy, seek medical microbiology advice If previous C. difficile (PCR or toxin), cefalexin needs microbiology approval.</td>
</tr>
</tbody>
</table>
If known to be sensitive based on culture and sensitivity results:

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Dose and Duration</th>
<th>Important Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Trimethoprim</td>
<td>200 mg bd for 7 days</td>
<td>Avoid in first trimester and in patients with a low folate status</td>
</tr>
</tbody>
</table>

**Recurrent UTI:**
Treatment should be guided by culture results. If the patient continues to experience UTIs she should be investigated to exclude causes such as obstruction.

**UPPER URINARY TRACT INFECTION (PYELONEPHRITIS) IN PREGNANCY**

If pyelonephritis is suspected then admission is required, blood and urine cultures sent for culture and sensitivity, and intravenous antibiotics commenced.

**IV Cefuroxime 1.5g tds for 48hrs** (not in severe penicillin allergy i.e. anaphylactic symptoms, angioedema or immediate onset urticaria)

If the patient is at risk of multi-resistant Gram negative organisms (see intranet antibiotic website for risk factors):

http://nuhnet/diagnostics_clinical_support/antibiotics/Pages/Bugs/Multiresistant_gra

**IV Meropenem 500mg qds for 48hrs** (not in severe penicillin allergy, anaphylactic symptoms, angioedema or immediate onset urticaria)

If severe penicillin allergy or cephalosporin allergy, seek medical microbiology advice.

If the patient has **High Risk Red Sepsis** or hypotension which fails to respond to an initial fluid bolus, or if there is no clinical improvement after 24 hours, add **IV Gentamicin** (See dosing advice and renal impairment appendix 1). If the patient does not improve discuss with a medical microbiologist.

Review IV antibiotics with culture result at 48hrs. If clinically improving, switch to **oral Cefalexin 500mg tds** for a total antibiotic course length of 7-10 days.
ASYMPTOMATIC BACTERIURIA

This should be confirmed as isolation of the same organism in an MSU sample twice on 2 separate occasions with a colony count of > 10,000 – 100,000 organisms/ml.

Treat for 7 days with an antibiotic according to the culture and sensitivity results, treatment options are the same as for symptomatic UTI (see symptomatic UTI section).

Repeat urine culture at a minimum in each trimester once asymptomatic bacteriuria is diagnosed and treated in pregnancy.

PYREXIA IN LABOUR

Defined as a temperature of >38°C

Complete a full septic screen, including sending blood cultures (before administering antibiotics where possible) and mid-stream urine sample.

- IV Amoxicillin 2g + IV Metronidazole 500mgs initially then IV Amoxicillin 1g tds + IV Metronidazole 500 mgs tds until delivery.
- In non severe penicillin allergy IV Cefuroxime 1.5g tds and IV Metronidazole 500 mgs tds until delivery
- If severe penicillin or cephalosporin allergy give IV Clindamycin 900 mgs tds until delivery.

Ensure delays in administration are avoided.

Add IV Gentamicin (See dosing advice and renal impairment appendix 1) immediately if the patient has High Risk Red Sepsis i.e. hypotension which fails to respond to an initial fluid bolus.

If there is clinical deterioration or if there is no improvement after 24 hours (see appendix 1) and seek advice from medical microbiologist. (note clindamycin resistance in one of the potential causative organisms (group B streptococcus) is rising)

Post delivery, if patient clinically well and cultures remain negative after 48 hours, stop antibiotics.
CHORIOAMNIONITIS

Clinical features suggestive of this are:
- Maternal pyrexia in labour >38°C
- Uterine tenderness
- Maternal tachycardia >100 beats per minute
- Fetal tachycardia >160 beats per minute

If chorioamnionitis is suspected it is important to undertake the following:
- Augmentation if not in established labour
- Hydration of mother
- Full blood count, mid stream urine sample, low vaginal swab and blood cultures
- Regular paracetamol if pyrexial
- Continuous electronic fetal monitoring if appropriate gestation
- **IV Amoxicillin 2g + IV Metronidazole 500mgs** initially then **IV Amoxicillin 1g tds + IV Metronidazole 500 mgs tds** until delivery
- In non severe penicillin allergy (i.e. no anaphylaxis, angioedema, respiratory distress or urticaria) **IV Cefuroxime 1.5g tds** and **IV Metronidazole 500 mgs tds** until delivery

- If severe penicillin allergy ((i.e. anaphylaxis, angioedema, respiratory distress or urticaria) or cephalosporin allergy give **IV Clindamycin 900 mgs tds until delivery** (need to review and discuss if not responding as clindamycin resistance in one of the potential causative organisms (group B streptococcus) is rising)

- Contact a Medical Microbiologist if no evidence of response to the above antibiotics.
- Post delivery, if patient clinically well and cultures remain negative at 48 hours, stop antibiotics.

INTRAPARTUM PROPHYLAXIS FOR GROUP B STREP (for indications and further details see separate Group B Strep Guideline)

Where antibiotic prophylaxis is offered and accepted, this should be commenced as soon as labour is diagnosed (antibiotics should be given at least 2 hours prior to delivery for maximum benefit).

**IV Benzylpenicillin 3g initially then 1.2g IV 4 hourly** until delivery.

In non-severe penicillin allergy (i.e. no anaphylaxis, angioedema, respiratory distress or urticaria)
**Cefuroxime IV 1.5 g loading dose followed by 750 mg every 8 hours**.
In severe penicillin allergy (i.e. anaphylaxis, angioedema, respiratory distress or urticaria)

**IV Vancomycin 1g BD** (Administer in 250ml saline 0.9% over at least 100 mins). Please note dose reductions are required in renal impairment. Use booking in weight to calculate creatinine clearance, and dose as per maintenance dose guidance on the antibiotic website. A vancomycin dosing calculator is available on the antibiotic website, prescribe the maintenance dose, no loading dose required. Levels should be checked pre fourth dose should the patient still be on prophylaxis at this time point, see antibiotic website for monitoring advice.

Note: Clindamycin can no longer be recommended as the current resistance rate in the UK is 16%. This is in accordance with the RCOG guidelines.

**CAESAREAN SECTION (C/S) PROPHYLAXIS**

**Elective C/S:**

**IV Co-amoxiclav 1.2g** prior to skin incision. Administer after cord clamping if situation does not permit (eg Cat 1 CS).

If non severe penicillin allergy (i.e. no anaphylaxis, angioedema, respiratory distress or urticaria)

**IV Cefuroxime 1.5g** prior to skin incision.

If severe penicillin allergy (i.e anaphylaxis, angioedema, respiratory distress or urticaria) or cephalosporin allergy or previous / known MRSA infection or colonisation: **IV Teicoplanin 800mg plus IV Gentamicin 1.5mg/kg and IV Metronidazole 500mg** prior to skin incision.

If MRSA status is unknown, the usual prophylaxis should be given as obstetric patients are a low risk group.

**Emergency C/S:**

Give the prophylaxis as for elective C/S detailed above, except in women who have a severe penicillin allergy and are already on Clindamycin for pyrexia in labour. These women require additional **IV Gentamicin 1.5mg/kg single dose** to add Gram negative cover. If the woman has already received Gentamicin then do not give additional dose unless the last dose was given more than 8 hours previously.
Endocarditis Prophylaxis for Obstetric Surgical Procedures:

In March 2008 NICE published guidelines for antibiotic prophylaxis for preventing endocarditis. These guidelines advise against routine antibiotic prophylaxis for the prevention of infective endocarditis, unless the patient is at high-risk of endocarditis (see below) and they are undergoing a gastrointestinal or genitourinary procedure at a site where there is a suspected infection.

High-risk patients are:
- Prosthetic cardiac valves
- Acquired valvular heart disease with stenosis or regurgitation
- Structural congenital heart disease (including surgically corrected or palliated structural conditions, but excluding isolated atrial septal defect, fully repaired ventricular septal defect, fully repaired patent ductus arteriosus, and closure devices considered to be endothelialised)
- Hypertrophic cardiomyopathy
- Previous episode of infective endocarditis

If a patient at high risk of infective endocarditis is already on antimicrobial therapy for chorioamnionitis, the patient should receive prophylactic antibiotics to cover the organisms that cause infective endocarditis including Enterococci.

These patients should receive IV Teicoplanin 800mg and IV Gentamicin 1.5mg/kg prior to skin incision.

Repeat antibiotics in prolonged operations and excessive blood loss:
Patients who experience major blood loss (greater than 1500ml) should have fluid resuscitation, followed by re-dosing with the recommend prophylaxis regimen for that operation. For operations lasting more than 3 hours re-dosing may be necessary depending on the antibiotics used (see below).

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Recommended re-dosing interval/dose to give</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-amoxiclav</td>
<td>4 hours, give 1.2g IV</td>
</tr>
<tr>
<td>Cefuroxime</td>
<td>4 hours, give 750mg IV</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>8 hours, give 500mg IV</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>6 hours, give 900mg IV</td>
</tr>
<tr>
<td>Teicoplanin</td>
<td>re-dosing not recommended</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>re-dosing not recommended</td>
</tr>
</tbody>
</table>
ENDOMETRITIS
Send a low vaginal swab and blood cultures

Mild endometritis without signs of systemic infection:

- Oral Co-amoxiclav 625mg tds

- If mild penicillin allergy (mild rash alone, with no anaphylactic symptoms, angioedema or immediate onset urticaria): Oral Cefalexin 500mg tds and Metronidazole 400mg tds

If more unwell, signs of High Risk Red Sepsis (ensure antibiotics administered within 1 hour of presentation) or unable to take oral medication:

- IV Cefuroxime 1.5g tds and IV Metronidazole 500mgs tds (not in severe penicillin allergy i.e. anaphylactic symptoms, angioedema or immediate onset urticaria)

- If High-risk red sepsis or septic shock add IV Gentamicin (dose as per calculator on antibiotic website)

- If severe penicillin allergy; IV Vancomycin (refer to the antibiotic website for dosing and monitoring, use booking in weight for dosing, IV Metronidazole and IV Gentamicin (Once daily dosing of Gentamicin can be used post partum please refer to the antibiotics website http://nuhnet/diagnostics_clinical_support/antibiotics/Pages/assays/gentamicin_od_dosing.aspx for dosing and monitoring).

- If the patient is at risk of multi-resistant Gram negative organisms Please refer to antibiotics website for risk factors; http://nuhnet/diagnostics_clinical_support/antibiotics/Pages/Bugs/Multiresistant_gramnegative.aspx;

- Meropenem IV 500mg qds (not in severe penicillin allergy i.e. anaphylaxis, angioedema or immediate onset urticaria).

Contact a Medical Microbiologist if no evidence of response to the above antibiotics at 48 hours or if deteriorating.

If clinical improvement within 48hrs, review IV antibiotics and check vaginal, urine and blood culture results. See intranet protocol for switching IV to oral:
Empirical switch if no positive microbiology to guide choice
Switch to oral Co-amoxiclav 625mg TDS for 5 days

If mild penicillin allergy (mild rash alone, with no anaphylactic symptoms, angiodema or immediate onset urticaria): Oral Cefalexin 500mg tds and Metronidazole 400mg tds for 5 days

Discuss with medical microbiologist for oral switch if patient has severe penicillin allergy.

INFECTED CAESAREAN WOUNDS / PERINEAL TEAR OR EPISIOTOMY

If the patient has no history of MRSA infection or colonisation:

| First Line | Flucloxacillin PO 500mg-1gram QDS  
dose dependent on severity and ability to tolerate higher dose (higher doses can cause GI upset)  
Plus  
Metronidazole PO 400mg TDS  
For 5 days |
|------------|--------------------------------------------------------------------------------------------------|

If more severe or has failed adequate doses of oral:

| Flucloxacillin IV 1-2gram QDS  
Dose dependent on severity  
Plus  
Metronidazole IV 500mg TDS  
For 5 days |
|---------------------------------------------------------------|

Penicillin Allergy

| Clindamycin PO 300mg-450mg QDS  
For 5 days  
Select dose dependent on severity |
|--------------------------------------------------------------------------------|

Note: patient with previous C. difficile infection (toxin or PCR positive) must be discussed with microbiology before prescribing clindamycin

For advice regarding prophylactic antibiotics for 3rd or 4th degree perineal tears, see separate NUH guideline for Perineal Trauma and Perineal Breakdown Management.

Ensure that a swab is taken and the treatment is reviewed at 48-72 hours with the microbiology results and clinical response.

Discuss with the duty microbiologist if not responding to treatment or if there is rapidly spreading infection.
GROUP A STREPTOCOCCAL (GAS) INFECTIONS

Pregnant and postpartum women have a 20-fold increase in attack rate for invasive Group A Streptococcal (GAS) infection compared with non-pregnant women. Maternal mortality is highest when infection develops within four days of delivery.

Pregnant women infected or colonised with GAS prior to admission should be treated and have this clearly documented in their medical notes.

Patients with GAS puerperal sepsis typically present with fever, abdominal pain (with or without hypotension), tachycardia or leukocytosis. Clinical clues for GAS infection include sudden onset of shock and organ dysfunction, including renal failure and acute respiratory distress syndrome.

Infection Control

All suspected cases of GAS infection identified whilst patients in an acute care area or on a maternity unit and any cases identified within seven days of discharge or delivery that could have been healthcare associated should be reported to the infection prevention and control team.

All patients with GAS should be placed in isolation for a minimum of 24 hours of effective antibiotic therapy. A mother and neonate on maternity/neonatal units should be isolated until culture negative (see GAS Infection Control policy).

Antibiotic Therapy

If either mother or baby develops suspected or confirmed invasive GAS during the neonatal period (first 28 days of life) antibiotics should be administered.

- First line: Amoxicillin 500mg PO TDS for 10 days
- If penicillin allergy: Clindamycin 300mg PO QDS for 10 days (check sensitivity results to confirm sensitive strain)

If the patient has confirmed GAS and are systemically unwell:

- 1st line: Benzylpenicillin 2.4 gram IV QDS +/- clindamycin 1.2 gram IV QDS until improvement then switch to amoxicillin 1 gram PO TDS to complete the 10 day course of antibiotics
- Penicillin allergy: Seek advice from Microbiology
Early Clinical Review

If the patient is not making a prompt clinical response or there are any clinical concerns, there should be a low threshold for repeating cultures, rapid escalation, Senior review (to include consideration of imaging and source control if necessary) and discussion with Microbiology.

For treatment of babies born to GAS colonised mothers please refer to neonatal guidelines on treatment of infections.
Appendix 1

Gentamicin dosing in pregnancy

- Conventional dosing 1-1.5mg/kg tds should be used in pregnancy (if normal renal function, see antibiotic website for dosing in renal impairment [http://nuhnet/diagnostics_clinical_support/antibiotics/Pages/Misc/Home.aspx](http://nuhnet/diagnostics_clinical_support/antibiotics/Pages/Misc/Home.aspx)).
- The current renal function should be checked using the Cockcroft-Gault equation using a current creatinine result (see antibiotic website) which gives an estimate of creatinine clearance (renal function) for the purposes of drug dosing in renal impairment.
- Pre and one hour post dose Gentamicin assays should be performed around the 3rd or 4th dose- see antibiotic website (http://nuhnet/diagnostics_clinical_support/antibiotics). Levels should be pre dose <2mg/L and post level of 5-10 mg/L.
- Gentamicin assays are available 24 hours a day, 7 days a week from clinical chemistry.
- Renal function should be checked at least three times a week and levels should be checked twice weekly during a treatment course.
- If renal function deteriorates then renal function should be checked daily and gentamicin levels closely monitored. A dose reduction may be required.
- All patients prescribed more than one dose of Gentamicin should have a fluid balance chart completed and urine output should be closely monitored.
### TABLE 1: Recommended oral alternatives
N.B. Check for allergy/interactions/microbiology results:

<table>
<thead>
<tr>
<th>IV</th>
<th>ORAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tazocin 4.5 g tds</td>
<td>Co-amoxiclav 625 mg tds</td>
</tr>
<tr>
<td>Co-amoxiclav 1.2g tds</td>
<td>Co-amoxiclav 625mg tds</td>
</tr>
<tr>
<td>Amoxicillin 500mg-1g tds</td>
<td>Amoxicillin 500mg-1g tds</td>
</tr>
<tr>
<td>Cefuroxime 1.5g tds +</td>
<td>Co-amoxiclav 625mg tds</td>
</tr>
<tr>
<td>Metronidazole 500mg tds</td>
<td>(if not penicillin allergic)</td>
</tr>
<tr>
<td></td>
<td>Or</td>
</tr>
<tr>
<td></td>
<td>Cefalexin 500mg tds and</td>
</tr>
<tr>
<td></td>
<td>Metronidazole 400mg tds</td>
</tr>
<tr>
<td>Cefuroxime 1.5g tds</td>
<td>Co-amoxiclav 625mg tds</td>
</tr>
<tr>
<td></td>
<td>(if not penicillin allergic)</td>
</tr>
<tr>
<td></td>
<td>Or</td>
</tr>
<tr>
<td></td>
<td>Cefalexin 500mg tds</td>
</tr>
<tr>
<td>Flucloxacillin 1-2g qds</td>
<td>Flucloxacillin 1g qds</td>
</tr>
<tr>
<td>Clindamycin 900mg tds</td>
<td>Clindamycin 300-450mg qds</td>
</tr>
</tbody>
</table>