South Australian Perinatal Practice Guidelines

urinary tract infections in pregnancy

Note

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

SA Health does not accept responsibility for the quality or accuracy of material on websites linked from this site and does not sponsor, approve or endorse materials on such links.

Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with **consumers** in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes:

- The use of interpreter services where necessary,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements

Literature review

> Urinary tract infection may present as asymptomatic bacteriuria, acute cystitis (bladder infection) or pyelonephritis (kidney infection) [1]

> Asymptomatic bacteriuria occurs in 2 % to 10 % of all pregnancies. If untreated, up to 30 % of mothers may develop acute cystitis and up to 50 % acute pyelonephritis [1,2,3]

> E Coli is the most common pathogen associated with asymptomatic bacteriuria (> 80 % of isolates). Staphylococcus saprophyticus is the second most frequently cultured uropathogen while other Gram-positive cocci, such as group B streptococci, are less common. Other organisms include Gram-negative bacteria such as klebsiella, proteus or enterobacteriaceae[1,2]

> Asymptomatic bacteriuria has been associated with low birthweight and preterm birth[3]

> Obstruction to the flow of urine in pregnancy leads to stasis and increases the likelihood that pyelonephritis will complicate asymptomatic bacteriuria (AB) [3]

> Antibiotic treatment is effective in reducing the risk of pyelonephritis in pregnancy [3]

> There is no clear consensus in the literature on antibiotic choice or duration of treatment for urinary tract infection [4,5,6]

ISBN number: 978-1-74243-106-2
Endorsed by: South Australian Maternal & Neonatal Clinical Network
Last Revised: 29/04/13
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Government of South Australia
SA Health

Definitions

- Urinary tract infections in pregnancy are classified as either asymptomatic or symptomatic
- **Asymptomatic bacteriuria** is defined as true bacteriuria (> 100,000 / mL) in the absence of specific symptoms of acute urinary tract infection
- **Symptomatic** urinary tract infections are divided into lower tract (acute cystitis) or upper tract (pyelonephritis) infections
    - **Acute cystitis** is defined as significant bacteriuria with associated bladder mucosal invasion, and is distinguished from asymptomatic bacteriuria by the presence of symptoms such as dysuria, urgency, frequency, nocturia, haematuria and suprapubic discomfort in afebrile women with no evidence of systemic illness [1,6]
    - **Pyelonephritis** is defined as the identification of at least 100,000 bacteria / mL of a single uropathogen in a midstream MSSU culture with associated inflammation of the renal parenchyma, calices and pelvis in the presence of systemic illness.Symptoms include flank or renal angle pain, pyrexia, rigor, chills, nausea and vomiting [1,6]

Antenatal screening

- Routine mid stream specimen of urine (MSSU) for all women at 1st visit (booking)

Indications for repeat screening

- Contaminated specimen
- History of recurrent infections outside of pregnancy
- Known and unknown structural abnormality of the urinary tract

Antenatal education

- Explain that urinary tract infections are common in pregnancy, the risk beginning in week 6 and peaking during weeks 22 to 24
- Smooth muscle relaxation leads to decreased bladder and ureteral tone and dilatation of the renal pelves and ureters, which increases bladder volume, urinary stasis, residual volume and vesicoureteric reflux. Differences in urine pH and osmolality and pregnancy-induced glycosuria and aminoaciduria may facilitate bacterial growth
- Sexual activity can traumatise the urothelium of the distal urethra, resulting in increased bacterial invasion

Risk factors

- Low socio-economic status
- Sickle cell trait
- Diabetes mellitus
- Neurogenic bladder retention
- History of previous urinary tract infections
- Structural abnormality of urinary tract
- Presence of renal stones

ISBN number: 978-1-74243-106-2
Endorsed by: South Australian Maternal & Neonatal Clinical Network
Last Revised: 29/04/13
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Diagnosis

> Quantitative MSSU culture is the only gold standard for diagnosis of ALL suspected urinary tract infections

Asymptomatic bacteriuria

> > 100,000 bacteria / mL with < 20 white cells, generally indicates asymptomatic bacteriuria
> A count > 100,000, with 2 or more organisms, indicates a contamination rather than bacteriuria

Acute cystitis

In addition to midstream MSSU, clinical diagnosis is based on symptoms such as:

> Dysuria, urinary frequency, strangury
> Lower abdominal pain or supra-pubic pain without fever
> Pyuria may also be present

Pyelonephritis

Pyelonephritis usually presents as an acute episode. In addition to midstream MSSU, clinical diagnosis should include:

> Full maternal clinical history and examination
> Assessment of fetal wellbeing
> Blood cultures (aerobic and anaerobic)
> Low and high vaginal swabs
> Complete blood count, renal function test including creatinine, urea and electrolytes
> Urinalysis for proteinuria
    > Women with pyelonephritis often have pyuria or leukocyte casts

Symptoms include:

> Pyrexia, chills, rigor
> Flank or renal angle pain
> Nausea and vomiting
> Usually dehydration
> Less commonly dysuria, frequency
> Fetal tachycardia may also be present

Treatment

> Intravenous antibiotic treatment should be guided by urine culture and sensitivity reports
> A seven day course is normally sufficient, however, shortest possible treatment is associated with better fetal outcomes [9]
> Increase fluid intake (may require intravenous fluids if clinically dehydrated)
> Monitor urine output to assess complete emptying of the bladder (assists antimicrobial treatment)
> Urinary alkalisers are safe in pregnancy, however they should not be used in combination with nitrofurantoin as it can result in a loss of treatment efficacy[9]

ISBN number: 978-1-74243-106-2
Endorsed by: South Australian Maternal & Neonatal Clinical Network
Last Revised: 29/04/13
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Asymptomatic bacteriuria

> Depending on the bacterial sensitivity, commence antibiotics

> Avoid trimethoprim in the 1st trimester and in pregnant women with established folate deficiency, low dietary folate intake, or for women taking other folate antagonists [9]

E coli

> Cephalexin 500 mg oral twice daily for 5 days [10]

> **OR**

> Nitrofurantoin 100 mg oral twice daily for 5 days

OR

> Trimethoprim 300 mg oral daily for 5 days (avoid in first trimester and in pregnant women with established folate deficiency, low dietary folate intake, or for women taking other folate antagonists)

OR

> Amoxycillin+clavulanate 500 + 125 mg oral, twice daily for 5 days (if < 20 weeks of gestation)

Note: In view of childhood outcomes –(ORACLE II trial and 7 year follow-up), which showed an associated increase in necrotising enterocolitis, functional impairment (low), and cerebral palsy, it is recommended that amoxicillin / clavulanate is only used if no alternative treatment is available [11,12]

Gram negative bacteria (Klebsiella, proteus, enterobacteriaceae, pseudomonas)

> Norfloxacin 400 mg oral twice daily for 5 days

> Repeat MSSU 48 hours after treatment completed

Group B streptococcus as a single organism

> Penicillin V 500 mg oral twice daily for 5 days

> GBS bacteriuria requires IV benzylpenicillin prophylaxis in labour. Give IV benzylpenicillin 3 g loading dose as soon as possible, then 1.2 g IV every 4 hours.

> If allergic to penicillin, lincomycin 600 mg IV every 8 hours, or azithromycin 500 mg IV once daily are alternatives, preferably prescribed based on sensitivity results from antenatal swabs. For further information see chapter 10 prevention and treatment of neonatal sepsis including maternal Group B Streptococcal colonisation

ISBN number: 978-1-74243-106-2
Endorsed by: South Australian Maternal & Neonatal Clinical Network
Last Revised: 29/04/13
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Acute cystitis

> Cephalexin 500 mg oral twice daily for 5-7 days

OR

> Nitrofurantoin 50 mg oral, 6 hourly for 5-7days

OR

> Amoxycillin+clavulanate 500 + 125 mg oral, twice daily for 5-7days (if < 20 weeks of gestation)

Note: In view of childhood outcomes –(ORACLE II trial and 7 year follow-up), which showed an associated increase in necrotising enterocolitis, functional impairment (low), and cerebral palsy, it is recommended that amoxicillin / clavulanate is only used if no alternative treatment is available [11,12]

> Repeat urine culture at least 48 hours after completion of treatment

Pyelonephritis

> Admit for antimicrobial treatment
> Ampicillin monotherapy has fallen into disfavour because of the high incidence of resistant bacteria. Preferred regimens are ampicillin plus gentamicin, or cefazolin, and ceftriaxone which are equally efficacious
> Dehydration is common. Administer intravenous fluids and monitor urine output
> Cooling blankets and antipyretics to alleviate pyrexia as required
> Monitor for signs of preterm labour and treat accordingly (please see PPG Preterm labour)
> Parenteral treatment should be continued until the woman is afebrile for a minimum of 24 hours

ISBN number: 978-1-74243-106-2
Endorsed by: South Australian Maternal & Neonatal Clinical Network
Last Revised: 29/04/13
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

A commonly used antibiotic regimen is:

> Gentamicin 5 mg / kg (*maximum initial dose 480 mg) intravenously as a single daily dose for 3 days, or until sensitivities are available. Serum levels should be taken if ongoing gentamicin treatment is required

* The actual weight of the woman may be used to calculate gentamicin dosing, except in the obese woman weighing 100 kg or over. In this case, calculate dose according to a maximum weight of 100 kg

AND

> Ampicillin [or amoxycillin] 2 g intravenous initial dose then 1g intravenous every 4 hours for 3 days

OR

> Cefazolin 1-2 g intravenously every 6 to 8 hours over 3 days

OR

> Ceftriaxone 1 g intravenously once a day over 3 days

OR

> Cefotaxime 1 g intravenously every 8 hours over 3 days

After 3 days:

> Cephalexin 500 mg oral 6 hourly for 10 days

OR

> Trimethoprim 300 mg oral daily for 10 days (avoid in first trimester and in pregnant women with established folate deficiency, low dietary folate intake, or for women taking other folate antagonists)

OR

> Amoxycillin+clavulanate 500 + 125 mg oral twice daily for 10 days (if < 20 weeks of gestation)

Note: In view of childhood outcomes –(ORACLE II trial and 7 year follow-up), which showed an associated increase in necrotising enterocolitis, functional impairment (low), and cerebral palsy, it is recommended that amoxicillin / clavulanate is only used if no alternative treatment is available [11,12]

Note:The choice of antibiotic should be based on sensitivity

Recurrent infections

> Treat according to bacterial sensitivity

> Repeat MSSU at every visit

> Exclude urinary tract anomalies

ISBN number: 978-1-74243-106-2
Endorsed by: South Australian Maternal & Neonatal Clinical Network
Last Revised: 29/04/13
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Antibiotic prophylaxis

Indicated after 2 or more documented separate episodes of cystitis or pyelonephritis

- Nitrofurantoin 50 mg oral at night
    - Caution should be exercised when administering nitrofurantoin at term, or with possible preterm birth, because of the possibility of producing haemolytic anaemia in patients with glucose-6-phosphate dehydrogenase (G6PD) deficiency and due to immature enzyme systems in the early neonatal period

OR

- Cephalexin 250 mg oral at night

OR

- Trimethoprim 150mg oral at night (avoid in first trimester and in pregnant women with established folate deficiency, low dietary folate intake, or for women taking other folate antagonists)

ISBN number: 978-1-74243-106-2
Endorsed by: South Australian Maternal & Neonatal Clinical Network
Last Revised: 29/04/13
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

References

1. McCormick T, Ashe RG, Kearney PM. Urinary tract infection in pregnancy. The Obstetrician and Gynaecologist 2008; 10: 156-162
2. Delzell JE, Lefevre ML. Urinary tract infections during pregnancy. American Family Physician 2000; 61: 713-21.
3. Smaill F, Vazquez JC. Antibiotics for asymptomatic bacteriuria in pregnancy. Cochrane Database of Systematic Reviews 2007, Issue 2. Art. No.: CD000490. DOI: 10.1002/14651858.CD000490.pub2 (Level I). Available from URL: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD000490/frame.html
4. Vazquez JC, Villar J. Treatments for symptomatic urinary tract infections during pregnancy. *Cochrane Database of Systematic Reviews* 2003, Issue 4. Art. No.: CD002256. DOI: 10.1002/14651858.CD002256 (Level I). Available from URL: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD002256/frame.html
5. Villar J, Widmer M, Lydon-Rochelle M, Gülmezoglu AM, Roganti A. Duration of treatment for asymptomatic bacteriuria during pregnancy. Cochrane Database of Systematic Reviews 2000, Issue 2. Art. No.: CD000491. DOI: 10.1002/14651858.CD000491. (Level I). Available from URL: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD000491/frame.html
6. Schnarr J, Smaill F. Asymptomatic bacteriuria and symptomatic urinary tract infections in pregnancy. Eur J Clin Invest 2008; 38 (S2): 50-57.
7. Smaill FM, Gyte GML. Antibiotic prophylaxis versus no prophylaxis for preventing infection after cesarean section. Cochrane Database of Systematic Reviews 2010, Issue 1. Art. No.: CD007482. DOI: 10.1002/14651858.CD007482.pub2 (Level I). Available from URL: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD007482/frame.html
8. Mittal P, Wing DA. Urinary tract infections in pregnancy. Clinics in Perinatology 2005; 32: 749-64.
9. Scottish Intercollegiate Guidelines Network (SIGN). Sign 88: Management of suspected bacterial urinary tract infection in adults. A national clinical guideline. Edinburgh:SIGN; 2012. Available from URL: http://www.sign.ac.uk
10. Therapeutic Guidelines. Antibiotic. Version 10. North Melbourne: Therapeutic Guidelines
11. Kenyon SL, Taylor DJ, Tarnow-Mordi W, for the ORACLE Collaborative Group. Broad-spectrum antibiotics for spontaneous preterm labour: the ORACLE II randomised trial. Lancet 2001; 357: 989–94.
12. Kenyon S, Pike K, Jones DR, Brocklehurst P, Marlow N, Salt A, Taylor DJ. Childhood outcomes after prescription of antibiotics to pregnant women with spontaneous preterm labour: 7-year follow-up of the ORACLE II trial. Lancet 2008; 372:1319-27.
13. Kenyon S, Boulvain M, Neilson JP. Antibiotics for preterm rupture of membranes. Cochrane Database of Systematic Reviews 2003, Issue 2. Art. No.: CD001058. DOI: 10.1002/14651858.CD001058 (Level I). Available from URL: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD001058/pdf_abstract_fs.html
14. Briggs GG, Freeman RK, Yaffe SJ. Drugs in Pregnancy and Lactation. 8th ed. Philadelphia: Wolters Kluwer / Lippincott Williams & Wilkins; 2008.

Useful website

Managing bacterial urinary tract infection in adults. Patient booklet. Available from URL: http://www.sign.ac.uk/pdf/pat88.pdf

ISBN number: 978-1-74243-106-2
Endorsed by: South Australian Maternal & Neonatal Clinical Network
Last Revised: 29/04/13
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Government of South Australia
SA Health

Abbreviations

et al	And others
AB	Asymptomatic bacteriuria
E Coli	Escherichia coli
mg	Milligram/s
mL	Millilitre/s
MSSU	Mid-stream specimen of urine

Version control and change history

PDS reference: OCE use only

Version	Date from	Date to	Amendment
1.0	18 May 10	29 Apr 13	Original version
2.0	29 Apr 13	current	review

ISBN number: 978-1-74243-106-2
Endorsed by: South Australian Maternal & Neonatal Clinical Network
Last Revised: 29/04/13
Contact: South Australian Perinatal Practice Guidelines workgroup at:
cywhs.perinatalprotocol@health.sa.gov.au

Government of South Australia
SA Health