Guideline

Surgical Antibiotic Prophylaxis Guideline

1. Purpose

The purpose of this guideline is to optimise the use of antibiotic prophylaxis for surgical procedures at the Women's in Parkville and in Sandringham.

Surgical site infections (SSIs) are a common adverse event in hospitalised patients[1]; 8-10% of gynaecological surgery patients undergoing an operative procedure will develop an SSI [2]. SSIs have been shown to increase mortality, readmission rate and length of hospital stay[3,4]. Appropriate and timely antibiotic prophylaxis has been shown to be highly effective in reducing the incidence of SSI[5]. The need for surgical antibiotic prophylaxis varies according to the type of procedure and its associated risk of SSI.

A number of studies across a range of surgical procedures have shown that there is a narrow window of opportunity for the administration of effective antimicrobial prophylaxis[6]. Antibiotics need to be present in the tissue at the time of incision in order to be effective[7].

Ideally prophylactic antibiotics should cover the narrowest spectrum of organisms possible in order to minimise the development of bacterial resistance[8]. For this reason it is important to consider the likely source of pathogens in each type of surgery. For most infections that occur after obstetric or gynaecological surgery, the source of pathogens is the endogenous flora of the patient's vagina or skin. The endogenous flora of the genital tract is polymicrobial, consisting of anaerobes, Gram negative aerobes and Gram positive cocci. In contrast, laparoscopic procedures that do not breach any mucosal surfaces are more commonly contaminated with skin organisms only (usually Gram positive organisms such as Staphylococci).

2. Definitions

Surgical site infection is an infection that occurs after surgery in the part of the body where the surgery took place.

Antibiotic prophylaxis is the use of antibiotics before, during, or after a diagnostic, therapeutic, or surgical procedure to prevent infectious complications. For surgical prophylaxis, these can generally be given prior to surgical incision.

3. Responsibilities

Surgeons are responsible for requesting the timely administration of appropriate antibiotic prophylaxis for their surgical patients.

Anaesthetists are responsible for liaison with surgeons and the provision of appropriate and timely antibiotic prophylaxis.

Pharmacists are responsible for ensuring prompt availability of required antibiotics. They are also responsible for provision of information to medical and nursing staff regarding doses of antibiotics and administration.

4. Guideline

Table 1 outlines recommended timing and choice of prophylactic antibiotics for surgical procedures at the Women's.

In patients being treated with antibiotic therapy for established infections, it is not necessary to give antibiotic prophylaxis provided the treatment regimen has activity against the organism(s) most likely to cause post-operative infection. However, adjust the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure. In general, if more than two half-lives of the drug have elapsed since the previous dose, an additional dose should be given[8]. Please refer to Table 2.

For patients colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), or at increased risk of being colonised or infected with MRSA use cefazolin 2 g IV, within 60 minutes before skin incision PLUS vancomycin 15mg/kg IV, 15 to 120 minutes before skin incision. For patients with severe penicillin hypersensitivity, replace the cefazolin with gentamicin 2mg/kg IV over 3-5minutes, 120 minutes before skin

incision. Vancomycin infusion should be started at least 15 minutes before skin incision, and the infusion can be completed after surgical skin incision. Do not give additional doses once procedure completed.[13]

The National Health and Medical Research Council (NHMRC) level of evidence for each recommendation is included in the Table. For some procedures, such as Caesarean section and hysterectomy, antibiotic prophylaxis is clearly indicated. For other procedures, such as insertion of an intra-uterine device, medical termination of pregnancy and diagnostic laparoscopy, antibiotic prophylaxis is usually not required. For other procedures, the evidence is less clear and recommendations are based upon expert agreement until further research evidence becomes available.

Note: Patients with immediate hypersensitivity reactions (eg. urticaria, angio-oedema, bronchospasm, anaphylaxis) to penicillins - avoid use of penicillins and cephalosporins.
Patients allergic to penicillins (excluding immediate hypersensitivity reactions eg. urticaria, angio-oedema, bronchospasm and anaphylaxis), use of cephalosporins can be considered.

Table 1: Antibiotics for surgical prophylaxis

Surgery	**1st line**	**Level of evidence[9]**	**Alternative**	**Comments**
Obstetric				
Caesarean section[10-13]	Cefazolin (cephazolin) 2 g IV, within 60 minutes (ideally 15-30 minutes) before skin incision.	I	Clindamycin 600 mg IV over at least 20 minutes, within 60 minutes (ideally 15-30 minutes) before surgical incision PLUS Gentamicin 2mg/kg IV over 3-5 minutes within 120 minutes before skin incision	Antibiotics prior to skin incision reduce maternal infection rate in emergency caesarean section.
Termination of pregnancy **(surgical)**[13-16]	Screen patient for STIs: *C. trachomatis, N. gonorrhoeae, M. genitalium and* bacterial vaginosis. Treat the woman and her partner(s) prior to ToP[17].	Consensus	If STI screening **not** performed or results unavailable: Metronidazole 2g oral stat within 120 minutes before procedure PLUS Azithromycin 1 g oral stat within 120 minutes before procedure	Nausea has been reported when metronidazole is administered, consider concurrent use of antiemetics
Termination of pregnancy **(medical)**[13]	Not indicated	I		
Manual removal of placenta[18-19]	Cefazolin (cephazolin) 2 g IV, at the time *of induction* PLUS Metronidazole 500 mg IV, ending the infusion at the time of induction	III-3	Clindamycin 600 mg IV PLUS Gentamicin 2 mg/kg IV (maximum 560 mg)	

3rd and 4th degree vaginal tears[13,20-24]	Cefazolin (cephazolin) 2 g IV within 60 minutes (ideally 15-30 15-30 minutes) before the repair PLUS Metronidazole 500 mg IV within 60 minutes (ideally 15-30 minutes) before the repair Followed by amoxicillin/clavulanic acid 875/125 orally BD for 5 days Cefalexin (cephalexin) 500mg orally QID for 5 days + metronidazole 400mg orally BD for 5 days can be used as an alternative regimen)	Consensus	Clindamycin 600 mg IV + Gentamicin 2 mg/kg IV (maximum 560 mg) within 60 minutes (ideally 15-30 minutes) before the repair Followed by trimethoprim/sulfamethoxazole 160/800 orally BD for 5 days PLUS metronidazole 400mg orally BD for 5 days	
Gynaecological Note: Prophylactic antibiotics for vaginal packs can be administered for the duration of vaginal pack use which is usually 24-48 hours.[33]				
Hysterectomy **(vaginal[13,25] and (abdominal)** [13,26]	Cefazolin (cephazolin) 2 g IV, within 60 minutes (ideally 15-30 minutes) before surgical incision (repeat dose if procedure > 4 hours) + Metronidazole 500 mg IV, within 120 minutes (ideally 15-30 minutes) before surgical incision	I	Clindamycin 600mg IV within 120 minutes before skin incision + Gentamicin 2mg/kg IV over 3-5minutes within 120 minutes before skin incision	Patients should be screened and treated for bacterial vaginosis before hysterectomy[27]
Urogynaecological procedures (mid-urethral sling/TVT, colposuspension, vaginal prolapse surgery +/- mesh/SSF)[13,28]	Cefazolin (cephazolin) 2 g IV, within 60 minutes before surgical incision + Metronidazole 500 mg IV, within 120 minutes before surgical incision	III-3 Consensus	Clindamycin 600mg IV within 120 minutes before skin incision + Gentamicin 2mg/kg IV over 3-5minutes within 120 minutes before skin incision	Do not give antibiotic prophylaxis to prevent catheter associated UTIs. [13]

Hysterosalpingography or Hysteroscopy or Chromotubation for patients with dilated tubes or a history of PID or tubal damage[28]	Azithromycin 1 g oral stat	Consensus		
Hysterosalpingography or Hysteroscopy or Chromotubation with NO history of PID and normal tubes on visualisation[29]	Not indicated	IV		
IUD insertion[30]	Not indicated	I		Patients should be screened and treated for STIs prior to insertion: *C. trachomatis, N. gonorrhoeae, M. genitalium and* bacterial vaginosis.
Endometrial biopsy[31]	Not indicated	IV		
Laparoscopy[32] (diagnostic or laparoscopy without breaching bowel/uterine/vaginal cavity)	Not indicated	II		
Laparoscopy (breach of bowel/uterine/vaginal cavity or conversion to operative laparotomy)	Cefazolin (cephazolin) 2 g IV, within 60 minutes (ideally 15-30 minutes) before surgical incision (repeat dose if procedure > 4 hours) + Metronidazole 500 mg IV, within 60 minutes (ideally 15-30 minutes) before surgical incision	Consensus	Clindamycin 600 mg IV + Gentamicin 2 mg/kg IV (maximum 560mg)	

Table 2: Suggested intraoperative redosing intervals for antibiotics commonly used for surgical antibiotic prophylaxis[13]

The redosing interval is the time at which repeat intraoperative dose is required and is measured from the initial pre dose. For a specific drug, the redosing interval is approximately equivalent to two half-lives.

Antimicrobial	Redosing interval for patients	Half-life
Cefazolin	4 hours	1.2 to 2.2 hours
Clindamycin	6 hours	2 to 4 hours
Gentamicin	Redosing not required	2 to 3 hours
Metronidazole	12 hours	6 to 8 hours
Vancomycin	12 hours	4 to 8 hours

Note: The redosing intervals apply to patients with normal renal function. For patients with impaired kidney function, seek expert advice. Despite gentamicin's short half-life, redosing is not required because of its 'post antibiotic' effect, whereby bacterial killing continues for many hours after plasma concentration is undetectable.

NHMRC Levels of Evidence[9]:

Level I: A systematic review of level II studies

Level II: A randomised controlled trial

Level III-1: A pseudo-randomised controlled trial

Level III-2: A comparative study with concurrent controls

Level III-3: A comparative study without concurrent controls

Level IV: A case series with either post-test outcomes or pre-test/ post-test outcomes

5. Evaluation, monitoring and reporting of compliance to this guideline

Compliance to this guideline or procedure will be monitored, evaluated and reported through:

1. Review of hysterectomy and caesarean surgical site infection rate
2. Spot audits of practice under the Quality Use of Medicines program
3. Laboratory review of infection clusters and antimicrobial resistance

6. References

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7. Legislation/Regulations related to this guideline

C. trachomatis and *N. gonorrhoeae* infection are Department of Health and Human Services notifiable conditions. Forms for notification can be found at http://ideas.health.vic.gov.au/notifying/what-to-notify.asp.