

NB

Comité de gérance des antimicrobiens
Anti-Infective Stewardship Committee

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antimicrobial care
for our patients
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Thérapie
antimicrobienne
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Surgical Prophylaxis Guidelines

Prepared by:

NB Provincial Health Authorities Anti-Infective Stewardship Committee

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Surgical Prophylaxis Guidelines

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These guidelines provide general recommendations for appropriate prophylactic antibiotic use for common surgical procedures; the list of surgical procedures is not all inclusive.

SECTION 1: GENERAL PRINCIPLES OF ANTIMICROBIAL PROPHYLAXIS^{1,2,3,4,6,7,8,10,11}

- Antimicrobial prophylaxis should be provided for surgical procedures for which it has been demonstrated to be beneficial.
- Antimicrobial surgical prophylaxis is administered to achieve serum and tissue antibiotic concentrations that exceed the minimum inhibitory concentration of the majority of organisms likely to be encountered, at the time of the incision and for the duration of the procedure. Key to achieving this goal is:
 - appropriate dosing
 - timely administration of first dose antimicrobial within 60 to 120 minutes of surgical incision
 - repeat dosing for prolonged procedures or in the event of major blood loss.
- It is estimated that 50% of surgical site infections are preventable by application of evidence-based strategies.
- General patient-related risk factors for surgical site infection include extremes of age, compromised nutritional status, obesity, diabetes mellitus, tobacco use, co-existent remote body site infection, altered immune response, corticosteroid therapy, recent surgical procedure, length of preoperative hospitalization and colonization with microorganisms

TIMING OF PROPHYLACTIC ANTIMICROBIAL DOSE:

- Preoperative doses of antimicrobials must be given in the 60 minutes before the first surgical incision. Some agents, such as fluoroquinolones and vancomycin, require administration over one to two hours; therefore, the administration of these agents should begin within 120 minutes before surgical incision.
- Patients receiving therapeutic antimicrobials for an infection before surgery should be given additional antimicrobial prophylaxis before surgery.

DURATION OF PROPHYLACTIC ANTIBIOTIC:

- Post-operative doses of prophylactic antibiotics are generally unnecessary.
- If antimicrobial prophylaxis is continued post-operatively, the duration should be less than 24 hours, regardless of the presence of intravascular catheters or indwelling drains.
- If the surgery is contaminated, it should be indicated that the post-operative antibiotic orders are for treatment.

CHOICE OF PROPHYLACTIC ANTIMICROBIAL:

- Antimicrobial prophylaxis is generally unnecessary for “clean” surgical procedures.
- For the majority of surgical procedures in which antimicrobial prophylaxis is indicated, a single dose of ceFAZolin 2 g IV given within the 60 minutes before the first surgical incision is appropriate.
- **Beta-lactam allergy: Obtain a reliable history and document exact nature of the reaction.**
Approximately 10% of the population report having a penicillin allergy; however, greater than 90% of these individuals are not truly allergic. Non-beta-lactam options may be more toxic and less effective. For example, there is an increasing rate of gram-positive resistance to clindamycin. In addition, a study by Blumenthal *et al.* found that patients with a reported penicillin allergy had a 51% increased risk of surgical site infection that was primarily related to receiving a non-beta-lactam antibiotic.¹⁷
 - For immediate or Type 1 (IgE-mediated) hypersensitivity reactions (e.g. anaphylaxis, urticaria, angioedema, hypotension, bronchospasm, stridor, pruritus), cross-reactivity between cephalosporins and penicillins is due to similarity in side-chains and was overestimated in the past. There is only significant risk of cross-reactivity among penicillins and between penicillins and cephalosporins with similar side-chains.
 - Immediate or Type 1 (IgE-mediated) hypersensitivity reaction to penicillin warrants the avoidance of cephalosporins with similar side chains and other penicillins.
 - Cross-reactivity among cephalosporins is low due to heterogeneity among side chains. Cephalosporin allergic patients may safely receive another cephalosporin with dissimilar side chains.
 - CeFAZolin does not share a side chain with any beta-lactam and is not expected to cross react with other beta-lactams. CeFAZolin is the only systemic beta-lactam included in this guide and may safely be given to patients with immediate or Type 1 (IgE-mediated) hypersensitivity reactions to penicillins or other cephalosporins. It should only be avoided in patients allergic to ceFAZolin or who have a severe non-IgE mediated reaction to a beta-lactam antibiotic (see below).
 - Severe non-IgE mediated hypersensitivity reactions (Stevens-Johnson syndrome, toxic epidermal necrolysis, drug reaction with eosinophilia and systemic symptoms, immune hepatitis, hemolytic anemia, serum sickness, interstitial nephritis, small vessel vasculitis)-warrant the avoidance of all beta-lactams.
 - Idiopathic reactions are not clearly immune-mediated (non-pruritic morbilliform rash) and are not a contraindication to taking a different beta-lactam such as ceFAZolin.
 - For more information on assessing beta-lactam allergies, please see the “Management of Penicillin and Beta-Lactam Allergy” Guide on the NB-ASC website.

- Known MRSA colonization:
 - Consider administration of pre-op vancomycin prophylaxis in addition to recommended routine surgical prophylaxis regimen. Vancomycin ALONE is less effective than ceFAZolin for preventing surgical site infections due to MSSA.
 - Consider pre-procedural MRSA decolonization
 - Consider consult to infectious diseases/medical microbiology for recommendations

DRUG DOSING

Intra-operative dosing:

- For antimicrobials with short half-lives, intra-operative dosing recommended for patients with normal renal function if: prolonged surgical procedure (> 2 half-lives of the antimicrobial) **OR** major blood loss (>1.5L). If massive blood loss occurs, a second dose should be given promptly. See Table 1.

Table 1. Intra-operative Antibiotic Prophylaxis		
Prophylactic Antibiotic	Half-life (hours)	Recommended re-dosing interval (from time of administration of the pre-op dose)
ceFAZolin	1.2–2.2	Q4h
clindamycin	2-4	Q6h
aminoglycoside	2-3	N/A*
metroNIDAZOLE	6-8	N/A*
vancomycin	4-8	N/A*

*Recommended redosing intervals marked as “not applicable” (N/A) are based on typical case length; for unusually long procedures, redosing may be needed except for aminoglycoside dosed at 5 mg/kg.

Renal or Hepatic Impairment:

- Antimicrobial prophylaxis for patients with renal or hepatic dysfunction often does not need to be modified when given as a single dose pre-operatively.

Aminoglycoside dosing:

- Aminoglycoside 5 mg/kg (extended interval dose) provides at least 24 hours of antimicrobial coverage.
- Tobramycin is an acceptable alternative for the indication of surgical prophylaxis in the event that gentamicin is not available. Dose based on ideal body weight (IBW), unless actual body weight (ABW) is greater than 20% above IBW, then use dosing body weight, calculated as follows:

- Ideal body weight (males) = 50 kg + (0.92 x cm above 150 cm) OR 50 kg + (2.3 kg x inches above 60 inches)
- Ideal body weight (females) = 45.5 kg + (0.92 x cm above 150 cm) OR 45.5 kg + (2.3 kg x inches above 60 inches)
- Dosing body weight = IBW + 0.4 (ABW –IDW)

Vancomycin Dosing:

- Vancomycin 15 mg/kg based on patient’s ABW and rounded to the nearest 250 mg.

Drug dosing in obesity:

- Conclusive recommendations for weight-based dosing for antimicrobial prophylaxis in obese patients cannot be made because data demonstrating clinically relevant decreases in SSI rates from the use of such dosing strategies instead of standard doses are not available in the published literature.
- Considering the low cost and favourable safety profile of ceFAZolin, the minimum dose should be 2 g. Increasing the dose to 3 g for those weighing 120 kg or more can easily be justified. For simplification, these guidelines recommend 2 g ceFAZolin doses for all adult patients.

Pediatric Dosing:

- Note: This guideline is intended for adults only. Pediatric dosing provided in Table 2.

Table 2. Pediatric Prophylactic Antibiotic Dosing^{a,b,c}	
Antibiotic	Recommended Dose
ampicillin	50 mg/kg
ceFAZolin	30 mg/kg
cefTRIAxone	50-70 mg/kg
ciprofloxacin	10 mg/kg
clindamycin	10 mg/kg
aminoglycoside	2.5 mg/kg based on dosing weight
metroNIDAZOLE	15 mg/kg
piperacillin-tazobactam	Infants 2 – 9 months: 80 mg/kg of the piperacillin component Children greater than 9 months and less than or equal to 40kg: 100mg/kg of the piperacillin component
vancomycin	15 mg/kg

^aThis table applies only to pediatric patients weighing 40kg or less

^bThe maximum pediatric dose should not exceed the usual adult dose

^cThis table does not specifically address new born infants

SECTION 2: SURGICAL PROPHYLAXIS RECOMMENDATIONS

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
CARDIAC ^{1,2,3,7,9,12}			
<ul style="list-style-type: none"> • Cardiac device insertion (pacemaker implantation) • Ventricular assist devices 	ceFAZolin 2 g*	vancomycin 15 mg/kg OR clindamycin 900 mg	No Antibiotics
<ul style="list-style-type: none"> • CABG • Prosthetic valve • Open heart surgery • Other cardiac procedures 	ceFAZolin 2 g*	vancomycin 15 mg/kg OR clindamycin 900 mg	Less than 24 hours
<ul style="list-style-type: none"> • Cardiac catheterization +/- stenting 	No Antibiotics	N/A	N/A
APPENDECTOMY ^{1,2,7,12}			
Appendectomy for uncomplicated appendicitis	metroNIDAZOLE 500 mg Plus ceFAZolin 2 g*	metroNIDAZOLE 500 mg Plus aminoglycoside 5 mg/kg	<ul style="list-style-type: none"> • No Antibiotic • If gangrenous or perforated appendicitis or intestine, initiate treatment course
COLORECTAL ^{1,2,3,7,9,12}			
All patients	metroNIDAZOLE 500 mg Plus ceFAZolin 2 g*	[metroNIDAZOLE 500 mg Plus aminoglycoside 5 mg/kg	No Antibiotics
SMALL INTESTINE SURGERY ^{1,3}			
Non-obstructed	ceFAZolin 2 g*	clindamycin 900 mg Plus aminoglycoside 5 mg/kg	Less than 24 hours
Obstructed or emergency surgery	ceFAZolin 2 g* Plus metroNIDAZOLE 500 mg	[metroNIDAZOLE 500 mg OR clindamycin 900 mg] Plus aminoglycoside 5 mg/kg	Less than 24 hours

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
GASTRODUODENAL ^{1,2,3,7,9,12}			
<ul style="list-style-type: none"> Procedures involving entry into lumen of GI tract (including bariatric surgery, pancreaticoduodenectomy, gastric carcinoma, perforated ulcer, and percutaneous endoscopic gastrostomy) Procedures not involving incision in GI tract (ex. antireflux, highly selective vagotomy), High risk patients only <ul style="list-style-type: none"> Decreased gastric acidity Decreased GI motility Obstruction Hemorrhage Gastric ulcer or malignancy morbid obesity Gastroduodenal perforation ASA classification of ≥3 	ceFAZolin 2 g*	clindamycin 900 mg Plus aminoglycoside 5 mg/kg	No Antibiotics
High risk gastroesophageal endoscopy <ul style="list-style-type: none"> esophageal dilation variceal sclerotherapy 	ceFAZolin 2 g*	clindamycin 900 mg Plus aminoglycoside 5 mg/kg	No Antibiotics
HERNIA REPAIR ^{1,2,3,9,12}			
All patients <ul style="list-style-type: none"> Herniorraphy Hernioplasty 	ceFAZolin 2 g*	vancomycin 15 mg/kg OR clindamycin 900 mg	No Antibiotics
HEPATIC PANCREATIC BILIARY TRACT (HPB) – Major Procedures ^{2,3,7}			
Major Procedures	metroNIDAZOLE 500 mg Plus ceFAZolin 2 g*	metroNIDAZOLE 500 mg Plus aminoglycoside 5 mg/kg	No Antibiotics

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
HEPATIC PANCREATIC BILIARY TRACT (HPB) – Minor Procedures ^{1,2,3,7,9,12}			
Low Risk Procedures <ul style="list-style-type: none"> • Elective laparoscopic cholecystectomy without risk factors (see below for risk factors) • Liver biopsy 	No Antibiotics (Note: many risk factors may not be known until intra-operatively, so may be reasonable to give every patient a single pre-op dose of antibiotic)	N/A	N/A
High risk Procedures <ul style="list-style-type: none"> • Laparoscopic cholecystectomy with risk factors which include: (emergency procedures, diabetes, anticipated procedure duration exceeding 120 minutes, intra-operative gallbladder rupture, age greater than 70 years, open cholecystectomy, risk of conversion from laparoscopic to open cholecystectomy, American Society of Anesthesiologists Physical Status Classification System (ASA) of 3 or more, episode of colic within 30 days before the procedure, re-intervention in less than a month for non-infectious complications of prior biliary operation, acute cholecystitis, anticipated bile spillage, jaundice, pregnancy, non-functioning gallbladder, biliary obstruction, obstructive jaundice or common bile duct stones and immunosuppression) • Open cholecystectomy • Insertion of prosthetic device • ERCP (if biliary obstruction, known pancreatic pseudocyst, or if complete biliary drainage is unlikely) • Liver Resection 	ceFAZolin 2 g*	clindamycin 900 mg Plus aminoglycoside 5 mg/kg	No antibiotics for most patients except <ul style="list-style-type: none"> • Acute cholecystitis: <ul style="list-style-type: none"> • 2 – 5 days • Emphysematous cholecystitis: <ul style="list-style-type: none"> • 5 – 7 days • Gangrene or perforated gall bladder: <ul style="list-style-type: none"> • change to broad spectrum antibiotic for treatment

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
HEAD AND NECK (MAJOR) ^{1,2,3,7,9,12}			
Clean procedures: <ul style="list-style-type: none"> • No incision of the oral or pharyngeal mucosa • No implantation of prosthetic material • Lymph node excisions • Exceptions (<i>no antibiotics</i>): <ul style="list-style-type: none"> ○ Thyroidectomy ○ Parotidectomy ○ Submandibular gland excision ○ all of above with no neck dissections and/or skull base involvement 	No Antibiotics	N/A	N/A
Clean procedures: <ul style="list-style-type: none"> • Cancer surgery • Placement of prosthesis (except tympanostomy tubes) 	ceFAZolin 2 g*	clindamycin 900 mg	24 hours
Clean-contaminated procedures: <ul style="list-style-type: none"> • Require penetration of the oral/nasal/pharyngeal mucosa • Complex resection with reconstruction procedures • Revision and salvage surgeries • Cancer surgery • Mandibular surgery (if tobacco/alcohol/drug use) 	ceFAZolin 2 g* Plus metronIDAZOLE 500 mg	clindamycin 900 mg Plus aminoglycoside 5 mg/kg	24 hours
<ul style="list-style-type: none"> • Tonsillectomy • Functional endoscopic sinus procedure • Nasal Septoplasty 	No Antibiotics	N/A	N/A
NEUROSURGERY ^{1,2,3,7,9,12}			
<ul style="list-style-type: none"> • Craniotomy (elective, clean, non-implant) • Elective implantation of intrathecal pump 	ceFAZolin 2 g*	vancomycin 15 mg/kg OR clindamycin 900 mg	No Antibiotics

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
Craniotomy <ul style="list-style-type: none"> • clean-contaminated • crosses sinuses or naso/oropharynx • emergency surgery • operation ≥2 hours • CSF leakage • Subsequent operation • Transsphenoidal surger^y (All patients) 	ceFAZolin 2 g* Plus metroNIDAZOLE 500 mg	vancomycin 15 mg/kg Plus metroNIDAZOLE 500 mg	No Antibiotics
CSF Shunting Procedures	ceFAZolin 2 g*	clindamycin 900 mg OR vancomycin 15 mg/kg	Less than 24 hours
OBSTETRICS AND GYNAECOLOGY ^{1,2,3,5,7,9,12,13,14,15}			
Therapeutic termination of pregnancy	doxycycline 100 mg PO 1 hr pre-op	azithromycin 1 g PO	If doxycycline used pre-op: doxycycline 200 mg PO 30 min post-op
Caesarean section <ul style="list-style-type: none"> • Administer antibiotics prior to skin incision NOT after cord clamping 	Elective Procedure: ceFAZolin 2 g*	Elective Procedure: clindamycin 900 mg Plus aminoglycoside 5 mg/kg	No Antibiotics
	Nonelective Procedure: ceFAZolin 2 g* Plus azithromycin 500 mg	Nonelective Procedure : clindamycin 900 mg Plus aminoglycoside 5 mg/kg Plus azithromycin 500 mg	No Antibiotics
<ul style="list-style-type: none"> • Radical and total hysterectomy (abdominal, laparoscopic or vaginal) • Vulvectomy with or without lymphadenectomy • Vaginectomy • Urogynecological procedures <ul style="list-style-type: none"> ○ Laparoscopic Burch ○ 2-Team sling 	ceFAZolin 2 g*	[clindamycin 900 mg OR metroNIDAZOLE 500 mg] Plus aminoglycoside 5 mg/kg	No Antibiotics

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
<ul style="list-style-type: none"> Endometrial ablation Dilatation and curettage Laparoscopic procedures that do not enter uterus and/or vagina 	No antibiotics	N/A	N/A
Endometriosis (laparoscopic and open)	metroNIDAZOLE 500 mg Plus ceFAZolin 2 g*	metroNIDAZOLE 500 mg Plus aminoglycoside 5 mg/kg	No antibiotics
OPHTHALMIC ^{1,3,12}			
Ophthalmic Procedures: <ul style="list-style-type: none"> Cataract extractions Vitreotomy Keratoplasty Intraocular lens implantation Glaucoma procedures Strabotomy Retinal detachment repair Laser in situ keratomileusis Laser-assisted subepithelial keratectomy Corneal transplant Eyelid surgery Dacryocystorhinostomy Enucleation 	4 th generation topical fluoroquinolones (moxifloxacin) given as 1 drop every 5-15 min for 5 doses within the hour before the start of the procedure Addition of ceFAZolin 100 mg by subconjunctival injection or intracameral ceFAZolin 1 – 2.5 mg or cefuroxime 1 mg at the end of the procedure is optional		
ORAL AND MAXILLOFACIAL ^{2,7}			
<ul style="list-style-type: none"> No oral or sinus cavity involvement 	ceFAZolin 2 g*	clindamycin 900 mg	No Antibiotics
<ul style="list-style-type: none"> Oral cavity or sinus cavity involvement Comminuted and compounded fractures Implants/prosthesis; bone graft Orthognathic 	ceFAZolin 2 g* Plus metroNIDAZOLE 500 mg	clindamycin 900 mg	No Antibiotics
<ul style="list-style-type: none"> Gunshot wound Animal or human bite injuries Grossly contaminated and dirty injury 	ceFAZolin 2 g* Plus aminoglycoside 5 mg/kg Plus metroNIDAZOLE 500 mg	clindamycin 900 mg Plus aminoglycoside 5 mg/kg	<ul style="list-style-type: none"> 24 hours For grossly contaminated/dirty wounds, consider a course of treatment with broad spectrum antibiotics

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
ORTHOPEDIC ^{1,2,3,7,9,12}			
Major procedures: <ul style="list-style-type: none"> • Difficult fracture reconstruction • Closed fracture with internal fixation • Total hip and knee replacement • Other procedures requiring prophylaxis • Total joint replacement • Implantation of internal fixation devices • Hip fracture repair • Fasciotomy 	ceFAZolin 2 g*	clindamycin 900 mg OR vancomycin 15 mg/kg	24 hours or less
Minor procedures: <ul style="list-style-type: none"> • Arthroscopy • Procedures not involving implantation of prosthetic material • Clean operations involving foot, hand, or knee 	No antibiotics	N/A	N/A
PLASTIC SURGERY ^{1,2,3,7}			
Clean Procedures (Low Risk) <ul style="list-style-type: none"> • Dermatologic • Facial bone fracture • Tumor excision • Simple rhinoplasty or septoplasty • Simple lacerations • Flexor tendon injuries • Hand surgery (simple) 	No Antibiotics	N/A	N/A
Clean Procedures (High Risk) <ul style="list-style-type: none"> • Placement of prosthetic material • Skin irradiation • Procedures below waist 	ceFAZolin 2 g*	clindamycin 900 mg OR vancomycin 15 mg/kg	No Antibiotics

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
Clean Contaminated Procedures <ul style="list-style-type: none"> Contaminated skin/mucosa/intertriginous areas (oral cavity, upper respiratory tract, axilla, groin, perineum) Wedge excision lip/ear Flaps on nose/head/neck Grafts 	ceFAZolin 2 g*	clindamycin 900 mg OR vancomycin 15 mg/kg	No Antibiotics
Breast: High risk patients only ^{14,15} <ul style="list-style-type: none"> Breast cancer procedures Recent neoadjuvant chemotherapy or radiation therapy Prosthetic material or mesh Re-operation or recent prior breast surgery Reconstruction surgeries Operation duration ≥2 hours Immunocompromised patients (diabetics, steroids, etc) Morbid obesity (> 100 kg) Skin irradiation 	ceFAZolin 2 g*	vancomycin 15 mg/kg OR clindamycin 900 mg	No Antibiotics Except Autologous breast reconstruction: Consider 24 hours or less
Hand: Complex Clean Procedures: <ul style="list-style-type: none"> Mutilating and crushing injuries from home & industrial source Bone, joint, tendon (except open flexor tendon injuries – see below) and nerve involvements Implants/ prosthesis Flap reconstruction Injuries require amputations High risk patients with medical comorbidities and/or immunosuppressive drugs 	ceFAZolin 2 g*	vancomycin 15 mg/kg OR clindamycin 900 mg	24 hours

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
<p>Hand: Clean-contaminated and Contaminated Procedures:</p> <ul style="list-style-type: none"> Mutilating and crushing injuries from farm environment Grossly contaminated and dirty injuries Animal and human bites Open fractures Use of leeches 	ceFAZolin 2 g* Plus aminoglycoside 5 mg/kg Plus metroNIDAZOLE 500 mg	clindamycin 900 mg Plus aminoglycoside 5 mg/kg	<ul style="list-style-type: none"> 24 hours For grossly contaminated/ dirty wounds and injuries longer than 6 hours consider a course of treatment with broad spectrum antibiotics
SPINE^{1,2,3,7,12}			
<ul style="list-style-type: none"> Fusion Decompression Laminectomy Microdiscectomy Insertion of foreign material Instrumentation 	ceFAZolin 2 g*	vancomycin 15 mg/kg OR clindamycin 900 mg	Less than 24hours
THORACIC^{1,2,3,7,12}			
<ul style="list-style-type: none"> Thoracentesis Chest tube insertion for spontaneous pneumothorax 	No antibiotics	N/A	N/A
Non-cardiac procedures: <ul style="list-style-type: none"> Lobectomy Pneumonectomy Lung resection Thoracotomy VATS (video assisted thoroscopic surgery) Chest tube insertion for chest trauma with hemo/pneumothorax 	ceFAZolin 2 g*	vancomycin 15 mg/kg OR clindamycin 900 mg]	Less than 24 hours
Esophageal resection	ceFAZolin 2 g* Plus metroNIDAZOLE 500 mg	clindamycin 900 mg Plus aminoglycoside 5 mg/kg	24 hours

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
TRAUMA – Gunshot^{2,7}			
Gunshot fracture wound	ceFAZolin 2 g*	vancomycin 15 mg/kg	48 hours
Gunshot fracture wound with <ul style="list-style-type: none"> • Large soft tissue defects or cavitory lesions AND/OR <ul style="list-style-type: none"> • Fracture of the extremities (in area of the hand, foot and ankle) 	ceFAZolin 2 g* Plus aminoglycoside 5 mg/kg	vancomycin 15 mg/kg Plus aminoglycoside 5 mg/kg	48 hours
Gunshot fracture wound with <ul style="list-style-type: none"> • Large soft tissue defects or cavitory lesions AND/OR <ul style="list-style-type: none"> • Fracture of the extremities (in area of the hand, foot and ankle) PLUS <ul style="list-style-type: none"> • Gross contamination of the wound and environment: <ul style="list-style-type: none"> ○ Occurred in rural/wooded area ○ Grossly dirty skin and clothes ○ Bowel communication 	ceFAZolin 2 g* Plus aminoglycoside 5 mg/kg Plus metroNIDAZOLE 500 mg	vancomycin 15 mg/kg Plus aminoglycoside 5 mg/kg Plus metroNIDAZOLE 500 mg	48 hours For grossly contaminated/dirty wounds and injuries longer than 6 hours consider a course of treatment with broad spectrum antibiotics.
TRAUMA – Abdomen^{2,7}			
Penetrating abdominal trauma <ul style="list-style-type: none"> • Hollow viscus injury 	metroNIDAZOLE 500 mg Plus ceFAZolin 2 g*	metroNIDAZOLE 500 mg Plus aminoglycoside 5 mg/kg	24 hours
Penetrating abdominal trauma <ul style="list-style-type: none"> • Non-hollow viscus injury 	metroNIDAZOLE 500 mg Plus ceFAZolin 2 g*	metroNIDAZOLE 500 mg Plus aminoglycoside 5 mg/kg	No Antibiotics
TRAUMA – Orthopedic^{3,18,19,20}			
Closed Fractures with internal fixation	ceFAZolin 2 g*	Vancomycin 15 mg/kg	No Antibiotics

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
Open/Compound Fractures <ul style="list-style-type: none"> Administer parenteral antibiotics as soon as possible after injury. Consider time of first dose and delay to surgical intervention when determining appropriate repeat dosing schedule 	ceFAZolin 2 g* If heavily soiled or contaminated complex open fracture: ADD aminoglycoside 5 mg/kg	Vancomycin 15 mg/kg If heavily soiled or contaminated complex open fracture: ADD aminoglycoside 5 mg/kg	24 to 48 hours post-op
URINARY DIVERSION PROCEDURES INVOLVING BOWEL SEGMENTS ^{2,3,7,12}			
(assuming all patients have urine culture performed and all positive urine culture patients are treated before surgery)			
<ul style="list-style-type: none"> Ileal conduit procedures or procedures involving bowel segments 	metronIDAZOLE 500 mg Plus ceFAZolin 2 g*	[metronIDAZOLE 500 mg Plus aminoglycoside 5 mg/kg	Less than 24 hours
UROLOGY ^{1,2,3,7,12,16}			
(assuming all patients have urine culture performed and all positive urine culture patients are treated before surgery)			
<ul style="list-style-type: none"> Lower tract instrumentation, including transrectal prostate biopsy, cystoscop, etc. High Risk only <ul style="list-style-type: none"> Advanced age Poor nutritional status Diabetes mellitus Smoking Obesity Coexisting infection at a remote body site Colonization with microorganisms Anatomical anomalies of the urinary tract Urinary obstruction or stone Chronic steroid use Immunodeficiency Externalised catheters Colonized endogenous/exogenous material Prolonged hospitalization 	ciprofloxacin 500 mg PO OR sulfamethoxazole/trimethoprim 800/160mg PO OR ceFAZolin 2 g* IM/IV OR aminoglycoside 5 mg/kg Note: PO regimens, give 1 – 2 hours pre-op	aminoglycoside 5 mg/kg with or without clindamycin 900 mg	Less than 24 hours

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
Clean without entry into urinary tract	ceFAZolin 2 g*	clindamycin 900 mg OR vancomycin 15 mg/kg	Less than 24 hours
Clean without entry into urinary tract + prosthesis	ceFAZolin 2 g* with or without aminoglycoside 5 mg/kg	(clindamycin 900 mg OR vancomycin 15 mg/kg) with or without aminoglycoside 5 mg/kg	Less than 24 hours
Clean with entry into urinary tract	ceFAZolin 2 g* with or without aminoglycoside 5 mg/kg (only if prosthesis involved)	ciprofloxacin 500 mg OR (aminoglycoside 5 mg/kg with or without clindamycin 900 mg)	Less than 24 hours
Clean Contaminated	ceFAZolin 2 g* Plus metroNIDAZOLE 500 mg	ciprofloxacin 500 mg OR (aminoglycoside 5 mg/kg Plus metroNIDAZOLE 500 mg)	Less than 24 hours
VASCULAR ^{1,2,3,7,12}			
<ul style="list-style-type: none"> • Lower limb amputation • Abdominal and lower limb vascular surgery • Procedures involving groin incision or insertion of prosthetic material • Carotid endarterectomy and brachial arterial repair <u>with prosthetic graft only</u> 	ceFAZolin 2 g*	vancomycin 15 mg/kg OR clindamycin 900 mg	24 hours or less
<ul style="list-style-type: none"> • Native AV fistula • Peritoneal dialysis catheter placement • Artificial AV graft 	ceFAZolin 2 g*	vancomycin 15 mg/kg OR clindamycin 900 mg	No antibiotics

*May consider ceFAZolin 3 g for patients weighing greater than or equal to 120 kg

Patient Selection	Pre-Operative Antibiotic Recommendation		Post-Operative IV Antibiotic Duration
	Preferred	Alternate (See Principles)	
Low risk carotid endarterectomy, brachial artery repair, endovascular stenting <u>without</u> implantation of prosthetic graft material	No Antibiotics	N/A	N/A

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