

### **RECOMMENDATIONS FOR SURGICAL ANTIBIOTIC PROPHYLAXIS**

This guideline is intended to provide practitioners with a standardized approach to surgical prophylaxis that is safe and effective. Recommended antibiotics target anticipated organisms. A thorough clinical assessment is required to identify complicating factors that may necessitate alternative/additional therapy.

### Timing of Prophylaxis:

- **Pre-Op dosing:** To be initiated within 60 minutes before surgical incision (120 minutes for vancomycin or fluoroquinolones). The goal of this timing is to ensure adequate antimicrobial tissue concentrations at the time of incision.
- Intra-Op dosing: To be administered if the duration of the procedure exceeds 2 half-lives of the antimicrobial agent or if there is excessive blood loss (> 20 mL/kg in pediatric patients; > 1,500 mL in adults). The goal is to maintain adequate antimicrobial concentrations throughout the surgical procedure. Intra-op redosing interval should be measured from the time of administration of the pre-op dose, not from the beginning of the procedure.
- **Post-Op dosing:** The duration of prophylaxis should be ≤ 24 hours for most procedures. Use of antibiotics beyond the recommended post-operative duration requires appropriate documentation of infection or suspected infection.

**Note:** According to the Infectious Diseases Society of America (IDSA), patients receiving therapeutic antimicrobials prior to surgery should also be given antimicrobial prophylaxis before surgery to ensure adequate serum and tissue levels of antimicrobials with activity against likely pathogens for the duration of the operation. For these patients, the surgeon will determine if the scheduled antibiotics are appropriate for surgical prophylaxis and if additional perioperative antibiotics or doses are needed. Administration of perioperative doses of gentamicin or vancomycin **in addition to** scheduled doses increases the risk of toxicity. Administration of perioperative doses of penicillins (e.g., ampicillin-sulbactam) or cephalosporins (e.g., cefazolin) **in addition to** scheduled doses is generally considered safe.

### Drains:

According to the CDC Guideline for the Prevention of Surgical Site Infection, in clean and clean-contaminated procedures, additional prophylactic antimicrobial agent doses should not be administered after the surgical incision is closed in the operating room, even in the presence of a drain (strong recommendation; high-quality evidence).

### **Chest Tubes:**

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There is no evidence to support continuing antibiotic prophylaxis until chest and mediastinal drainage tubes are removed.

### Allergy:

Beta-lactam antibiotics (e.g., cefazolin, ceftriaxone, ampicillin-sulbactam) are the safest and most effective agents for surgical prophylaxis. Use of second line agents (e.g., fluoroquinolones, vancomycin, clindamycin) are associated with inferior patient outcomes and increased risk of toxicity, *C. difficile* infection and drug-resistant organisms. Every effort should be made to thoroughly evaluate reported beta-lactam antibiotic allergies prior to surgery to ensure patients do not receive second-line, inferior agents unnecessarily. Beta-lactam allergies comprise a spectrum of allergic reactions. See Appendix A (pages 13-16) for antibiotic choices appropriate to the type and severity of beta-lactam allergy. Cefazolin or other cephalosporins may still be indicated.

### MRSA Colonization or history of MRSA Infection:

- · Clindamycin can be used instead of vancomycin if the isolate is known to be susceptible to clindamycin.
- The combination of cefazolin plus vancomycin is preferred over vancomycin alone for effective concurrent coverage of MSSA (cefazolin). Surgical prophylaxis with vancomycin alone has been associated with higher rates of MSSA surgical site infections than cefazolin alone.



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### TABLE 1. RECOMMENDATIONS FOR PERIOPERATIVE ANTIBIOTIC SELECTION

Type of Procedure	Recommended Agent(s)	Severe ß-lactam Allergy	MRSA Colonization OR History of MRSA Infection	Postoperative Duration	Comments
Cardiac					
<ul> <li>Congenital heart surgery</li> <li>Valve repair</li> <li>Placement of cardiac implantable device (pacemaker, ICD, VAD)</li> <li>Heart transplantation (± previous VAD)</li> </ul>	Cefazolin	Vancomycin	Vancomycin plus Cefazolin Allergy: Vancomycin	≤ 24 hours	Delayed sternal closure: Optimal duration is not well defined but shouldbe ≤ 24 hours after closure
Urological					
Hypospadias repair	Cefazolin (Option to limit prophylaxis to proximal hypospadias)	Clindamycin (Option to limit prophylaxis to proximal hypospadias)	Vancomycin plus Cefazolin Allergy: Vancomycin (Option to limit prophylaxis to proximal hypospadias)	Single pre-op dose	
Ureteral reimplantation	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Sacral neuromodulator implantation	Cefazolin plus Gentamicin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	



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Type of Procedure	Recommended Agent(s)	Severe ß-lactam Allergy	MRSA ColonizationOR History of MRSA Infection	Postoperative Duration	Comments
Urological, continued					
Pyeloplasty, open	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Pyeloplasty, robotic	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Nephrectomy	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Vesicostomy	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Ureterostomy	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Ureteroscopy w/wo stone manipulation	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Cystoscopy with urothelial manipulation	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Cystoscopy without urothelial manipulation	None	None	None	N⁄A	
Ureterocele puncture	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Posterior urethral valves incision	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Circumcision, chordee repair, Orchiopexy, Urethromeatoplasty, Torsion repair	None	None	None	N/A	
Augment cystoplasty discharge with SP-tube	Cefoxitin	Levofloxacin plus Metronidazole	Vancomycin plus Cefoxitin Allergy: Vancomycin plus Levofloxacin plus Metronidazole	24 hours or until intra-op urine culture results are available to allow targeted antimicrobial treatment	
ACE procedure	Cefoxitin	Levofloxacin plus Metronidazole	Vancomycin plus Cefoxitin Allergy: Vancomycin plus Levofloxacin plus Metronidazole	24 hours	
Mitrofanoff procedure	Cefoxitin	Levofloxacin plus Metronidazole	Vancomycin plus Cefoxitin Allergy: Vancomycin plus Levofloxacin plus Metronidazole	24 hours	



Type of Procedure	Recommended Agent(s)	Severe ß-lactamAllergy	MRSA ColonizationOR History of MRSA Infection	Postoperative Duration	Comments
Neurosurgical					
Spinal procedures without hardwa	reimplantation				
Idiopathic or neuromuscular/ syndromic patients with bowel and bladder control	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	24 hours	
Neuromuscular/syndromic patients without bowel and bladder control	Cefazolin plus Gentamicin	Clindamycin plus Gentamicin	Vancomycin plus Gentamicin	24 hours	
Myelomeningocele repair in patients ≤ 72 hours of age	Ampicillin plus Gentamicin	N/A	Vancomycin plus Ampicillin plus Gentamicin	24 hours	
Spinal procedures with hardwarei	mplantation				
Halo application, cervical and thoracic fusion	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	24 hours	
Lumbar fusion, insertion of lumbar drain	Cefazolin plus Gentamicin	Clindamycin plus Gentamicin	Vancomycin plus Gentamicin	24 hours	
Cranial procedures					
Cranial procedures without sinus violation	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	24 hours	
Cranial procedures with sinus violation	Ampicillin-sulbactam	Clindamycin plus Gentamicin	Vancomycin plus Ampicillin-sulbactam Allergy: Vancomycin plus Clindamycin plus Gentamicin	24 hours	
Ophthalmic					
All ophthalmic surgeries	<ul> <li>Practice varies to include:</li> <li>Topical neomycin– polymyxin B– dexamethasone OR tobramycin- dexamethasone at the end of procedure</li> <li>Cefazolin (50 mg) by subconjunctival injection or intracameral moxifloxacin (450–600 mcg) at the end of procedure</li> <li>Erythromycin ointment at the end of procedure</li> </ul>	N⁄A	N⁄A	<ul> <li>Practice varies to include:</li> <li>Topical neomycin–polymyxin B– dexamethasone OR tobramycin-dexamethasone drops TID x 7 days or BID x 10 days</li> </ul>	

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Type of Procedure	Recommended Agent(s)	Severe ß-lactam Allergy	MRSA ColonizationOR History of MRSA Infection	Postoperative Duration	Comments
ENT					
Otic/Ear					
Implants (cochlear and other)	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	Single pre-op dose	Post-op amoxicillin-clavulanate x 5 days
Ear cases(clean)	None	None	None	N/A	
Ear cases (clean-contaminated)	None unless active infection	None unless active infection	None unless active infection	N/A	
Tympanoplasty with tube placement Tympanoplasty with skin incision Mastoidectomy/ Tympanomastoidectomy	None unless active infection	None unless active infection	None unless active infection	N/A	
Salivary gland procedures (including removal/ligation)	Ampici Ilin-sulbactam	Clindamycin	Vancomycin plus Ampicillin-sulbactam Allergy: Vancomycin plus Clindamycin	Continue post-op IV antibiotics x 7 days (combined IV and oral therapy)	
Salivary gland tumor removal	None	None	None	N/A	
Facial					
Facial fractures (maxillary, zygomatic, or mandibular condyle surgery)	None	None	None	N/A	
Facial fractures with concern for sinus involvement	Ampicillin-sulbactam	Clindamycin	Vancomycin plus Ampicillin- sulbactam Allergy: Vancomycin plus Clindamycin	<ul> <li>If no significant disruption, no post-op prophylaxis needed</li> <li>If significant disruption, continue post-op IV antibioticsx</li> <li>3–5 days</li> </ul>	
Facial fractures with incision through face and orbital fracture	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	Single pre-op dose	
Nasal					
Septoplasty	None	None	None	N/A	
Open septorhinoplasty	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	<ul> <li>If allograft used, no post- operative IV antibiotics needed</li> <li>If allograft not used, post- operative antibiotics only if splints left in place</li> </ul>	If splints in place, post-op cephalexin or clindamycin until removal

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Type of Procedure	Recommended Agent(s)	Severe ß-lactam Allergy	MRSA ColonizationOR History of MRSA Infection	Postoperative Duration	Comments
ENT, continued					
Sinus					
Sinus surgery	None If cystic fibrosis, antibiotic selection may be directed by pulmonology for appropriate coverage	None If cystic fibrosis, antibiotic selection may be directed by pulmonology for appropriate coverage	None If cystic fibrosis, antibioticselection may be directed by pulmonology for appropriate coverage	N/A	
Oropharyngeal					
Intra-oral procedures (including mucosal/tongue biopsy), Tonsillectomy	None	None	None	NA	
Mandibular distraction	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	Continue postop antibiotics until external pins removed for ≤ 7 days (combined IV and oraltherapy)	
Facial plastics/cleft lip and palate repair	None	None	None	NA	
Cervical/Neck					
Neck surgery clean-contaminated	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	Single pre-op dose	
Neck mass/cyst excision	None	None	None	N/A	
Brachial cleft cyst	None unlessactively infected	None unlessactively infected	None unless actively infected	N/A	
Tracheostomy/tracheotomy	None (continue antibiotics if previously prescribed)	None (continue antibiotics if previously prescribed)	None (continue antibiotics if previously prescribed)	N/A	
Total Thyroidectomy, parathyroidectomy	None	None	None	N/A	
Airway reconstruction	Cefazolin ifno <i>Pseudomonas;</i> If <i>Pseudomonas</i> colonization, Cefepime	Clindamycin if no <i>Pseudomonas</i> ; If <i>Pseudomonas</i> colonization, Clindamycin plus Ciprofloxacin	Vancomycin plus Cefazolin Allergy: Vancomycin	If no MRSA, continue IV antibiotics until drain removed If MRSA, continue IV antibiotics until able to take oral TMP-SMX	If MRSA colonization or infection, TMP-SMX x 3 days before surgery and to complete 14 total days of post-op antibiotics
Pharyngeal flap	None	None	None	N/A	

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Age < 25 years of age

SURGICAL GUIDELINE

### Aim: To standardize surgical antibiotic prophylaxis.

Type of Procedure	Recommended Agent(s)	Severe ß-lactam Allergy	MRSA Colonization OR History of MRSA Infection	Postoperative Duration	Comments
ENT, continued					
Craniofacial Reconstruction					
Cranioplasty/facial reconstruction	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	72 hours	
Skull base surgery	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	Continue post-op IV antibiotics until packing removed	
Oral and Maxillofacial Surgery					
Palatoplasty with bone grafting	Cefazolin	Clindamycin	Vancomycin plus Cefazolin <i>Allergy</i> : Vancomycin	24 hours	
Orthognathic surgery	Ampicillin	Clindamycin	Vancomycin plus Ampicillin <i>Allergy</i> : Vancomycin plus Clindamycin	24 hours	Oral antibiotics may be continued upon conclusion of post-operative IV antibiotics to complete a 7 day course
Alloplastic temporomandibular joint (TMJ) replacement	Cefazolin	Clindamycin	Vancomycin plus Cefazolin <i>Allergy</i> : Vancomycin plus Clindamycin	48 hours	After completion of IV antibiotics, oral antibiotics will be continued to complete a 7 day course.
Third molar extraction/Dental implants	Ampicillin	Clindamycin	Vancomycin plus Ampicillin <i>Allergy</i> : Vancomycin plus Clindamycin	Single pre-op dose	High risk cardiac patients should follow preoperative antibiotic prophylaxis per American Heart Association (AHA) guidelines. Antibiotics to be continued after surgery if adherence to oral hygiene measures is not feasible (e.g. neurodevelopmental delay or aspiration risk) or if preceding tissue inflammation
Maxillofacial fracture surgery	Ampicillin-sulbactam	Clindamycin	Vancomycin plus Ampicillin- sulbactam <i>Allergy</i> : Vancomycin plus Clindamycin	<ul> <li>If no significant disruption, no post-op prophylaxis needed</li> <li>If significant disruption, continue post-op IV antibiotics □ 3-5 days</li> </ul>	Prophylaxis is not recommended in setting of maxillary, zygomatic, or mandibular condylesurgery

Age < 25 years of age



#### Aim: To standardize surgical antibiotic prophylaxis.

Type of Procedure	Recommended Agent(s)	Severe ß-lactam Allergy	MRSA Colonization OR History of MRSA Infection	Postoperative Duration	Comments
Gynecological					
Hysterectomy (supracervical, vaginal, abdominal, laparoscopic, robotic)	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	Screening for bacterial vaginosis in patients undergoing hysterectomy can be considered
Colporrhaphy	Cefazolin	Clindamycin plus Gentamicin	No change	Single pre-op dose	
Laparotomy without entry into bowel or vagina	Consider cefazolin	Consider clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	Decision for antibiotic surg. prophylaxis is based on risk factors (e.g., obesity, diabetes)
Cystoscopy	None	None	None	N/A	Rule out urinary tractinfection; treat positive urine culture prior to procedure
Hysterosalpingogram and Chromotubation	None, unless history of PID or abnormal tubes; If history of PID or abnormal tubes, doxycycline 100 mg BID for 5 days starting the night prior to procedure AND Cefazolin pre-operatively	If history of PID or abnormal tubes, Doxycycline plus Clindamycin plus Gentamicin	No change	Single pre-op dose of cefazolin If tubes abnormal at time of procedure, discharge on doxycycline 100 mg BID x 5 days	History of PID or abnormal tubes, doxycycline 100 mg BID x 5 days total
Sonohysterography (saline infusion sonography)	None	None	None	N/A	
Cervical tissue excision procedures (LEEP, biopsy, endocervical curettage)	None	None	None	N⁄A	
Endometrial biopsy	None	None	None	N⁄A	
Laparoscopic procedures without entry into bowel or vagina	None	None	None	N⁄A	
Hysteroscopy (operative or diagnostic)	None	None	None	N⁄A	
Intrauterine device insertion	None	None	None	N/A	
D&C for non-pregnancy indications	None	None	None	N/A	

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Type of Procedure	Recommended Agent(s)	Severe ß-lactamAllergy	MRSA ColonizationOR History of MRSA Infection	Postoperative Duration	Comments
Orthopedic Trauma					
Open fractures	Se	ee https://starnet.children.shc	.org/references/cds/recommendations-f	for-open-fracture-antibiotic-prophyl	axis.pdf
Closed fractures with implantation of internal fixation devices (e.g., nails, screws, plates, wires)	Cefazolin	Clindamycin	Vancomycin plus Cefazolin	≤ 24 hours	
Simple supracondylar humeral fractures pinned percutaneously	None	None	None	N/A	
Plastic Surgery					
Clean with risk factors or clean- contaminated	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	≤ 24 hours	
Vascular					
All	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	≤ 24 hours	
Fetal Surgery					
All	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	≤ 24 hours	
General Surgery					
Thoracic					
Lobectomy, pneumonectomy, lung resection, thoracotomy, video- assisted thoracoscopic surgery	Cefazolin	Clindamycin	Vancomycin plus Cefazolin Allergy: Vancomycin	Single pre-op dose	
Tracheœsophageal fistula (TEF)repair	Cefazolin OR Ampicillin plus Gentamicin (if other maternal/ neonatal indications)	NA	Vancomycin plus Cefazolin	≤ 24 hours	
Congenital diaphragmatic hernia (CDH)	Cefazolin	N⁄A	Vancomycin plus Cefazolin	<ul> <li>No patch: Single pre-opdose</li> <li>Patch w/o chest tube: &lt; 24 hrs</li> <li>Patch w/ chest tube: 24–48 hrs</li> </ul>	

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Age < 25 years of age

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### Aim: To standardize surgical antibiotic prophylaxis.

Type of Procedure	Recommended Agent(s)	Severe ß-lactam Allergy	MRSA ColonizationOR History of MRSA Infection	Postoperative Duration	Comments
General Surgery, continued			-		'
Biliary tract					
Open procedure	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Laparoscopic procedure Elective, low-risk	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Laparoscopic procedure Elective, high-risk	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Gastroduodenal					
Procedures involving entry into lumen of gastrointestinal tract (e.g., duodenal atresia)	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Gastroschesis	Cefazolin OR Ampicillin plus Gentamicin (if other maternal/ neonatal indications)	N⁄A	Vancomycin plus Cefazolin	≤ 48 hours	<ul> <li>Antibiotics are recommended from delivery until silo placed or primary closure.</li> <li>No antibiotics needed while silo in place</li> <li>Initiate perioperative coverage at time of final closure until 48 hours postoperatively</li> </ul>
Procedures without entry into GI tract for high-risk patients	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Small intestine and colorectal (cont	tinues on next page)				
Hemia repair (hemioplasty and hemiorrhaphy)	None	None	None	N/A	
Nonobstructed small intestine	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	Single pre-op dose	
Obstructed small intestine	Cefoxitin	Ciprofloxacin plus Metronidazole	Vancomycin plus Cefoxitin Allergy: Vancomycin plus Ciprofloxacin plus Metronidazole	Single pre-op dose	
Stoma revisions and/or closures (small intestine only)	Cefazolin	Clindamycin plus Gentamicin	Vancomycin plus Cefazolin Allergy: Vancomycin plus Gentamicin	< 24 hours	
Stoma revisions and/or closures (small intestine and colon or colostomy)	Cefoxitin	Ciprofloxacin plus Metronidazole	Vancomycin plus Cefoxitin Allergy: Vancomycin plus Ciprofloxacin plus Metronidazole	< 24 hours	

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#### Aim: To standardize surgical antibiotic prophylaxis.

Type of Procedure	Recommended Agent(s)	Severe ß-lactam Allergy	MRSA Colonization OR History of MRSA Infection	Postoperative Duration	Comments			
General Surgery, continued								
Small intestine and colorectal, con	tinued							
Colorectal procedures	Cefoxitin	Ciprofloxacin plus Metronidazole	Vancomycin plus Cefoxitin Allergy: Vancomycin plus Ciprofloxacin plus Metronidazole	Single pre-op dose				
Necrotizing enterocolitis (NEC)	See https://starnet.childrenshc.org/references/cds/antibiotic-recommendations-for-nec-in-nicu.pdf https://starnet.childrenshc.org/references/cds/antibiotic-recommendations-for-nec-in-cvicu.pdf							
Appendectomy								
Uncomplicated (including gangrenous appendicitis)	Ceftriaxone plus Metronidazole	Ciprofloxacin plus Metronidazole	Vancomycin plus Ceftriaxone plus Metronidazole Allergy: Vancomycin plus Ciprofloxacin plus Metronidazole	Single pre-op dose				
Complicated appendicitis or other ruptured colorectal viscus	Ceftriaxone plus Metronidazole	Ciprofloxacin plus Metronidazole	Vancomycin plus Ceftriaxone plus Metronidazole Allergy: Vancomycin plus Ciprofloxacin plus Metronidazole	≤ 24 hours	Appropriate antibiotic treatment should be administered for underlying infection beyond perioperative prophylaxis.			



## TABLE 2. RECOMMENDATIONS FOR PERIOPERATIVE DOSING OF PROPHYLACTIC ANTIBIOTICS IN NEONATES [POSTMENSTRUAL AGE (PMA) <44 WEEKS]

Antibiotic	Pre-Op Dose	Timing of Pre-Op Dose	Administration	Intra-Op Dose	Post-Op Dose	
Ampicillin	50 mg/kg		IVP over 3–5 min	50 mg/kg q4h	50 mg/kg q12h	
Coforalia					PNA 0-7 days: 30 mg/kg q12h	
Cerazolin	30 mg/kg		IVP over 3–5 min	30 mg/kg q4n	<b>PNA≥8 days:</b> 30 mg/kg q8h	
Cefazolin	20 mm/hm			15 mg/kg at initiation of CPB AND again with weaning off of	<b>PNA 0–7 days:</b> 30 mg/kg q12h	
(cardiopulmonary bypass, CPB)	30 mg/kg	Beg in within <b>60</b> min before incision; If possible, complete 15 min prior to incision	IVP over 3–5 min	CPB or at 4 hours (whichever is shorter)	<b>PNA≥8 days:</b> 30 mg/kg q8h	
	PNA ≤ 28 days and ≤ 2 kg 30 mg/kg		IV over 30 min		<b>PNA ≤ 28 days and ≤ 2 kg</b> 30 mg/kg q12h	
Cefepime	All others: 50mg/kg			If procedure lasts > 8 hours, redose based on Post-Op dosing interval	<b>PNA ≤ 28 days and &gt; 2 kg</b> 50 mg/kg q12h	
					<b>PNA &gt; 28 days</b> 50 mg/kg q8h	
Cefoxitin	30 mg/kg		IVP over 3–5 min	30 mg/kg q2h	30 mg/kg q8h	
Gentamicin	4 mg/kg			IV infusion over 20 min with 10	None	<b>PNA ≤ 7 days and &lt; 1,250 g</b> 4 mg/kg q48h
			min flush		All others 4 mg/kg q24h	
					PMA ≤ 29 weeks	
					<b>PNA ≤ 14 days:</b> 15 mg/kg q18h <b>PNA &gt; 14 days:</b> 10-15 mg/kg q12h	
		Begin within <b>120</b> min before		If procedure lasts > 8 hours	PMA 30–36 weeks	
Vancomycin	15 mg/kg	incision; If possible, complete 15 min prior to incision	IV over 60 min	redose based on Post-op dosing interval	<b>PNA ≤ 14 days:</b> 10-15 mg/kg q12h <b>PNA &gt; 14 days:</b> 10-15 mg/kg q8h	
					PMA 37–44 weeks	
					<b>PNA ≤ 14 days:</b> 15 mg/kg q8-12h <b>PNA &gt; 14 days:</b> 10-15 mg/kg q8h	

Abbreviations: PNA = postnatal age

## TABLE 3. RECOMMENDATIONS FOR PERIOPERATIVE DOSING OF PROPHYLACTIC ANTIBIOTICS IN PEDIATRIC [POSTMENSTRUAL AGE (PMA)≥ 44 WEEKS] AND ADULT PATIENTS

Antibiotic	Pre-Op Dose	Timing of Pre-Op Dose	Administration	Intra-Op Dose	Post-Op Dose				
Ampicillin	50 mg/kg (max 2000 mg)		IVP over 3–5 min	q2h	q6h				
Ampicillin-Sulbactam	50 mg/kg (max 2000 mg) of ampicillin component		IVover 15 min	q2h	q6h				
Cefazolin	30 mg/kg (max 2000 mg)				- 01-				
	lf ≥ 120 kg: 3000 mg		IVP over 3–5 min	q4n	q&n				
Cefazolin	30 mg/kg (max 2000 mg)	Begin within <b>60</b> min before		15 mg/kg at initiation of CPB					
(cardiopulmonary bypass, CPB)	lf ≥ 120 kg: 3000 mg	15 min prior to incision	IVP over 3–5 min	ANDagain with weaning off of CPB or at 4 hours (whichever is shorter)	30 mg/kg q8h				
Cefepime	50 mg/kg		IV over 30 min	q4h	q8h				
Cefoxitin	40 mg/kg (max 2000 mg)		IVP over 3–5 min	q2h	q6h				
Ceftriaxone	50 mg/kg (max 2000 mg)		IV over 30 min	No redose	q24				
Ciprofloxacin	10 mg/kg (max 400 mg)	Begin within <b>120</b> min before incision; If possible, complete 15 min prior to incision	IV over 60 min	If procedure lasts > 12 hours, redose based on Post-op dosing interval	q12h				
Clindamycin	10 mg/kg (max 900 mg)	Begin within <b>60</b> min before	IV infusion at ≤ 30 mg/min	If procedure lasts > 6 hours, redose based on Post-op dosing interval	q8h				
Gentamicin	2.5 mg/kg (use adjusted body weight if ≥ 95% percentile BMI for age and sex)	incision; If possible, complete 15 min prior to incision	sion; If possible, complete 15 min prior to incision IV infusion over 20 min with 10 min flush		q8h				
Levofloxacin		Begin within <b>120</b> min before	N/ 00 i		q12h (if 6 months to < 5 years old)				
	10 mg/kg (max 500 mg)	15 min prior to incision	IV over 60 min	N/A	q24h (if ≥ 5 years old)				
Metronidazole	10 mg/kg (max 500 mg)	Begin within <b>60</b> min before incision; If possible, complete	IV over 30–60 min	If procedure lasts > 8 hours, redose based on Post-op dosing interval	q8h				
Metronidazole (appendicitis)	30 mg/kg (max 1500 mg) 15 min prior to incision IV over 30–60 min		IV over 30–60 min	N/A	q24h				
Vancomycin	15 mg/kg (max 1500 mg)	Begin within <b>120</b> min before incision	IV over 60 min (if dose is ≤ 1000 mg) or over 90 min (if dose is > 1000–1500 mg)	If procedure lasts > 8 hours, redose based on Post-op dosing interval	q8h				

Age < 25 years of age



Aim: To standardize surgical antibiotic prophylaxis.

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Updated by Mary Ullman, PharmD and Bill Pomputius with guidance from Oral and Maxillofacial Surgery and ENT on 7/31/24

### SURGICAL SURGICAL ANTIBIOTIC PROPHYLAXIS **GUIDELINE**

Age < 25 years of age

### Appendix A

#### Aim: To standardize surgical antibiotic prophylaxis.

Patient with PENICILLIN allergy label



Disclaimer: This guideline is designed for general use with most patients; each clinician should use their own independent judgment to meet the needs of each individual patient. This quideline is not a substitute for professional medical advice, diagnosis or treatment.

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Age < 25 years of age

### **Appendix A**

SURGICAL GUIDELINE

### Aim: To standardize surgical antibiotic prophylaxis.

Patient with	CEPHAL	OSPORIN	alleray	lahel
	CLFIIAL	.USF UNIN	anergy	lane

			55															
Discuss with Infectious Disease if allergy label to: carbapenem, aztreonam, or multiple classes of beta-lactams (e.g penicillin and cephalosporin).• Evaluate reported <ul><li>Previous evaluation</li><li>Name of cep</li><li>Reaction def</li><li>Timing/onse</li><li>Tolerance of</li><li>Update EMR with</li></ul>	allergy and severity ( <b>Table 4</b> ) by obtaining infor aluation by an allergist for penicillin allergy. halosporin(s) that allergy label applies to. tails (e.g. see <b>page 16</b> for rash type examples). t of reaction: Immediate/acute (<24 hrs of cephal reaction: None/antibiotic continued, antibiotic dis culprit cephalosporin and other beta-lactams be information above.	$\Psi$ mation on: osporin dosing), o scontinued, antihi fore and after cou	lelaye stamir rse th	ed (> 2 nes, s iat ca	24 hrs teroid used	s of ce ls, ep the re	ephalo inephr eactior	ospor rine, ł n.	in dos hospit	sing). talizat	tion/E	Đ.						
Severe Type II-IV reactions (delayed)	Severe Type I reactions (immediate)		Non-severe reactions Reactions inconsi						nsist	sistent with allergy								
<ul> <li>Stevens-Johnson syndrome (SJS).</li> <li>Toxic epidermal necrolysis (TEN).</li> <li>Drug reaction with eosinophilia and systemic symptoms (DRESS).</li> <li>Acute generalized exanthematous pustulosis (AGEP).</li> <li>Generized bullous fixed drug eruption (GBFDE).</li> <li>Linear IgA bullous dermatosis.</li> <li>Severe† maculopapular rash.</li> <li>Drug-induced autoimmune disease (bullous pemphigoid, pemphigus vulgaris, drug-induced lupus).</li> <li>Serum sickness.</li> </ul>	<ul> <li>Anaphylaxis (Table 5)</li> <li>Skin: Acute urticaria (hives), angioedema, flushing/redness.</li> <li>CV: Hypotension, syncope.</li> <li>GI: Repetitive vomiting, abdominal cramping.</li> <li>MSK: Hypotonia.</li> <li>Resp: Dyspnea, wheezing, hypoxia, repetitive coughing, stridor, aphonia, dysphonia.</li> </ul>	Mild/mod     Isolated p     Delayed to     other syst     Patient de      Use table to     cefoxitin, c     cephalospo     -If green b     -If red box	<ul> <li>ild/moderate<sup>†</sup> maculopapular rash.</li> <li>olated pruritus without rash.</li> <li>played urticaria<sup>*</sup> with pruritus and without her systemic symptoms.</li> <li>atient denies allergy but is on record.</li> <li>Patient tolerate allergy label.</li> <li>e table below to asses if cefazolin, foxitin, ceftriaxone can be used based on bhalosporin allergy label:</li> <li>green box, can use.</li> <li>red box, use NON beta-lactam antibiotic.</li> </ul>							lerand t repe he, fa y of a ated c cefa one, o am.	ances: diarrhea, nausea, petitive), mild abdominal , fatigue, vaginitis. If allergy to penicillin. d culprit penicillin after efazolin, œfoxitin, a, or ampicillin-							
• Blood disorders (hemolytic anemia,		<b>D</b> emonstra	Demonstrad 1st 2nd				3rd 4th						5 <sup>th</sup>					
agranulocytosis, thrombocytopenia). •Drug-induced liver injury, nephritis, pneumonitis, meningitis, pancreatitis, vasculitis. • Drug fever.		Surgical Prophylaxis agent	Cefadroxil	Cephalexin	Cefazolin	Cefoxitin	Cefuroxime	Cefprozil	Cefdinir	Cefixime	Ceftriaxone	Cefotaxime	Cefpodoxime	Ceftazidime	Cefepime	Ceftaroline	Ceftolozane	Cefiderocol
	Use NON beta-lactam antibiotics	Cefazolin																
• Delayed urticaria: See definition on page 13	appropriate to procedure (see Table 1, "Severe ß-lactam Allergy" column).	Cefoxitin																
tClassification of maculopapular rash: See page 13.		Ceftriaxone																

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1st, 2nd, 3rd, etc. refer to generation of cephalosporins.

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**Chîldren's** 

MINNESOTA

### SURGICAL ANTIBIOTIC PROPHYLAXIS SURGICAL **GUIDELINE**

Age < 25 years of age



#### Aim: To standardize surgical antibiotic prophylaxis. **Appendix A** Table 4. Immune-Mediated Antibiotic Hypersensitivity Reactions Description **Onset of Reaction** Typical Clinical Findings Type Pathogenesis Anaphylaxis, urticaria (hives), Antibiotic-specific IgE binds to mast cells and Minutes to an hour (can angioedema, repetitive vomiting, SOB, also be considered within basophils. Subsequent antibiotic exposure leads to I (Immediate) IgE-mediated hypersensitivity wheezing, chest pain, palpitations, mast cell and basophil degranulation 6 hours of exposure) syncope, cardiac arrest Antibiotic binds to WBC, RBC, or platelet and acts Hemolytic anemia, thrombocytopenia, as antigen leading to antibody medicated cell IgG-mediated hypersensitivity Days to weeks II (Delayed) neutropenia destruction Serum sickness (fever, urticaria, Days to weeks Antibiotic and IgG/IgM bind to form immune Immune-complex mediated arthralgia, lymphadenopathy), drug fever, III (Delayed) hypersensitivity complex activate complement vasculitis Pustules, vesicles, desguaration, exfoliative exanthema, contact dermatitis, Days to weeks maculopapular rash, DRESS, SJS, TEN, IV (Delayed) Cell-mediated hypersensitivity Antigen specific T-cell activation AGEP, acute interstitial nephritis, druginduced liver injury,

AGEP: acute generalized exanthematous pustulosis. DRESS: drug rash with eosinophilia and systemic symptoms. RBC: red blood cell. WBC: white blood cell. SJS: Stevens-Johnson Syndrome. SOB: shortness of breath. TEN: toxic epidermal necrolysis.

### Table 5. Anaphylaxis is highly likely when any one of the following 2 criteria are fulfilled:

1. Acute onset\* of an illness with involvement of the skin, mucosal tissue, or both (e.g. generalized hives, pruritus or flushing, swollen lips-tongue-uvula) AND ≥ 1 of the following:

- a. Respiratory compromise (e.g. dyspnea, wheeze-bronchospasm, stridor, reduced peak expiratory flow (PEF), hypoxemia)
- b. Reduced blood pressure\*\* or associated symptoms of end-organ dysfunction (e.g. hypotonia [collapse], syncope, incontinence)
- c. Severe gastrointestinal symptoms (e.g. severe crampy abdominal pain, repetitive vomiting)

2. Acute onset of hypotension\* or bronchospasm or laryngeal involvement (stridor, vocal changes, odynophagia) even in the absence of typical skin involvement

\*Minutes to several hours from exposure. Most immediate reactions occur within the 1st hour following drug administration.

\*\*Hypotension defined as systolic blood pressure (mm Hg):

- < 12 months of age: < 70
- 1-10 years of age:  $< 70 + (2 \times age in years)$
- > 10 years of age: < 90.

## SURGICAL GUIDELINE SURGICAL ANTIBIOTIC PROPHYLAXIS

Age < 25 years of age

### Aim: To standardize surgical antibiotic prophylaxis.

### **Appendix A**

### **Examples of Rash Types**



Images used with p ermission from the following references:

penicillin-aller av-algorithm-with-pictures.pdf (hopkinsmedicine.org)

Atlas of Dermatological Conditions in Populations of African Ancestry. CMYA Donkor, J Aryee-Boi, IR Osazuwa, FK Afflu, AF Alexis. Springer Cham 2021 ٠

Disclaimer: This guideline is designed for general use with most patients; each clinician should use their own independent judgment to meet the needs of each individual patient. This quideline is not a substitute for professional medical advice, diagnosis or treatment.

ren's

Age < 25 years of age



### **Appendix A**

Aim: To standardize surgical antibiotic prophylaxis.

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