

INTRODUCTION

The antimicrobial surgical prophylaxis guideline establishes evidence-based standards for surgical prophylaxis at UCSF Medical Center and UCSF Benioff Children's Hospital San Francisco. The protocol has been adapted from published consensus guidelines from the American Society of Health-System Pharmacists (ASHP), Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), Centers for Disease Control and Prevention (CDC), and the Surgical Infection Society (SIS) for use at UCSF with input from the Antimicrobial Stewardship Program, the Infectious Diseases Management Program, the Department of Anesthesiology, and the surgical departments.

PRINCIPLES OF ANTIMICROBIAL SURGICAL PROPHYLAXIS

- This guideline is focused on clean and clean-contaminated surgeries
- Prophylaxis should be targeted against most likely pathogens, taking into consideration type of surgery and local epidemiology
- Administer correctly—goal is for adequate tissue concentration at the time of risk
 - Administer within 60 minutes before the incision
 - For vancomycin and fluoroquinolones, the ideal timing is to start the infusion 60-120 minutes prior to incision
- Give dose before the tourniquet goes up, if applicable
- Confirm with the surgeon at the Time-out or earlier since occasionally antibiotics need to be delayed until after culture
- In clean and clean-contaminated surgeries, discontinue antibiotics after the surgical incision is closed unless the patient has a documented or suspected infection. In pancreatic transplantation, continuation of antibiotics until duodenal cultures result is an exception.

Patients with existing infections

- The appropriate antibiotic to treat the underlying infection should be chosen on a case-by-case basis
- Continue the antibiotic to treat infection
- If spectrum of activity does not cover the usual organisms covered by routine prophylaxis for that type of case, add the routine prophylactic agent
 - Antibiotic spectrum guidance: <https://idmp.ucsf.edu/content/antibiotic-stewardship-and-spectrum-guide>
- Ensure dose is given at appropriate time to achieve maximal tissue levels at time of incision
- Duration should be determined by the duration for the existing infection

Patients known to be colonized with methicillin-resistant *Staphylococcus aureus* (MRSA)

- Can consider addition of vancomycin to prophylaxis, especially if implant is being placed. Standard prophylaxis (e.g. cefazolin) should still be provided as this affords superior surgical site infection prevention for methicillin-sensitive *Staphylococcus aureus* (MSSA).

Patients with recent history of resistant organisms

- Data is limited
- Take into account:
 - Timing of infection
 - Location of infection
 - Prior treatment
 - Planned procedure
 - Organism

Patients with penicillin allergy

- Take an antibiotic history
 - Exact details of reaction, description of rash (if present)
 - Timing of reaction
 - Reason for antibiotic prescription
 - Other antibiotics received since then (also review the EMR to see whether the patient has received other antibiotics)
- Severe beta-lactam allergy: Do not re-challenge
 - Immediate-type hypersensitivity: Hives, angioedema, wheezing, anaphylaxis
 - Late reactions: Hemolytic anemia, thrombocytopenia, serum sickness, drug reaction with eosinophilia, Stevens Johnson syndrome (SJS)/Toxic epidermal necrolysis (TEN)
- When to re-challenge or use alternative β -lactam
 - Okay if patient had history of maculopapular rash (no hives, wheezing, anaphylaxis)
 - Okay if history of other drug intolerances like nausea

DOSING AND RE-DOSING INTERVALS

- In addition to the re-dosing intervals suggested below, consider immediate re-dosing in patients who have > 1.5 L of blood loss (>25ml/kg or > 30% blood volume loss for patients < 40kg) within a short time frame and those with severe burns.
 - Restart the re-dosing clock if this is done
 - Do not re-dose vancomycin or gentamicin for blood loss

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COMMONLY USED IV DRUG DOSING AND ADMINISTRATION

ADULTS	Ampicillin-sulbactam[#]	Cefazolin	Ceftriaxone	Clindamycin	Gentamicin	Levofloxacin	Metronidazole	Piperacillin-tazobactam	Vancomycin
Initial dose									
≥ 40 kg	3 g	40-120 kg: 2 g > 120 kg: 3 g	2 g	900 mg	5 mg/kg*	500 mg	500 mg	Standard: 3.375 g P aeruginosa: 4.5 g	40-80 kg: 1 g ≥ 80 kg: 1.5 g
< 40 kg adult	1.5 g	1 g	1 g	600 mg	2.5 mg/kg*	500 mg	500 mg	Standard: 3.375 g P aeruginosa: 4.5 g	750 mg
Admin	15 min IVPB	IVP over 3-5 mins	IVP over 3-5 mins	15 min IVPB	30 min IVPB	60 min IVPB	30 min IVPB	30 min IVPB	60 min/1 g IVPB
Intraoperative redosing interval, h	CrCl (>30): 2 CrCl (10-30): 6 CrCl (<10): Do not redose	CrCl (>30): 4 CrCl (10-30): 6 CrCl (<10): Do not redose	12	6	None	None	12	2	CrCl > 30: 12 CrCl ≤ 30: None
When to start standard dosing	After 3 doses	After 3 doses	After 2 doses	After 3 doses	Already standard	Already standard	Already standard	After 3 doses	Already standard
Standard dosing interval	q6h	q8h	q24h	q8h	q24h	q24h	Q12h	q8h	q12h
Compatibility issues	No	No	Ca++ containing solutions (incl LR) → possible precipitation 1. No Y-site 2. Flush line with normal saline or use alt solution	No	Propofol → Δ emulsion integrity 1. No Y-site 2. Flush line with normal saline	Propofol → free oil formation 1. No Y-site 2. Flush line with normal saline	Propofol → Δ fat globule size 1. No Y-site 2. Flush line with normal saline	Vecuronium → precipitation 1. No Y-site 2. Flush line with normal saline	No

[#]Note: Adult dosing for combination antibiotics is based on *total* drug product e.g. 3 g ampicillin-sulbactam = 2 g ampicillin + 1 g sulbactam

*Use ideal body weight, max dose = 400 mg

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PEDIATRIC/ NEONATAL	Ampicillin- sulbactam	Cefazolin	Ceftriaxone	Clindamycin	Gentamicin	Levofloxacin	Metronidazole	Piperacillin- tazobactam	Vancomycin
Initial dose									
Usual dose	50 mg/kg ampicillin component	30 mg/kg	50 mg/kg	>1 mo: 10 mg/kg ≤1 mo: 5 mg/kg	>1 mo: 2.5 mg/kg ≤ 1 mo: 5 mg/kg	10 mg/kg	15 mg/kg	Age 0-9 mo: 80 mg/kg piperacillin component Age >9 mo: 100 mg/kg piperacillin component	15 mg/kg
Maximum	2 g ampicillin component	Usual Max: 2g Wt > 120kg: 3g	2g	900mg	n/a	500mg	500mg	3g piperacillin component (standard) 4g piperacillin component (<i>Pseudomonas</i>)	1g
Admin	15 min infusion (OR-specific)	IVP over 3-5 mins	IVP over 3-5 mins	15 min infusion (OR-specific)	30 min infusion	60 min infusion	30 min infusion	30 min infusion	60 min infusion
Intraoperative redosing intervals, h									
Pediatric Age > 1 mo	CrCl >30: 2 CrCl 10-30: 6 CrCl <10: do not redose	CrCl >30: 4 CrCl 10-30: 6 CrCl <10: do not re-dose	12	6	CrCl ≥=50: 8	6mo-<5yo CrCl ≥50: 12 ≥5yo CrCl ≥50: 24	8	2	CrCl>90: 6 CrCl 60-90: 8 CrCl 30-60: 12 CrCl < 30: do not re-dose
Neonate Age <=7d, OR Weight <=2kg	Consult pharmacist	6	Do not use	12	Do not re-dose	Do not use	Do not re-dose	Consult pharmacist	Do not re-dose
Neonate Age >7d AND Weight > 2kg	Consult pharmacist	4	Do not use	6	Do not re-dose	Do not use	Do not re-dose	Consult pharmacist	Do not re-dose
When to start standard dosing	After 3 doses	After 3 doses	After 2 doses	After 3 doses	Already standard	Already standard	Already standard	After 3 doses	Already standard
Standard dosing interval	>1mo, CrCl ≥=50: q6h	>1mo, CrCl ≥=70: q8h	>1mo: q24h	>1mo: q8h				>1 mo CrCl ≥50: q6h	
Compatibility issues	No	No	Ca++ containing solutions (incl LR) → possible precipitation 1. No Y-site 2. Flush line with normal saline or use alt solution	No	Propofol → Δ emulsion integrity 1. No Y-site 2. Flush line with normal saline	Propofol → free oil formation 1. No Y-site 2. Flush line with normal saline	Propofol → Δ fat globule size 1. No Y-site 2. Flush line with normal saline	Vecuronium → preci pitation 1. No Y-site 2. Flush line with normal saline	No

Note: Pediatric dosing for combination antibiotics is based on core drug component e.g. 50 mg/kg/dose ampicillin-sulbactam = mg of ampicillin component

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APPENDIX A. RECOMMENDED PROPHYLAXIS AGENTS BY ADULT OR PROCEDURE

	Recommended Agents	Severe β -Lactam Allergy
CARDIAC		
CABG	Cefazolin	Vancomycin
Cardiac Device Insertion (pacemaker) and valves	Cefazolin	Vancomycin
Ventricular Assist Device	Cefazolin + Vancomycin	Vancomycin
THORACIC		
Thoracotomy, Pneumonectomy, Lobectomy	Cefazolin	Vancomycin
VATS	Cefazolin	Vancomycin
GENERAL SURGERY		
GASTRODUODENAL—No suspected infection		
Entry into lumen of GI tract (bariatric)	Cefazolin	Vancomycin + levofloxacin
Pancreatoduodenectomy (with or without stent)	Piperacillin/tazobactam	Levofloxacin + metronidazole
Without entry into GI tract (anti-reflux)	Cefazolin	Vancomycin + levofloxacin
BILIARY—No suspected infection		
Open-Biliary (no infection)	Cefazolin	Levofloxacin + metronidazole
Laparoscopic- Biliary		
-Low Risk	None	None
-High Risk (no infection)	Cefazolin	Levofloxacin + metronidazole
INTESTINE—No suspected infection		
Appendectomy (uncomplicated)	Cefazolin if > 8h from ceftriaxone; give metronidazole if not administered in the ED	Ciprofloxacin + metronidazole
Nonobstructed small intestine	Cefazolin	Clindamycin + levofloxacin
Hernia Repair	Cefazolin	Vancomycin
Colorectal	Preop mechanical bowel prep + neomycin/metronidazole PO x 3 doses (metronidazole allergy: substitute erythromycin) Periop ceftriaxone + metronidazole	Preop mechanical bowel prep + neomycin/metronidazole PO x 3 doses Periop levofloxacin + metronidazole

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	Recommended Agents	Severe β -Lactam Allergy
HEAD & NECK		
Clean, including tympanostomy tube placement	None	None
Clean, neck dissection or prosthesis placement (except tympanostomy tube)	Cefazolin	Clindamycin
FESS	Cefazolin	Clindamycin
Tonsillectomy	Ampicillin	Clindamycin
Clean-contaminated except FESS and tonsillectomy	Ampicillin/sulbactam (cefazolin/metronidazole if non-severe PCN allergy)	Clindamycin/levofloxacin
NEUROSURGERY		
Elective craniotomy & CSF Shunting-Primary	Cefazolin	Vancomycin
Implantation of Intrathecal Pumps-Primary	Cefazolin	Vancomycin
Revision craniotomy	Cefazolin + Vancomycin	Vancomycin
Skull base with dural resection	Ceftriaxone (2 g IV q12H) + metronidazole	Aztreonam 2 g + metronidazole + vancomycin
ORTHOPEDIC and SPINE		
Clean operations of hand, knee, foot (without implantation of foreign material), \leq 30 min	None	None
Clean operations of hand, knee, or foot (with foreign material), > 30 min	Cefazolin	Vancomycin
Laminectomy or primary spinal fusion	Cefazolin	Vancomycin
Spinal fusion (revision)	Cefazolin + vancomycin	Vancomycin
Spinal fusion (revision involving sacrum)	Cefazolin + vancomycin + gentamicin	Vancomycin + gentamicin
Arthroplasty for femoral neck fracture	Cefazolin + (vancomycin if deemed high risk for drug-resistant organisms)	Vancomycin
Implantation of internal fixation devices (nails, screws, wires)	Cefazolin	Vancomycin
Total joint replacement	Cefazolin	Vancomycin
Total joint replacement- Revision	Cefazolin + vancomycin (Cefazolin + clindamycin for a vancomycin allergy)	Vancomycin
PLASTIC SURGERY		
Routine prophylaxis	Cefazolin	Clindamycin
Approach through oral cavity	Ampicillin/sulbactam	Clindamycin

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	Recommended Agents	Severe β -Lactam Allergy
TRANSPLANTATION		
Heart, Lung, Heart-Lung	Cefazolin	Clindamycin
Kidney	Cefazolin	Clindamycin
Liver	Piperacillin-tazobactam	Vancomycin + Aztreonam
Pancreas & Kidney-Pancreas	Cefazolin +/- fluconazole (if high risk of fungal infection)	Vancomycin + levofloxacin +/- fluconazole (if high risk of fungal infections)
UROLOGY		
Lower tract instrumentation with risk of infection (incl TURP)	Cephalexin (cefazolin if PO dose not given in preop)	Trimethoprim-sulfamethoxazole
Clean without entry into urinary tract	Cefazolin	Clindamycin
Clean without entry into urinary tract + prosthesis	Cefazolin + gentamicin	Vancomycin + gentamicin
Clean with entry into urinary tract	Cefazolin	Clindamycin + gentamicin
Clean-contaminated	Ceftriaxone + metronidazole	Levofloxacin + metronidazole
Complex stones/stents/upper tract instrumentation	Treat based on clinical judgement and culture data	
Upper tract instrumentation	Cephalexin (cefazolin if PO dose not given in preop)	Trimethoprim-sulfamethoxazole
Vaginal surgery	Cefazolin	Clindamycin + gentamicin
VASCULAR	Cefazolin (+ vancomycin if MRSA colonization or graft/wound infection)	Vancomycin

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APPENDIX B. RECOMMENDED PROPHYLAXIS AGENTS BY PEDIATRIC/NEONATAL OR PROCEDURE

	Recommended Agent	Severe β -Lactam Allergy
PEDIATRIC CARDIOTHORACIC		
For detailed recommendations including post-operative prophylaxis, refer to "Antimicrobial Prophylaxis Guidelines for Pediatric Cardiac Surgery Patients" https://idmp.ucsf.edu/content/antimicrobial-prophylaxis-guidelines-pediatric-cardiac-surgery-patients		
Routine case (without any below special circumstances) Includes pre- and intra-operative prophylaxis for cases that may have different recommendations for post-operative prophylaxis:	Cefazolin (+ Vancomycin if h/o MRSA)	Vancomycin
<ul style="list-style-type: none"> open sternum ECLS cannulation ventricular assist device placement rhythm management and monitoring device implantation 		
Special circumstances:		
Aortic root surgery, defined as aortic root replacement or reconstruction	Cefazolin + Vancomycin	Vancomycin
Presence of tracheostomy	Cefepime (+ Vancomycin if h/o MRSA)	Consult pharmacist
Slide tracheoplasty	Vancomycin + Cefepime	Consult pharmacist
PEDIATRIC SURGERY		
CLEAN PROCEDURES		
Clean procedure without foreign body (e.g. hernia repair, mass/lymph node excision)	None	None
Clean procedure with foreign body placement	Cefazolin	Clindamycin
Thoracic procedure without entry into aerodigestive tract	Cefazolin	Clindamycin
CLEAN-CONTAMINATED PROCEDURES		
Thoracic and/or head and neck procedure with entry into aerodigestive tract (e.g. repair of esophageal atresia, lobectomy, thyroglossal duct, tracheostomy)	Ampicillin-sulbactam	Clindamycin
Gastrointestinal procedures (e.g. G tube* placement, pyloroplasty, duodenal atresia repair, gastrocutaneous fistula closure)	Cefazolin	Clindamycin + Gentamicin OR Levofloxacin
Special circumstance:		
*G tube + CAPD catheter placement	Cefazolin + Fluconazole	Clindamycin + Fluconazole
Hepatobiliary +/- pancreatic procedures (e.g. pancreatectomy, uncomplicated cholecystectomy, hepatectomy)	Cefazolin	Clindamycin + Gentamicin OR Levofloxacin
Procedures involving the small intestine (non-obstructed)	Cefazolin	Clindamycin + Gentamicin OR Levofloxacin

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	Recommended Agent	Severe β -Lactam Allergy
Colorectal procedures	Ceftriaxone + Metronidazole	Levofloxacin + Metronidazole
Special circumstance:		
Incidental appendectomy (e.g. Ladd's procedure)	Cefazolin + Metronidazole	Levofloxacin + Metronidazole
CONTAMINATED PROCEDURES		
Contaminated abdominal procedure – e.g. uncomplicated or complicated appendicitis, ostomy closure, obstructed small intestine, cholecystectomy for cholecystitis	Ceftriaxone + Metronidazole OR Cefoxitin 40mg/kg/dose IV (max 2g/dose, intra-operative redosing q2h) unless Ceftriaxone dose documented within prior 8 hours (per Pediatric Appendicitis Algorithm)	Levofloxacin + Metronidazole OR If receiving Ciprofloxacin + Metronidazole (per Pediatric Appendicitis Algorithm), repeat dose of Ciprofloxacin 15mg/kg/dose IV (max 400mg/dose) if \geq 12 hours from prior dose
Special circumstance:		
Procedure for active intra-abdominal infection with hospital-onset	Piperacillin-tazobactam	Levofloxacin + Metronidazole
NEONATAL PROCEDURES		
Neonatal cases e.g. CDH repair, gastroschisis repair, omphalocele repair	ADD Cefazolin, even if patient is already on Ampicillin + Gentamicin	
PEDIATRIC HEAD AND NECK		
Adenotonsillectomy	None	None
Tympanostomy tube insertion	None	None
Laryngoscopy/bronchoscopy	None	None
Sinus surgery	None	None
Major ear surgery (with or without implant)	Cefazolin	Clindamycin
Open neck surgery (clean, without entry into aerodigestive tract)	None	None
Open neck surgery (clean, contaminated, with entry into aerodigestive tract)	Ampicillin-sulbactam	Clindamycin
Major intraoral surgery	Ampicillin-sulbactam	Clindamycin
PEDIATRIC NEUROSURGERY		
Elective craniotomy	Cefazolin	Clindamycin
CSF shunting procedure	Cefazolin OR Vancomycin (per surgeon)	Clindamycin OR Vancomycin (per surgeon)
Spinal cord untethering	Cefazolin	Clindamycin
Myelomeningocele repair	ADD Cefazolin, even if patient is already on Ampicillin + Gentamicin	
PEDIATRIC ORTHOPEDIC AND SPINE		
Percutaneous tenotomy	None	None
Other procedure of extremity except hip	Cefazolin	Clindamycin
Hip procedures	Cefazolin	Vancomycin

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	Recommended Agent	Severe β -Lactam Allergy
Spine procedure for primary idiopathic scoliosis	Cefazolin	Clindamycin
Spine procedure, complex case	Cefazolin + Vancomycin	Vancomycin
PEDIATRIC PLASTIC SURGERY		
Clean, uncomplicated procedure	None	None
Clean procedure, complex or with risk factors for infection	Cefazolin	Clindamycin
Clean-contaminated procedure	Follow recommendations from other categories as applicable to body site	
Contaminated procedures (with active infection)	Treat based on clinical judgment, ensure adequate prophylaxis for skin flora and potential pathogens	
PEDIATRIC ABDOMINAL TRANSPLANTATION		
Kidney	Cefazolin	Clindamycin
Liver	Piperacillin-tazobactam	Vancomycin + Aztreonam
Pancreas or kidney-pancreas	Cefazolin +/- Fluconazole (if high risk of fungal infection)	Vancomycin AND Levofloxacin +/- Fluconazole (if high risk of fungal infection)
PEDIATRIC UROLOGY		
Clean procedure without entry into urinary tract, open or laparoscopic (hernia repair, orchiopexy, circumcision)	No risk factors: No antibiotic Risk factors (complex medical history, heart disease, etc.): Cefazolin	No risk factors: No antibiotic Risk factors (complex medical history, heart disease, etc.): Clindamycin
Procedure with entry into urinary tract: open or laparoscopic (hypospadias repair, partial nephrectomy, ureteral re-implant, pyeloplasty)	Cefazolin	Clindamycin + Gentamicin
Procedure with entry into intestine: open or laparoscopic (MACE, Monti, augmentation cystoplasty)	Ceftriaxone + Metronidazole	Levofloxacin + Metronidazole
Vaginal surgery	Cefazolin	Clindamycin + Gentamicin
Procedure involving implanted prosthesis (e.g. testicular prosthesis)	Cefazolin + Gentamicin	Vancomycin + Gentamicin
Lower tract instrumentation with risk for infection	Cefazolin Alternative: Cephalexin if PO dose can be given in pre-op	Trimethoprim-sulfamethoxazole (if not on prophylaxis with this agent) Alternative: Levofloxacin OR Gentamicin
Upper tract instrumentation	Cefazolin	Clindamycin + Gentamicin
Procedure involving complex stone/stent/upper tract instrumentation	Treat based on clinical judgment and culture data	

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APPENDIX C. RECOMMENDED PROPHYLAXIS AGENTS BY OB/GYN PROCEDURE

OB-GYN	Recommended Agents	Severe β -Lactam Allergy
Vaginal Delivery w/ manual placenta removal	Cefoxitin	Clindamycin
Cesarean Delivery	Cefazolin <u>MRSA colonized</u> : consider vancomycin x 1, in addition to above <u>Ruptured membranes or in labor at time of C-section</u> : Add Azithromycin 500 mg IV x 1	Clindamycin + gentamicin
Uterine balloon	Cefoxitin	Clindamycin
Laceration repair (3 rd or 4 th degree only)	Cefoxitin 1g IV	Clindamycin
Hysterectomy (vaginal or abdominal), urogynecology procedures (+/- mesh)	Cefazolin +/- metronidazole	Clindamycin + gentamicin
Hysteroscopy, laparoscopy, laparotomy		None
Hysterosalpingogram, endometrial biopsy	Doxycycline 100 mg po twice daily x 5 days if hx of PID or dilated fallopian tubes	
Medical abortion		None
Induced abortion/D+E/ D+C/manual uterine inspection (including Laminaria placement)	Doxycycline 200 mg po prior to procedure Add metronidazole 500 mg q8H x 2 doses	Doxycycline 200 mg po prior to procedure Add metronidazole 500 mg q8h x 2 doses
With fetal demise (any gest age)		
Ultrasound (USIC), history-indicated cerclage (HIC), or laparoscopic-assisted abdominal cerclage		None
Physical exam-indicated cerclage (PEIC)	Consider cefazolin + indomethacin	Consider clindamycin + indomethacin
Transabdominal cerclage (TAC)	Cefazolin	Clindamycin
Cystoscopy alone		<u>Low risk</u> : no antibiotics required <u>High risk</u> : TMP/SMX 160/800 DS (+ urine culture, pre-op catheter, prosthetic material)
Cystoscopy with manipulation or upper tract instrumentation (e.g. ureteroscopy)		TMP/SMX 160/800 DS x1
Cystoscopy with open surgery	Cefazolin	Clindamycin + gentamicin
Risk of colorectal injuries	Preoperative mechanical bowel prep + neomycin/metronidazole PO x 3 doses Perioperative ceftriaxone + metronidazole	Preoperative mechanical bowel prep + neomycin/metronidazole PO x 3 doses Perioperative levofloxacin + metronidazole
PUBS/IUT/RFA/Thoracoamniotic shunt/vesicoamniotic shunt/amnioreduction/ECV/laser ablation in TTTS, FETO (fetal endoscopic balloon occlusion), myelomeningocele repair/open fetal surgery	Cefazolin	Clindamycin

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APPENDIX D. RECOMMENDED PROPHYLAXIS AGENTS BY IR PROCEDURE

	Recommended agent	Severe β -lactam allergy
Angiography, angioplasty, thrombolysis, arterial closure device placement, stent placement, superficial venous insufficiency treatment, IVC filter placement	None	N/A
Central venous access	None	None
Chemoembolization, ablation, embolization, or radioembolization where sphincter of Oddi is not intact (eg, history of biliary reconstructive surgery)	Moxifloxacin 400 mg daily x 3 days prior and 11 days post-procedure	
Embolization, ablation, radioembolization, and chemoembolization of liver (if intent to create infarction or high likelihood of infarction)	Ampicillin/sulbactam	Levofloxacin
Endograft placement	None	None
Gastrostomy tube placement	Cefazolin	Levofloxacin
Percutaneous abscess drainage, on antibiotics	Continue directed therapy for the existing infection	
Percutaneous abscess drainage, not on antibiotics	Discuss with primary service whether antibiotics should be given (if active signs of infection) or held until after cultures obtained	
Percutaneous nephrostomy tube placement or change	Cefazolin	Levofloxacin
Renal ablation, embolization	Cefazolin	Levofloxacin
Uterine Artery Embolization (UAE)	Cefazolin	Levofloxacin
TIPS creation	Cefazolin	Levofloxacin
Tube check/change (hepatic, biliary)	Cefazolin	Levofloxacin

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