NATIONAL GUIDELINES FOR ANTIMICROBIAL PROPHYLAXIS IN SURGERY

Policy/Protocol No. 1

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NATIONAL GUIDELINES FOR ANTIMICROBIAL PROPHYLAXIS IN SURGERY

National Antimicrobial Rational Use Committee

Policy No. 1
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Egyptian Drug Authority
Central Administration of Pharmaceutical Care
Drug Utilization and Pharmacy Practice Administration

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السياسة

- تحديد المضادات الحيوية المستخدمة للوقاية من عدوى المواضع الجراحية طبقا لنوع العملية الجراحية وتوضيح الجرعات المستخدمة للكبار والأطفال ووقت استخدامها قبل البدء في العملية الجراحية، وتوزعّ هذه السياسة على المؤسسات الصحية التي تحتوي على أقسام عمليات جراحية لتنفيذها طبقا لسياسات المستشفى بهدف منع حدوث عدوى المواضع الجراحية.

تعريفات

- الوقاية: الوقاية من العدوى ويمكن وصفها بأنها وقاية أولية أو وقاية ثانوية.
- الوقاية الأولية: الحماية من الإصابة بالعدوى لأول مرة (العدوى الأولية).
- الوقاية الثانوية: منع تكرار أو إعادة تنشيط عدوى موجودة مسبقًا.
- الجروح/القطوع الجراحية النظيفة: جرح جراحي لا يظهر فيه أي التهاب ولا يدخل فيه الجهاز التنفسي أو الهضمي أو الأعضاء التناسلية أو المسالك البولية.
- الجروح/القطوع الجراحية النظيفة- الملوثة: الجروح الجراحية التي يدخل فيها الجهاز التنفسي أو الهضمي أو التناسلي أو المسالك البولية تحت ظروف مواتية للإصابة بالعدوى بعد إعداد موضع الجراحة وبدون حدوث تلوث غير عادي .
- الجروح/القطوع الجراحية الملوثة: عمليات الجروح المفتوحة مع حدوث خرق بالتقنية المعقمة (على سبيل المثال، تدليك القلب المفتوح)، أو الانسكاب من الجهاز الهضمي، أو الغرغرينا الجافة.
- الجروح/القطوع الجراحية القذرة أو المصابة: تشمل الجروح الرضحية القديمة ذات الأنسجة الميتة المحتبسة وتلك التي تنطوي على عدوى إكلينيكية موجودة أو أحشاء مثقوبة. حيث أن الكائنات الحية المسببة للعدوى بعد الجراحة كانت موجودة في مجال الجراحة قبل العملية.

الإجراءات

- يقوم مدير الصيدلية بتحديد الصيادلة المسئولين عن إعداد قائمة بالمضادات الحيوية المستخدمة للوقاية من عدوى المواضع الجراحية.
- يقوم الصيادلة المذكورون بإعداد قائمة للمضادات الحيوية الموجودة بالمستشفى.
- يقوم الصيادلة المذكورون بالاجتماع مع مقدمي الخدمة الطبية بأقسام العمليات الجراحية لمعرفة أنواع العمليات الجراحية التى يتم إجراؤها بالمستشفى وتصنيف المرضى المترددين على الأقسام الجراحية.
- يقوم الصيادلة المذكورون بوضع بروتوكول يحتوى على المضادات الحيوية التي يتم استخدامها للوقاية من عدوى المواضع الجراحية في الجراحات المختلفة (ويمكن الاسترشاد بالبروتوكول المرفق الصادر من اللجنة القومية لترشيد استخدام مضادات الميكروبات بهيئة الدواء المصرية الخاص بالمضادات الحيوية للوقاية من عدوى المواضعالجراحية للكبار والأطفال) المتضمن:
  - ❖ التعريفات.
  - ❖ نوع العملية وتصنيف القطوع الجراحية.
  - ❖ تحديد المضادات الحيوية المستخدمة لكل إجراء جراحي - وبدائلها.
  - ❖ تعليمات إعطاء المضادات الحيوية للوقاية من عدوي المواضع الجراحية قبل وأثناء وبعد إجراء العمليات (التوقيت – الطريقة- الجرعة- المعدل).
  - ❖ تحديد المدة الزمنية لاستخدام المضاد الحيوي بعد العملية لبعض الجراحات.
- يقوم مدير الصيدلية والفريق المسئول بمناقشة البروتوكول في اللجان المعنية (لجنة الدواء والعلاج / لجنة المضادات الحيوية) بالمؤسسة الصحية والاعتماد .
- يقوم الفريق المسئول بالنشر و توزيع البروتوكول بالإضافة إلى قائمة مضادات الميكروبات إلى جميع أقسام العمليات الجراحية بالمستشفى.
- يقوم مدير الصيدلية/الصيدلية الرئيسية/مسئول الإمداد الدوائي بتوفير المضادات الحيوية التي تم الاتفاق عليها ووضعها بالبروتوكول.

- يقوم الطبيب المختص مع الصيدلي الإكلينيكي بتحديد المرضى المؤهلين لاستمرار المضاد الحيوى الوقائى لبعد الاجراء الجراحى لبعض الحالات طبقا للبروتوكول المعتمد و تحديد المدة الزمنية المطلوبة.
- يقوم الصيدلي الإكلينيكي بالمراجعة اليومية لحالات المرضى ومتابعة استخدام المضاد الوقائي لكل مريض .
- في حالة الانتهاء من المدة الزمنية الوقائية المحددة بعد العملية يقوم الطبيب المختص بكتابة أمر إيقاف للدواء الوقائي" وفقًا للبروتوكول المعتمد".
- يجب أن يتضمن أمر الإيقاف تاريخ بدء و إيقاف العلاج والجرعة ومدة استخدامه، وطريق الإعطاء المناسب.
- تقوم اللجان المختصصة بالمستشفى بتحديد القائم بإعطاء المضاد الحيوى الوقائي.
- يقوم الفريق المختص بتدريب وتوعيةمقدمي الخدمة الطبية بأقسام العمليات الجراحية على آليات تنفيذ البروتوكول.
- يقوم الصيدلى الإكينيكى بالتثقيف الدوائى دوريا للفريق الطبى بمعرفة التفاصيل العلاجية الخاصة بالأدوية المدرجة بالقوائم المذكورة لضمان استخدامها بالطريقة الصحيحة والآمنة.
- يقوم الفريق المختص بالتعاون مع فريق الإستخدام الرشيد للمضادات الحيوية لمتابعة مدى الإلتزام بتنفيذ البروتوكول عن طريق تجميع البيانات وتحليلها وعرض التقرير النهائى على اللجنة المختصة كل ثلاثة أشهر ومن ثم تقوم اللجنة بإتخاذ قرارات أو خطوات تصحيحية بناءا على هذا التقرير.
- تقوم اللجنة المختصة بمراجعة وتحديث البروتوكول سنويا أو عند حدوث أي تعديلات في خطوات العمل.

المسئول

- رؤساء أقسام العمليات الجراحية والفريق الطبي.
- لجنة الدواء والصيدلة.
- لجنة المضادات الحيوية.
- مدير الصيدلية.
- الصيادلة الإكلينيكيون.
- مسئول الجودة.

النماذج

- قائمة للمضادات الحيوية الموجودة بالمستشفى.
- سجل دوائي خاص بالمضادات الحيوية التى تم ذكرها في البروتوكول .
- بروتوكول المضادات الحيوية للوقاية من عدوى المواضع الجراحية (مرفق البروتوكول الخاص بهيئة الدواء المصرية للكبار والأطفال)
- نموذج صرف وإعطاء المضادات الحيوية الخاص بالعمليات.

مؤشرات التقييم

- نسبة التزام مقدمي الخدمة الطبية بأقسام العمليات الجراحية بالسياسة.
- معدلات عدوى المواضع الجراحية.
- فترة إقامة مرضى العمليات الجراحية بالمستشفى.
- معدلات الوفاة الناتجة عن عدوى المواضع الجراحية.
- معدلات استهلاك المضادات الحيوية المستخدمة للوقاية من عدوى المضادات الحيوية.

ملحوظة : تتضمن السياسات القومية لترشيد استخدام مضادات الميكروبات الصادرة عن اللجنة القومية لترشيد استخدام مضادات الميكروبات بهيئة الدواء المصرية إجراءات استرشادية تطبق وفقا لطبيعة العمل داخل كل مؤسسة/ جهة.

National Guide for Antibiotic Use in Surgical Prophylaxis

Introduction

Prophylaxis refers to the prevention of an infection and can be characterized as primary prophylaxis, secondary prophylaxis, or eradication:

- Primary prophylaxis refers to the prevention of an initial infection.
- Secondary prophylaxis refers to the prevention of recurrence or reactivation of a pre-existing infection.
- Eradication refers to the elimination of a colonized organism to prevent the development of an infection.

These guidelines focus on primary perioperative prophylaxis in surgical procedures associated with a high rate of infection (i.e., clean-contaminated or contaminated procedures) and in certain clean procedures where there are severe consequences of infection (e.g., prosthetic implants), even if infection is unlikely. While prophylactic antimicrobials are not indicated for some clean surgical procedures. The use of antimicrobial agents for dirty procedure or established infection is classified as treatment of presumed infection not prophylaxis, it is excluded from this guideline.

Recommendations are provided for adult (age above 18 years), pediatric (age 1–18 years) patients, infants (age ≥ 28 days - ≤ 1 years) and neonates (age < 28 days). While the guidelines do not address all concerns for patients with renal or hepatic dysfunction, antimicrobial prophylaxis often does not need to be modified for these patients when given as a single preoperative dose before surgical incision.

Although antimicrobial prophylaxis plays an important role in reducing the rate of surgical site infections (SSIs), other factors such as attention to basic infection-control strategies, the surgeon's experience and technique, the duration of the procedure, hospital and operating room environments, instrument sterilization issues, preoperative preparation (e.g., surgical scrub, skin antisepsis, appropriate hair removal), perioperative management (temperature and glycemic control), and the underlying medical condition of the patient may have a strong impact on SSI rates.

Goals of Surgical Prophylaxis

1. Prevention of SSI.
2. Prevention of SSI-related morbidity and mortality.
3. Reducing the duration and cost of health care.
4. Prevention of adverse consequences for the microbial flora of the patient or the hospital.

Surgical Wound Classification

The Centers for Disease Control and Prevention(CDC) identifies four surgical wound classification categories:

1. Clean: An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tracts are not entered. In addition, clean wounds are primarily closed and, if necessary, drained with closed drainage.
2. Clean-contaminated: Operative wounds in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.
3. Contaminated: Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique (for example, open cardiac massage) or gross spillage from the gastrointestinal tract, and incisions in which acute, non-purulent inflammation is encountered including necrotic tissue without evidence of purulent drainage (for example, dry gangrene) are included in this category.
4. Dirty or infected: Includes old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing post-operative infection were present in the operative field before the operation.

Staphylococcus aureus Screening

Screen for Staphylococcus aureus (MSSA and MRSA) and decolonize surgical patients of orthopedic, cardiothoracic and transplant procedures. If positive, decolonize 3 days before surgery with nasal mupirocin and chlorhexidine for 5 days in total, for both MSSA and MRSA. For patients known to be colonized with methicillin-resistant Staphylococcus aureus, it is reasonable to add a single preoperative dose of vancomycin to the recommended agent(s).

In case of patient already receiving antimicrobials and planned to undergo procedures

If the agents used therapeutically are appropriate for surgical prophylaxis, administering an extra dose within 60 minutes before surgical incision is sufficient. Otherwise, the antimicrobial prophylaxis recommended for the planned procedure should be used.

Preoperative-dose timing

The optimal time for administration of preoperative doses is within 60 minutes before 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.

Intraoperative redosing

The redosing interval should be measured from the time of administration of the preoperative dose, not from the beginning of the procedure.

For all patients, intraoperative redosing is needed if the duration of the procedure exceeds two half-lives of the drug or there is excessive blood loss during the procedure (i.e., > 1500 mL).

Redosing may also be warranted if there are factors that shorten the half-life of the antimicrobial agent (e.g., extensive burns). Redosing may not be warranted in patients in whom the half-life of the antimicrobial agent is prolonged (e.g., patients with renal insufficiency or renal failure)

Duration of prophylaxis

Recommendations for a shortened postoperative course of antimicrobials involving a single dose or continuation for less than 24 hours are provided.

Summary of Antibiotic Use for Surgical Prophylaxis in Adults and Pediatrics

Surgery	Recommended (No Penicillin Allergy)	Alternatives (Penicillin Allergy)	Notes
Cardiothoracic			
Cardiac Procedures Coronary artery bypass, cardiac device insertion procedures (e.g., pacemaker implantation), ventricular assist devices.	Cefazolin Cefuroxime	Clindamycin	- No prophylaxis needed for cardiac catheterization. - Data support a duration ranging from a single dose up to 24 hours postoperatively.
Thoracic Surgeries • Non-cardiac procedures including: lobectomy, pneumonectomy, lung resection, and thoracotomy. • Video-assisted thoracoscopic surgery.	Cefazolin Ampicillin/Sulbactam	Clindamycin	
Esophageal Surgeries	Cefazolin Amoxicillin + Gentamicin	Clindamycin	
Gastrointestinal			
Biliary Open or Laparoscopic Procedures Antibiotics should be reserved for high risk patients who fulfill one or more of the following criteria: Age > 70 years, acute cholecystitis, non-functioning gallbladder, obstructive jaundice, common duct stone, DM,pregnancy, immunosuppression.	Cefazolin Cefoxitin	Clindamycin + Gentamicin Metronidazole + Gentamicin	No need for antibiotic prophylaxis in case of elective, low-risk laparoscopic procedures.

Surgery	Recommended (No Penicillin Allergy)	Alternatives (Penicillin Allergy)	Notes
Cholangiopancreatography (ERCP) In case of obstructions: The Sanford Guide to Antimicrobial Therapy.	Piperacillin/tazobactam	Ciprofloxacin	No need for antibiotic prophylaxis if there is no obstruction.
Percutaneous endoscopic gastrostomy/ jejunostomy (PEG/PEJ)	Cefazolin		
Endoscopic ultrasound guided fine needle aspiration (EUS-FNA) of mediastinal cysts, pancreatic or peripancreatic cysts.	Ciprofloxacin		Surgical antibiotic prophylaxis is not needed for EUS-FNA of solid lesions of the GI tract.
Procedures involving entry into lumen of gastrointestinal tract (bariatric, pancreaticoduodenectomy) **Procedures without entry into gastrointestinal tract** (anti-reflux, highly selective vagotomy) for high-risk Patients (morbid obesity, decreased motility or gastric acid, bleeding, cancer). **Surgeries of the Small Intestine (Non-Obstructed)**	Cefazolin	Clindamycin + Gentamicin	**Splenectomy:** Amoxicillin 250 mg orally once daily (*or Erythromycin 500 mg orally twice daily in penicillin allergic patients*) is essential in the first 2 years after the operation and vaccinations are recommended**.**
Appendectomy (Uncomplicated Appendicitis) **Surgeries of the Small Intestine (Obstructed)** **Colorectal Surgeries**	Cefazolin + Metronidazole	Metronidazole + Gentamicin	**Complicated appendicitis** is treated as a complicated intra-abdominal infection: (3 to 5 days of IV antibiotics is recommended for

Surgery	Recommended (No Penicillin Allergy)	Alternatives (Penicillin Allergy)	Notes
Oral Prophylaxis prior to colorectal surgeries: For most patients undergoing colorectal surgeries, a mechanical bowel preparation combined with oral neomycin sulfate 1 g at 1:00 pm, 2:00 pm and 11:00 pm on the day preceding 8:00 am surgery plus oral erythromycin base or oral metronidazole 1 g should be given in addition to IV prophylaxis.	Cefoxitin		perforated appendicitis after appendectomy).
Hernia Repair (Hernioplasty and Herniorrhaphy)	Cefazolin	Clindamycin	
Transplantation			
Liver Transplantation	Piperacillin/Tazobactam	Clindamycin + Gentamicin	The prophylactic regimen may need to be modified to provide coverage against any potential pathogens, including vancomycin-resistant enterococci, isolated from the recipient before transplantation.
Pancreas and Pancreas–Kidney Transplantation	Cefazolin +/- Fluconazole (for patients at high risk of fungal infection e.g., those with enteric drainage of the pancreas).	Clindamycin + Gentamicin	

Surgery	Recommended (No Penicillin Allergy)	Alternatives (Penicillin Allergy)	Notes
Endo-urologic Surgeries			
• **Percutaneous nephrolithotomy (PCNL).** • **Ureteroscopy.** • **Transurethral resection of the bladder** in patients who have a high risk of suffering post-operative sepsis. • **Transurethral resection of the prostate**.	Cefoxitin OR Cefotaxime OR Ampicillin/Sulbactam	Gentamicin + Clindamycin (For PCNL)	Do not use antibiotic prophylaxis to reduce the incidence rates of symptomatic urinary infections following: urodynamics, cystoscopy.
• **Extracorporeal shockwave lithotripsy (ESWL)** in patients at high risk of infectious complications (i.e. patients with large stone burden, associated pyuria, history of pyelonephritis, and adjunctive operative procedure including stent, nephrostomy insertion, PCNL or ureteroscopy).	Cefazolin OR Cefuroxime	Gentamicin OR Clindamycin	Pre-procedural antibiotics do not significantly reduce the risk of UTI and fever in patients undergoing ESWL without high risk of infectious complications.

Surgery	Recommended (No Penicillin Allergy)	Alternatives (Penicillin Allergy)	Notes
Urologic Surgeries			
Lower tract instrumentation with risk factors for infection, includes trans rectal prostate biopsy or clean-contaminated procedure.	Cefazolin (+ Metronidazole if clean contaminated).	Gentamicin +/- Clindamycin (Clindamycin must be added in clean-contaminated procedures)	- Patients with preoperative bacteriuria or UTI should be treated before the procedure, when possible, to reduce the risk of postoperative infection. - Continuing antimicrobial prophylaxis until urinary catheters have been removed is not recommended.
Clean surgeries without entry into urinary tract.	Cefazolin (the addition of a single dose of an aminoglycoside may be recommended for placement of prosthetic material e.g., penile prosthesis).	Clindamycin	
Clean surgeries with entry into urinary tract, involving implanted prosthesis.	Cefazolin +/- Gentamicin (the addition of a single dose of an aminoglycoside may be recommended for placement of prosthetic material e.g., penile prosthesis).	Clindamycin +/- Gentamicin If procedure involving implanted prosthesis. Gentamicin +/- Clindamycin If Clean with entry into urinary tract.	

Gynecological Surgeries			
Cesarean Delivery **Hysterectomy (Vaginal or Abdominal)** using an open or laparoscopic approach.	Cefazolin	Clindamycin + Gentamicin	Antimicrobial Prophylaxis is not recommended in (Diagnostic laparoscopy, intrauterine device (IUD) insertion, Endometrial biopsy)
Head and Neck and Neurosurgeries			
Clean-contaminated cancer surgery, and Other clean-contaminated procedures with the exception of tonsillectomy and functional endoscopic sinus procedures.	Cefazolin + Metronidazole Cefuroxime	Clindamycin	
Clean with placement of prosthesis (except for tympanostomy tubes).	Cefazolin Cefuroxime	Clindamycin	No need for antibiotic prophylaxis in case of clean procedures.
Elective craniotomy and cerebrospinal fluid-shunting procedures. **Implantation of Intrathecal Pumps.**	Cefazolin	Clindamycin	**Neurosurgery:** Either a single-dose prophylaxis regimens or regimens with a duration of 24–48 hours postoperatively.

Orthopedic Surgeries			
Spinal procedures with and without instrumentation. **Hip Fracture Repair** Implantation of internal fixation devices (e.g., nails, screws, plates, wires). **Total Joint Replacement** **Orthopedic Surgeries-open fracture** Type I fracture: Open fracture with clean wound <1 cm long Type II fracture: Open fracture with laceration >1 cm long without extensive soft tissue damage	Cefazolin	Clindamycin	- Not need antibiotic prophylaxis if clean operations involving hand, knee, or foot and not involving implantation of foreign materials. - **Open fracture types I or II:** Use antibiotics for 24 hours.
Orthopedic Surgeries-open fracture Type III fracture: Open segmental fracture, open fracture with extensive soft tissue damage, or traumatic amputation No gross contamination	Ceftriaxone (add metronidazole **if** contamination with *soil* or *fecal* material) Piperacillin /tazobactam (**if** contamination with *standing water*)	(Clindamycin + levofloxacin **if** not contaminated) (Levofloxacin + metronidazole **if any** contamination is present)	**Open fracture type III:** *If no gross contamination,* use antibiotics for 48 hours or 24 hours after wound closure, whichever is shorter. *If contaminated,* use antibiotics for 48 hours after wound closure

Open surgery for closed fracture	Ceftriaxone		
Vascular Surgeries	Cefazolin	Clindamycin	Prophylaxis is not routinely indicated for brachiocephalic procedures. Although there are no data in support, patients undergoing brachiocephalic procedures involving vascular prostheses or patch implantation (e.g., carotid endarterectomy) may benefit from prophylaxis.
Plastic Surgeries	Cefazolin	Clindamycin + Gentamicin Clindamycin only (If clean with risk factors or clean-contaminated)	

Ophthalmic Surgeries	Topical neomycin + polymyxin B + gramicidin or fourth-generation topical fluoroquinolones (gatifloxacin or moxifloxacin) given as 1 drop every 5 - 15 min for 5 doses. Addition of cefazolin 100 mg by subconjunctival injection or intracameral cefazolin 1–2.5 mg or cefuroxime 1 mg at the end of procedure is optional.		

Surgical prophylaxis antibiotics summary in the most common surgeries in neonates

Surgery	Recommended (no beta-lactam allergy)	Alternatives (beta-lactam allergy)	Notes
Biliary Tract/Choledochal Cyst **Congenital Diaphragmatic Hernia** **Duodenal Atresia** **Gastrostomy Tube** **Nissen Fundoplication** **Liver Biopsy** **Head and Neck Surgeries**	One dose of Cefazolin		The following types of surgeries do not require preoperative antibiotic prophylaxis: • Central Venous Catheter (CVC/Broviac/Port). • Bronchoscopy. • Circumcision. • Inguinal hernia. • Neonatal testicular torsion. • Ovarian cyst. • Gastroschisis/Omphalocele.

Surgery	Recommended (no beta-lactam allergy)	Alternatives (beta-lactam allergy)	Notes
Jejunal/Ileal Atresia **Esophageal Atresia with or without Tracheoesophageal Fistula (EA/TEF)** **Hirschprung Disease Pull-through** **Ostomy closure** **Posterior sagittal Anorectoplasty (PSARP)**	Cefazolin/Metronidazole OR Piperacillin/Tazobactam OR Cefoxitin For 24-48 hours		
Cardiac Surgeries through Lateral Thoracotomy or Median Sternotomy (Closed or Open Sternum)	Cefazolin Use vancomycin if known colonization/ infection with MRSA		

Recommended Doses and Re-Dosing Intervals for Commonly Used Antimicrobials for Surgical Prophylaxis

Please note: Many procedures do not require post-operative prophylaxis with antimicrobials. If desired, limit the duration to 24 hours or less after closure.

Antimicrobial Name	Adult Dose	Pediatric Dose	Re-dosing Interval (From Initiation of Preoperative Dose)	Preoperative dose time	Dosage regimen If continued After Surgery
Ampicillin–sulbactam	3 g (ampicillin 2 g/ sulbactam 1 g)	50 mg/kg of the ampicillin component	2 hours	60 minutes before incision	3 grams every 6 h up to 3 doses.
Cefazolin	2 g, 3 g for pts weighing ≥120 kg	30 mg/kg (the same for neonates)	4 hours	60 minutes before incision	• Adults:2 grams /8h up to 2 doses • Neonates & Paediatrics: 30 mg/kg/dose • Age ≤7 days old: every 12 hours. • Age >7 days old: every 8 hours. • If cardiac surgery closed sternum discontinue antibiotics 48 hours after surgery end time. • If cardiac surgery open sternum, discontinue antibiotics 24 hours after sternal closure.
Cefuroxime	1.5 g	50 mg/kg	4 hours	60 minutes before incision	1.5 grams /8h up to 2 doses

Cefoxitin	2 g	40 mg/kg	2 hours	60 minutes before incision	2 grams /6h up to 3 doses
Cefotaxime	1 gram, 2 g for patients weighing ≥120 kg	50 mg/kg	3 hours	60 minutes before incision	
Ceftriaxone	2 gram				- 2 grams every 24 hours - Type III Fractures (*No gross contamination*): use antibiotics for 48 hours or 24 hours after wound closure, whichever is shorter - Type III fracture (*if contaminated*): use antibiotics for 48 hours after wound closure

Clindamycin	900 mg	10 mg/kg	6 hours	60 minutes before incision	- 900 mg q8h up to 2 doses - Type III Fractures (*No gross contamination*): use antibiotics for 48 hours or 24 hours after wound closure, whichever is shorter - Type III fracture (*if contaminated*): use antibiotics for 48 hours after wound closure
Ciprofloxacin	400 mg	10 mg/kg	N/A (Not Applicable)	120 minutes before incision	- 400 mg q12h up to 1 dose - EUS-FNA drainage of cystic lesions , needs Cipro up to 3 days after the procedure
Fluconazole	400 mg	6 mg/kg		60 minutes before incision.	

Gentamicin*	5 mg/kg based on dosing weight (single dose) If on dialysis or Cr.Cl. <20 ml/min, use 2mg/kg (Hopkins 2016)	2.5 mg/kg based on dosing weight	Not applicable (NA) but for unusually long procedures, re-dosing may be needed.		Gentamicin for surgical antibiotic prophylaxis should be limited to a single dose given preoperatively
Levofloxacin	500 mg			120 minutes before incision	- 500mg every 24 hours - Type III Fractures (*No gross contamination*): use antibiotics for 48 hours or 24 hours after wound closure, whichever is shorter - Type III fracture (*if contaminated*): use antibiotics for 48 hours after wound closure
Metronidazole	500 mg	15 mg/kg (Neonates weighing < 1200 g should receive a single 7.5 mg/kg dose)	6-8 hours	60 minutes before incision	- 500 mg q8h up to 2 doses - Type III fracture (*if contamination*) use antibiotics for 48 hours after wound closure.

Piperacillin–tazobactam	3.375 g	Infants 2–9 mo: 80 mg/ kg of the piperacillin component Children >9 mo and ≤40 kg: 100 mg/kg of the piperacillin component	2 hours	60 minutes before incision	- 3.375g q8h extended infusion up to 2 doses - Type III fracture (*if contamination with standing water*) use antibiotics for 48 hours after wound closure.
Vancomycin	15 mg/kg	15 mg/kg (the same for neonates)	NA but for unusually long procedures, re-dosing may be needed.	120 minutes before incision	Neonates: 15 mg/kg/dose ≤7 days old: q 12hours >7 days old: q 8 hours • If cardiac surgery closed sternum discontinue antibiotics 48 hours after surgery end time. • If cardiac surgery open sternum Discontinue antibiotics 24 hours after sternal closure

*Gentamicin dosing is based on the patient's actual body weight. If the patient's actual weight is more than 20% above ideal body weight (IBW), the dosing weight (DW) can be determined as follows: DW = IBW + 0.4(actual weight – IBW).

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