Antibiotic Prophylaxis in Surgery

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Prevention of surgical site infections (SSI)

- Surgical site infections account for approximately 15 % of nosocomial infection *
- Lead to prolonged hospital stay and increased coasts

*Mongolia: 3,9 % (5,4 %)
(B-E Ider et al BMC Proceedings 2011, Volume 5 Suppl 6)
(WHO Report on the Burden of Endemic Health Care-Associated Infection Worldwide)

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Risk factors of surgical site infections (1):

-**Nutritional status** (malnutrition increases the risk of SSI)

-**Diabetes** (significant relationship between increased glucose levels peri-operative and risk of SSI)

-**Nicotine**

-**Obesity** (BMI > 40)

-**Co-morbidity** (e.g. liver cirrhosis)

-**Co-existing skin infections**

-**Colonisation with micro-organisms (MO)** (e.g. nasal carriage of *S. aureus)*

-**Length of preoperative stay** (may indicate severe illness)

Modified from
Ific – Basic concepts of Infection Control
Second Edition – revised 2011

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Risk factors of surgical site infections (2):

-**Preoperative skin antisepsis** (Alcohols, Chlorhexidine)

-**Surgical scrub** (surgical team)

-**Preoperative shaving** (clipping the hair immediately before the operation reduces the risk)

-**Duration of operation**

-**Contamination of the operative site** (Antimicrobial prophylaxis)

-**Foreign materials** (sutures, drains, implants etc)

-**Hypothermia** (due to vasoconstriction)

-**Surgical techniques** (good surgical technique reduces the risk of SSI, the risk is strongly associated with the experience of the surgical team)

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Risk factors of surgical site infections (3):

Operation room ventilation (preventing of SSI in implant surgery; number of MO in the operation theatre is directly proportional to the number of people and their movement – so movement must be controlled)

-**Inadequate sterilisation of instruments**

-**Contamination from the surgical team** (barrier clothing and sterile gloves)

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Antimicrobial prophylaxis

-Antimicrobial prophylaxis reduces SSI.

-A single dose is usually sufficient.

-No more than 30 min before incision.

-Prophylactic agent should be save.

-It should cover probable intra-operative contaminants, according to the local resistance situation.

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Antimicrobial prophylaxis

Means of antibiotic prophylaxis depend on the type of operation,
and may be broadened by risk-factors

(e.g.. prolonged operation time, co-morbidities, etc.)

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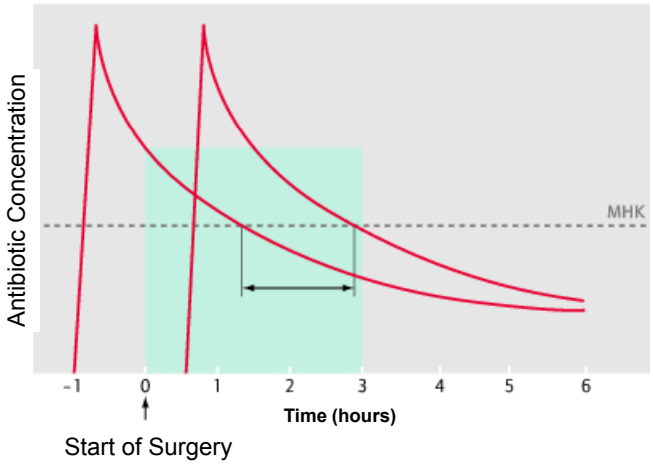

Effective time for antibiotic prophylaxis

Perioperative Antibiotika-Prophylaxe;
Empfehlungen einer Expertenkommission der Paul-Ehrlich-Gesellschaft für Chemotherapie e. V.
Chemother J 2010;19:70–84.

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Antimicrobial prophylaxis

- Antibiotics should be administered as close to incision time as possible
- Antibiotics after wound closure do not make any sense

Classen DC, Evans RS, Pestotnik SL, Horn SD, et al. The timing of prophylactic administration of antibiotics and the risk of surgical-wound infection. NEJM 1992;326:281–6.
Bates T, Siller G, Crathern BC, Bradley SP, et al. Timing of prophylactic antibiotics in abdominal surgery: trial of a preoperative versus an intra-operative first dose. Br J Surg 1989;76:52–6.
Weber WP, Marti WR, Zwahlen M, Misteli H, et al. The timing of surgical antimicrobial prophylaxis. Ann Surg 2008;247:918–26.

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Antimicrobial prophylaxis

- A single dose provides effective prophylaxis in operation < 2 h
- In longer operation time the second dose depends on the half life of the antibiotics.

Hellbusch LC, Helzer-Julin M, Doran SE, Leibrock LG, et al.
Single-dose vs. multiple-dose antibiotic prophylaxis in instrumented lumbar fusion – a prospective study.
Surg Neurol 2008;70:622–7.

Perioperative Antibiotika-Prophylaxe;
Empfehlungen einer Expertenkommission der Paul-Ehrlich-Gesellschaft für Chemotherapie e. V.
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Frequently used antibiotics

antibiotics	daily dosage	half life
Ampicilline	5 g	60 – 120 min
Ampicilline/ Sulbactam	2 g/1 g	60 min
Ampicilline/ Clavulanacid	2 g/0,2 g	60 min
Cefotaxime	2 g	2 – 12 h
Cefuroxim	1,5 g	120 – 240 min
Ceftriaxone	2 g	> 8 h
Metronidazole	2 g	8.5 h

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Surgery of the esophagus or pancreas, liverresection

Expected spectrum of pathogens:

Anaerobians, Enterobacteriaceae, Enterokokki, Staphylokki

Recommended antibiotics:

2nd generation Cephalosporins (e. g. Cefuroxime)

Optionally plus Metronidazole

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Gastric surgery

Expected spectrum of pathogens:

Anaerobians, Enterobacteriaceae, Staphylokki

Recommended antibiotics:

Aminopenicillines (e. g. Amoxicillin, Ampicillin)

1st or 2nd generation Cephalosporins (e. g. Cefazoline, Cefuroxime)

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Surgery of the biliary tract

Expected spectrum of pathogens:

E. coli, Anaerobians, Enterobacteriaceae, Enterokokki, (Staphylokki)

(Pseudomonas after ERCP)

Recommended antibiotics:

In case of acute cholecystitis or emergency procedure:

Aminopenicillines (e. g. Amoxicilline, Ampicilline),

1st or 2nd generation Cephalosporins (e. g. Cefazoline, Cefuroxime)

No antibiotics may be needed in cases of elective laparascopic surgery

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Surgery of the colon

Expected spectrum of pathogens:

Bacterioides fragilis, E. coli, Anaerobians, Enterobacteriaceae, Enterokokki

Recommended antibiotics:

Aminopenicillines (e. g. Amoxicilline, Ampicilline)

or

1st/2nd generation Cephalosporines (e g Cefazoline, Cefuroxime) **plus**

Metronidazole

Use of carbapenems may lead to more C. diff. infections

and risk of development of carbapenemases

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Appendectomy
No routine prophylaxis!

Expected spectrum of pathogens:
E. coli, Bacteroides fragilis,
Anaerobians, Enterobacteriaceae, Enterokokki

Recommended antibiotics:
Only in case of acute appendicitis or emergency operation:

Aminopenicillines (e. g. Amoxicilline, Ampicilline)

or

1st/2nd generation Cephalosporins (e. g. Cefazoline, Cefuroxime)
plus
Metronidazole

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Hernia surgery

No routine antibiotic prophylaxis!

Antibiotic prophylaxis is only recommended in case of risk factors

e. g. implantation of vicryl-mesh

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Neurosurgery

Expected spectrum of pathogens:

Headmost: Staphylokki

contingently Streptokokki and Propionibacteria (shunt)

Recommended antibiotics:

Aminopenicillines

or

1st generation Cephalosporines (e. g. Cefazoline)

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Obstetrics and Gynecologie

Prophylaxis of urinary tract infections

(hysterectomy, surgical abortion, caesarean section)

Expected spectrum of pathogens:

Anaerobians, Enterobacteriaceae, Enterokokki, Staphylokki

STD (Treponema pallidum, Chlamydia, Neisseria gonorrhoea)

Recommended antibiotics:

Aminopenicilline (e. g. Amoxicilline, Ampicilline)

1st/2nd generation Cephalosporines (e. g. Cefazoline, Cefuroxime)

Penicilline when syphilis is suspected

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Surgery of the urinary tract

Goals:
1. avoiding UTI
2. avoiding SSI

Expected spectrum of pathogens:
Anaerobians, Enterobacteriaceae, Enterokokki, Staphylokki,
STD
Related to type of procedure

Recommended antibiotics:
Aminopenicillines (e. g. Amoxicilline, Ampicilline)
1st/2nd generation Cephalosporins (e. g. Cefazoline, Cefuroxime)
Fluoro-chinolones with good penetration in urine (Ofloxacine, Ciprofloxacine)

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Cardiac surgery

Expected spectrum of pathogens:

Headmost: Staphylokki

Recommended antibiotics:

1st/2nd generation Cephalosporines (e. g. Cefazoline, Cefuroxime)

Activity against Staphylokokki not sufficient in 3rd generation Cephalosporins (better activity in gram-negatives)

Consider 24 hour prophylaxis for extended procedures!

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Orthopedics: Bone Surgery

Prosthesis implantation, open bone fractures

Expected spectrum of pathogens:

Staphylokki (Anaerobians in risk patients)

Recommended antibiotics:

Aminopenicilline (e g Amoxicilline, Ampicilline)

1./2. Generation Cephalosporins (e g Cefazoline, Cefuroxime)

Clindamycine

No routine antibiotic prophylaxis for arthroscopy

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Otorhinolaryngology - Surgery

Expected spectrum of pathogens:

Staphylokki, Streptokokki, oral anaerobians

Recommended antibiotics:

Aminopenicilline (e. g. Amoxicilline, Ampicilline)

1st/2nd generation Cephalosporins (e. g. Cefazoline, Cefuroxime)

(Clindamycine)

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Conclusions:

- Antibiotic prophylaxis is useful during operation:
  Choose the right time!
- Continuing of antibiotic prophylaxis means antibiotic therapy:
  Only special indications!
- If you know the bacteria you can choose the correct drug!

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hdm3 Clinda? Ist das nicht eher bizarr bis antik?
Held Michael; 12.04.23