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ANTIMICROBIAL STEWARDSHIP IN THE PERIOPERATIVE PERIOD

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DISCLOSURE

In relation to this presentation, I declare there are no real or perceived conflicts of interest.

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LEARNING OBJECTIVES

- Describe how antimicrobial stewardship principles are applied in the perioperative setting
- Explain the rationale for and appropriate use of antibiotic prophylaxis in the perioperative setting
- Summarise the roles of pharmacists in discharge planning to facilitate continuity of medication administration and adherence

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PHARMACIST COMPETENCY STANDARDS

Pharmacist competency standards* addressed include:
- 3.1.2
- 3.2.3

*National competency standards framework for pharmacists in Australia, 2016

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ANTIMICROBIAL USE IN THE PERI-OPERATIVE SETTING

- Prevention of surgical site infections (SSIs)
  - 2-13% of procedures in Australia[1-3]
  - ~50% considered preventable[4,5]
  - $268 million per annum in Australia[2]
- Most common antibiotic indication in Australian hospitals (11-15%)[6]
- Prescribed inappropriately (43.3%)[6]
- Evidence supports single-dose Surgical Antimicrobial Prophylaxis (SAP) efficacy[7]

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ANTIMICROBIAL USE IN THE PERI-OPERATIVE SETTING

1. Existing antimicrobials
2. Pre-Operative
3. Intra-Operative
4. Post-Operative
   - prophylaxis
   - treatment of infection related to the procedure

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ANTIMICROBIAL APPROPRIATENESS

Why do we care?

- Surgical site infections – direct patient harm
- Prolonged length of stay – cost to patient and healthcare
- Unnecessary exposure (e.g. prolonged prophylaxis)
  - *Clostridioides difficile* infection
  - toxicities
  - side effects
- Community-level risks i.e., antimicrobial resistance (AMR)

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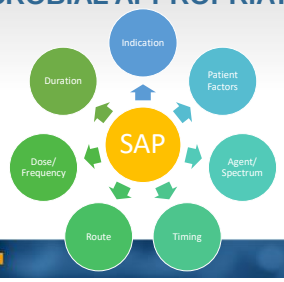
ANTIMICROBIAL APPROPRIATENESS



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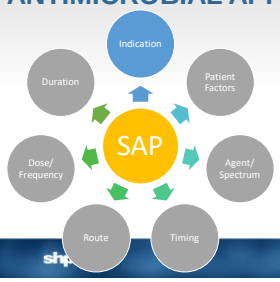
ANTIMICROBIAL APPROPRIATENESS



- Contaminated surgery
- Clean-contaminated surgery
- Clean surgery***
  - significant risk of postop infection
  - serious consequences from postop infections

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CDC CLASSIFICATION OF SURGICAL PROCEDURES ACCORDING TO INFECTION RISK [8-9]

Table 1

Classification of surgical procedures according to infection risk [6]

Type of surgery	Definition	Examples	Indication for surgical antibiotic prophylaxis
Clean surgery	Healthy skin incised Mucosa of respiratory, alimentary, genitourinary tract and oropharyngeal cavity not traversed	Herniorrhaphy, mastectomy, cosmetic surgery	Not recommended
	Insertion of prosthesis or artificial device	Hip replacement, heart valve	Recommended
Clean-contaminated	Respiratory, alimentary or genitourinary tract is penetrated under controlled conditions without unusual contamination	Laryngectomy, uncomplicated appendicectomy, cholecystectomy, transurethral resection of prostate gland	Recommended
Contaminated	Macroscopic soiling of operative field	Large bowel resection, biliary or genitourinary tract surgery with infected bile or urine	Strongly recommended

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ANTIMICROBIAL APPROPRIATENESS

Patient Factors that impact on prescribing [10]	
Pre-existing infection	Allergy status
Known colonisation with a resistant organism	Comorbidities
Recent antimicrobial use	Prostheses
Prolonged hospitalisation	Renal function
Immunosuppression	Weight

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ANTIMICROBIAL APPROPRIATENESS

- Covers organism(s) most likely to cause postop infection[11]
- **Cefazolin** most common
- **Vancomycin/Teicoplanin** for MRSA
- **Metronidazole** for anaerobic cover

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ANTIMICROBIAL APPROPRIATENESS

- **MUST** be administered before surgical incision[11,12]
- Short acting Abx = <60mins
- Long acting Abx = <120mins
- Insufficient evidence for 0-15 mins pre incision

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ANTIMICROBIAL APPROPRIATENESS

- IV- most common
- IM- limited use

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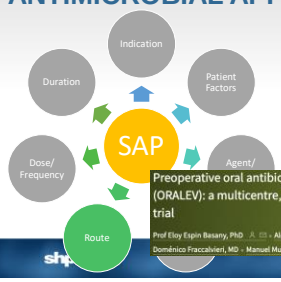
ANTIMICROBIAL APPROPRIATENESS



- IV- most common
- IM- limited use
- Oral
  - colon surgery
    ORALEV[13]
    SSI rate 11% vs 5%
    p=0.013

Preoperative oral antibiotics and surgical-site infections in colon surgery (ORALEV): a multicentre, single-blind, pragmatic, randomised controlled trial

Prof Eloy Espin Basany, PhD · Alejandro Solís-Peña, MD · Gianluca Pellino, MD · Esther Kreisler, MD · Doménico Fraccalvieri, MD · Manuel Muinelo-Lorenzo, MD · et al. Show all authors

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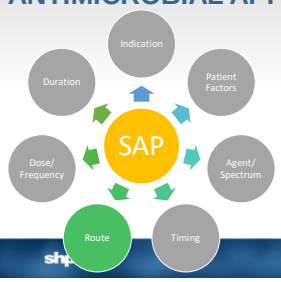
ANTIMICROBIAL APPROPRIATENESS



- IV- most common
- IM- limited use
- Oral
  - colon surgery ✓
- Topical
  - ophthalmic and burns ✓
  - intraop powder ?
  - wounds ✗

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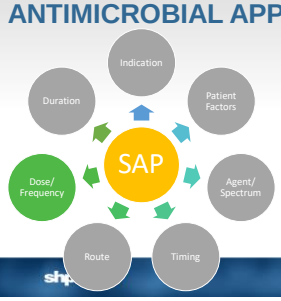
ANTIMICROBIAL APPROPRIATENESS



- ***Single dose preferred***[11]
- ***Intra-op redosing***[11]
  - significant delay to surgical incision
  - short-acting Abx
    > 2 drug half-lives elapsed (e.g., 4 hours for cefazolin)
  - excessive blood loss (e.g., > 1.5L adults)

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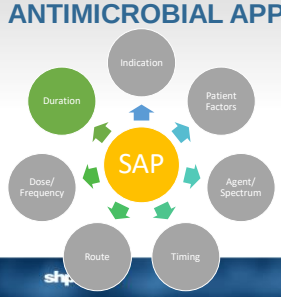
ANTIMICROBIAL APPROPRIATENESS



- ***Single dose preferred***[11]
- Some exceptions….
- Total prophylaxis duration ≥ than 24 hours.

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ANTIMICROBIAL APPROPRIATENESS

- *Single dose preferred*[11]
- Some exceptions….
- Total prophylaxis duration ≥ than 24 hours.

- breast reconstruction/ augmentation
- cardiac
- laryngectomy
- neck dissection/debulking/ reconstruction
- orthognathic
- total knee arthroplasty

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CASE STUDY #1 MR NM

Gender	Male
Age	60
Weight	85kg
eGFR	>90
Surgical Procedure	abdominal aortic aneurysm repair
Procedure Duration	6 hours
Procedure start time	10am

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CASE STUDY #1 QUESTION 1

1. What antimicrobial, dose and route would you recommend for pre-operative SAP

A. Cefazolin 3g IV
B. Flucloxacllin 2g IV
C. Cefazolin 2g IV
D. Vancomycin 1g PO

*ANSWER =C.
3g can be considered on obese patients, limited evidence here. Flucloxacillin is considered too narrow spectrum.
Vancomycin only for MRSA or in penicillin allergy (in combo with gentamicin). Should be IV not oral vancomycin

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CASE STUDY #1 QUESTION 2

2. If the surgery started at 10am, when would you need to re-dose Cefazolin intra-operatively? (2x half lives of the drug).

A. 2 hours
B. 3 hours
C. 4 hours
D. 6 hours (straight after the surgery)

*ANSWER = c. 4 hours. Cefazolin half life I 1.2-2.2 hours. So 2x half life is 4 hours.

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CASE STUDY #2 MS CE

Gender	Female
Age	31
Weight	65kg
eGFR	>90
Surgical Procedure	Total Knee Arthroplasty
Procedure Duration	6 hours
Procedure start time	12pm

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CASE STUDY #2 QUESTION

1. What is the maximum number of antibiotic doses recommended (inclusive of pre-, intra- and post-operative)

a. 2
b. 4
c. 1
d. 5

*ANSWER= B.

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CASE STUDY #3

Gender	Male
Age	46
Weight	70kg
eGFR	>90
Surgical Procedure	Appendectomy
Procedure Duration	3 hours
Procedure start time	12pm

- Mr DE presented with severe CAP and appendicitis
- Current Abx
  i. metronidazole IV 500mg BD (@0800 and 2000)
  ii. ceftriaxone IV 2g d (@1000)
  iii. azithromycin 500mg d (@1000)

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CASE STUDY #3 QUESTION

1. How many antibiotics need to be give pre-operatively?

a. 3- metronidazole, ceftriaxone and azithromycin
b. 1- metronidazole
c. 2- metronidazole and ceftriaxone
d. None

*ANSWER: D. None

Metronidazole half life 6-8 hours. Redosing interval is 12 hours. Ceftriaxone half life is 5-10 hours and no redosing interval required. 12 or 24 hourly dose.
Azithromycin indicated for atypical CAP cover, not SAP

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PHARMACIST ROLE

OPTIMISING SAP PRESCRIBING[14]	
Barriers	**Enablers**
Surgeon preference > guidelines	Meaningful local data linked to outcomes
SAP low priority for surgical team	Benchmarking data
Intra-specialty surgical hierarchy	Support and education to ALL prescribers
Cross-specialty prescriber etiquette	Partnered/ collaborative SAP prescribing model
Poor Documentation	Adapt Time-Out and Enhanced Recovery After Surgery (ERAS) pathways
Fear of infection, litigation, career setbacks	Multi-disciplinary surgical AMS teams

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PHARMACIST ROLE

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Unknown
- impact of electronic medical records
? a new opportunity

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FINAL THOUGHTS

- Antimicrobial use across the peri-operative pathway can be complex
- **All pharmacists** contribute to AMS as part of their daily clinical review
- Peri-operative and surgical ward pharmacists;
  - support appropriate decision-making, documentation and partnered medication charting
  - contribute to data audit and feedback

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THANK YOU

NCAS National Centre for Antimicrobial Stewardship

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SURGICAL NAPS National Antimicrobial Prescribing Survey

AlfredHealth

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