Antimicrobial prophylaxis in the surgical patient

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Introduction

- Significant cause of morbidity
- Important part of perioperative care
- Many choices available
Why does it happen?

- Bacteria introduced into sterile environment
- Immunosuppression
- Risk factors
Where

- Surgical site
- Sepsis
- Organ specific
  - Pneumonia
  - UTI
  - Mesh/foreign body
  - Endocarditis
Non-microbial strategies – for local wound infections

- Maintain normothermia
  - Study of regular vs intensive perioperative temp monitor, colon resection, 200 pt, 19% vs 6%

- Maintain euglycemia
  - ICU study with intensive insulin, major stuff

- Perioperative hyperoxygenation
  - 30% vs 80% FiO2 perioperative, 11% vs 5%
Benefits

- Reduction of infection
Risks

- Allergy
- Toxic effects
- Adverse interactions
- Selection pressures to microorganisms
- Cost
Principles

- Directed vs most likely organism
- should use agents shown to work
- procedure should ...
  - carry a significant risk of infection or
  - cause significant bacterial contamination
Principles

- Antibiotic should achieve MIC of the suspected pathogen at the wound site at the time of incision.
- Shortest possible course should be given.
  - Consider Vd and half life.
Principles cont’d

- Do not use newer broad spectrum agent
  - save your guns
  - not appropriate for some flora
  - expensive
Expected infection rates

- **Clean - 2%**
  - R/GI/GU not entered, no inflam; no tech break

- **Clean-contaminated - 10%**
  - R/GI/GU entered but no major spill; minor tech break – i.e. punctured glove, dirty staple line cleaned
  - **Prophylaxis decreases rates to 1.8 %**
Expected infection cont’d

**Contaminated - 18%**
- gross spill; fresh trauma; major break; entry into infected R/GI/GU
- **Prophylaxis decreases rates to 10%**

**Dirty-Infected - 42%**
- old trauma; clinical infection; perforated viscus – not for duodenum/gastric, though.
- Some people do not distinguish between dirty and contaminated.
- other cases that follow in the same OR should not be vasc/ortho/clean
Risk Factors - patient

- age
- Nutrition
- DM
- Smoking
- Remote/current infections/foley > 3 days
- altered immune system
- preoperative stay/illness/severity
Risk factors cont’d

- Duration of scrub
- Skin antisepsis
- Preop shaving/skin prep
- Surgical attire/draping
- Surgical technique
- OR duration
- Prophylaxis
Risk factors cont’d

- Ventilation
- Drains
- Wound type
Antisepsis

- Shaving preop only
- Avoid rigorous scrubbing
- Alcohols (iso, ethanol) have the best kill immediately
  - Less sustained kill, inactivated by bio fluids, risk of combustion +++
- Iodine based not as effective as alcohols
  - Less sustained kill, inactivated by bio fluids ++
Antisepsis

- Chlohexedine excellent for immediate and sustained kill (up to 6 h post)
  - Choice in ICU setting
- Combinations have been designed for scrubs in OR
When to give antibiotics?

- **Preoperatively:**
  - Timing of dose (not too soon, not too late)
  - 1 to ½ h before cut

- **Intraoperatively**
  - Blood loss (>1500 cc – repeat dose for cef)
How long to give?

Subsequent to OR:

- Little if any data to support
- No more then 24 hours
Special considerations

PCN allergy
- If no hives/wheezing/anaph - ceph ok
- Avoid ceph if under GA unless tried before when awake
  - A rare case of anaphylaxis would be difficult to distinguish from other perioperative trouble when under GA

Alternatives - clinda, may add fluroquinolon/aminoglyc
- Consider preop testing- good Ortho study...
- Vancomycin - gold (expensive) standard

Morbid obesity
- Increase dose
- Give at opening and closing
- Blood concentration of drug tends to run lower
Cardiac

- cefazolin recommended
- mupirocin intranasal
  - Showed to decrease sternal wound infection
- consider Vanco for high risk MRSA
  - RCT did not show much benefit
GI

**Recommended**
- Esophageal procedures (rigid scope/dilatations, not for flex/OGD)
- Risk of obstruction/reduced gastric acidity/GI bleed
- Cancer?
- Obesity
- Billiary/ERCP
- Colorectal resection
  - Consider enema/washout
  - ?role for neomycin/erythromycin debatable, not used here

**not recommended for ROUTINE lap chole and herniorrhaphy**
- Some studies do, however, site lower incidence of infections with the use of one dose of ampicillin when using mesh
GI continued

- Upper GI – ancef/cephazolin
- Lower GI – anced/flagyl equivalent to cefotetan
ENT

- ampicillin-sulbactam
- clinda/gent
- not for endoscopic sinus surgery
Ortho

- no for arthroscopy
- yes for prosthetics
  - Especially with long standing foleys (> 3 days)
  - concept of “consequential antibiotic use” – if a complication with prosthesis does arise, then the cost of dealing with it WILL exceed the potential risk/benefit of using prophylactic abx to prevent this complication
  - Not very scientific at all…
  - treats the doctor well though...
Gyne/Obs

- For vaginal delivery - if risk factors present
- For **C-Section** abx given routinely regardless of risk status
  - decreased risk of endometritis by 2/3 to 3/4. Cochrane review...
Endocarditis

Special considerations:
look at PATIENT and PROCEDURE
Endocarditis – pt risk

**Low risk-**
- Isolated secundum atrial defect
- 6/12 post atrial/ventricular defect repair
- Prior CABG/
- Pacemaker/ICDF/for catheterization
- Benign murmur/mitral valve prolapse WITHOUT regurge/leaflet thickening

**Moderate risk-**
- Congenital cardiac mal (not cyanotic)
- Rheumatic/abnormal valves
- Hypertrophic cardiomyopathy
- Mitral valve prolapse WITH regurgitation/leaflet thickening

**High risk –**
- Prosthetic valve
- Prior endo
- Complex cyanotic heart disease
Endocarditis - procedure

- **High**
  - Any procedure with infection
  - Dental
  - Tonsillectomy
  - Rigid Bronch
  - Biliary/intestinal surgery

- **Medium**
  - Prostate
  - Cystoscopy

- **Low risk**
  - Vaginal hysterectomy - surprise:)
  - Vaginal delivery
  - CS
  - D&C
Endocarditis – risk analysis

- no prophylaxis for low risk pt AND low risk procedure
- prophylaxis for low risk pt AND mod/ high risk procedure, as well as for all pts AND mod/ high procedure
Endocarditis prophylaxis

Lower GI/GU
- Ampicillin/genta in high risk preop, amp 6h post op
- Amoxicillin po in mod risk
- Vanco if true penicillin allergy

Upper GI/resp
- Amoxicillin 2 g po 1h prior/ 2 g iv 1/2h prior
- Clinda 600 mg po 1h prior
- Azithromycin 500 mg po 1h prior
Conclusions

🔹 Antiseptic technique

🔹 Remember the principles
  - Selected m/o coverage, not “napalm the jungle” approach
  - Proven benefit
  - Appropriate timing and duration

🔹 Proper patient preparation/discussions

🔹 Antibiotics only for mod/high risk of infection

🔹 Difficult to make recommendations
Cases

- 25 yom for herniorrhaphy – NO
- 24 yof elective CS – YES
- 26 yof emergent CS for NFHR - YES
- 65 yom with stub wound to belly – YES
  - Don’t forget TETANUS, even though if the knife is clean 😊
- 35 yof for craniotomy, tumor – NO, consider YES only if repeat.
  - Remember the “Consequential approach”
Useful literature

- http://www.utmem.edu/cardiology/articles/Amen%20Corner.ppt