Updates on Intrapartum Antibiotic Management

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Antepartum and Intrapartum Management
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Overview

- Group B Streptococcus prophylaxis
- Infective endocarditis prophylaxis
- PPROM and PTL prophylaxis
- Chorioamnionitis and endometritis
- Preoperative prophylaxis
  - Cesarean delivery
  - Cerclage, PPTL
- Procedural prophylaxis
  - 3rd/4th degree repair
  - Manual removal of placenta

GBS Prophylaxis

- No GBS resistance to penicillin or ampicillin
- GBS susceptibility
  - Penicillin G, ampicillin, extended-spectrum penicillins, cephalosporins, vancomycin
- Penicillin G is most active agent in vitro
- Penicillin preferred
  - Narrower spectrum of activity
  - Theoretic reduction of ampicillin-resistant organism development
- Oral treatment NOT recommended

Disclosures

- I have no industry affiliations.

CDC/MMWR 2010, Andrews 200
**GBS Prophylaxis**

**GBS resistance**
- Clindamycin: 13-20%
- Erythromycin: 25-32%
- Trimethoprim-sulfamethoxazole: most isolates

**Erythromycin resistance**
- **Erythromycin NO LONGER recommended!**
  - Do not reach fetal tissues reliably
- Often associated with clindamycin resistance
- GBS may have inducible resistance to clindamycin
- D-zone testing for inducible resistance performed

**Appropriate maternal vancomycin dosing?**
- Dosing regimens
  - **Phase 1:** 1 g Q 12 hours (CDC 2010 Guidelines)
  - **Phase 2:** 15 mg/kg Q 12 hours
  - **Phase 3:** 20 mg/kg Q 8 hours (max individual dose=2 g)
- 55 women: 31 phase 1, 12 phase 2, 12 phase 3

**Maternal and neonatal therapeutic levels**
- Phase 1: 32% and 9%
- Phase 2: 50% and 33%
- Phase 3: 83% and 83%

**GBS Prophylaxis**

**GBS intrapartum antibiotic prophylaxis**
- **Penicillin G** 5 M, then 2.5-3 M units IV Q 4 hours
  - **PREFERRED over ampicillin**
- **Ampicillin** 2 g IV, then 1 g IV Q 4 hours
- **Low risk penicillin allergy**
  - Cefazolin 2 g IV, then 1 g IV Q 8 hours
- **High risk penicillin allergy**
  - Anaphylaxis, angioedema, respiratory distress, urticaria
  - Clindamycin 900 mg IV Q 8 hours
- **High risk penicillin allergy and clindamycin resistant**
  - Vancomycin 1 g Q12 hours or **20 mg/kg IV Q8 hours**

**Infected Endocarditis Prophylaxis**

**Highest risk of adverse endocarditis outcomes**
- Prosthetic valve or valve repair material
- Previous history of infective endocarditis
- Congenital heart disease
  - Cyanotic CHD (unrepaired), prosthetic material or device < 6 months, residual defect at or near repair site with prosthetic material or device
- Cardiac transplant patients with regurgitation
  - Due to abnormal valve

American Heart Association 2008, American College of Cardiology 2008, ACOG 2011

CDC/MMWR 2010, Onwuchuruba 2014
Infective Endocarditis Prophylaxis

- Prophylaxis for IE is NOT recommended for either VD or CD in absence of infection
- May consider for patients at highest risk of adverse cardiac outcomes undergoing VD
  - Potential for significant morbidity and mortality
  - Retrospective study cyanotic HD (3 IE cases)
- Administer 30-60 minutes before delivery
- Additional antibiotics not needed if patient being treated for other infection (chorio, pyelo)


IE intrapartum antibiotic prophylaxis

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Dose (30-60 min prior to VD)</th>
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<tr>
<td>Intravenous therapy</td>
<td>Ampicillin 2 g IV</td>
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<tr>
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<td>Cefazolin or Ceftriaxone* 1 g IV</td>
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<td>Allergic to PCN or AMP</td>
<td>Cefazolin or Ceftriaxone* 1 g IV</td>
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<td>Clindamycin* 600 mg IV</td>
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<tr>
<td></td>
<td>Azithromycin 500 mg</td>
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<td>Cephalexin 2 g</td>
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*Does not cover enterococcus. Vancomycin if enterococcus is of concern.

American Heart Association 2008, American College of Cardiology, 2008, ACOG 2011

Preterm Premature Rupture of Membranes

- Use broad-spectrum antibiotics during conservative management
  - Prolong pregnancy
  - Decrease short-term neonatal complications
- Use antibiotics for GBS perinatal infection prevention

PPROM antibiotic management < 37 weeks
- DEPENDENT on institution’s delivery timing
- Generally delivered at 34 weeks +/- FLM

2013 systematic review
- 22 placebo-controlled randomized trials
- >6800 women evaluated the use of antibiotics following PPROM before 37 weeks’ GA
- Antibiotic use associated with significant reductions in adverse events
  - Amoxicillin-clavulanic acid: necrotizing enterocolitis risk in infants? (RR 4.72, 95% CI 1.57-14.23)

Hutzal 2008, ACOG 2011, Kenyon 2013
Preterm Premature Rupture of Membranes

- Reduction of perinatal adverse events
  - Chorioamnionitis (RR 0.66, 95% CI 0.46-0.96)
  - Infants born in relation to randomization
    - Within 48 hours (RR 0.71, 95% CI 0.58-0.87)
    - Within 7 days (RR 0.79, 95% CI 0.71-0.89)
  - Neonatal infxn (RR 0.67, 95% CI 0.52-0.85)
  - Surfactant use (RR 0.83, 95% CI 0.72-0.96)
  - Neonatal oxygen tx (RR 0.88, 95% CI 0.81-0.96)
  - Abnormal cerebral US prior to hospital discharge (RR 0.81, 95% CI 0.68-0.98)

Hutzal 2008, ACOG 2011, Kenyon 2013

Preterm Premature Rupture of Membranes

- PPROM prophylactic antibiotic management when FLM not documented and delivery not imminent <34-37 weeks’ GA
  - Amp/Amox and erythromycin regimen x 7 days
    - Amp 2 g IV Q 6 hours and erythromycin 250 mg IV Q 6 hours x 48 hours
    - Then, amoxicillin 250 mg PO Q 8 hours and erythromycin 333 mg Q 8 hours x 5 days
    - Alternative (no trial)
      - Amp 2 g IV Q 6 hours, Azithromycin 1 g PO x 1
      - Then amoxicillin 500 mg PO Q 8 hours x 5 days

ACOG 2011, Mercer 1997

Preterm Premature Rupture of Membranes

- PCN allergic patients (not anaphylaxis)
  - Replace PCN agent with cefazolin 1 g IV Q8 hrs x 48 hrs
  - Then cephalaxin 500 mg PO QID x 5 days for h/o non-severe reactions
- PCN allergic patients- high risk for anaphylaxis
  - Anaphylaxis, angioedema, respiratory distress, urticaria
  - Replace PCN agent with Clindamycin 900 mg IV Q 8 hours PLUS gentamicin 5 mg/kg daily x 48 hours
  - Then clindamycin 300 mg PO Q 8 hours x 5 days
  - USE vancomycin 1 g Q 12 hours or 20 mg/kg Q 8 hours for GBS +, clindamycin resistance or if GBS unknown status!!!

ACOG 2011, Mercer 1997

Preterm Premature Rupture of Membranes

- GBS perinatal infection prevention
  - Regimen with adequate IV GBS coverage for at least first 48 hours of preterm PROM latency prophylaxis, pending GBS test results obtained on admission
  - GBS test results should not affect antibiotic therapy duration for PPROM management
  - Intrapartum GBS prophylaxis should then be managed by the results of baseline GBS test at the time of preterm PROM for up to 5 weeks

CDC/MMWR 2010, ACOG 2011
Preterm Labor (Intact Membranes)

Antibiotics do NOT prolong pregnancy and do not have short-term neonatal benefits
- Multicenter, randomized clinical trial
- 7-year follow-up
- 3196 (71%) infants with outcome data
- Infants exposed prenatally to erythromycin
  - Higher functional impairment (42% vs. 38%)
  - Higher mild functional impairment (24% vs. 21%)

Contrast to antibiotic use in PPROM

Kenyon 2008, ACOG 2011

Preterm Labor (Intact Membranes)

Use intrapartum antibiotics to prevent GBS perinatal infection if status unknown or positive
- Administer abx until GBS result available
- Then prophylaxis per GBS result and labor status
- GBS culture is valid for 5 weeks

CDC/MMWR 2010, ACOG 2011

Chorioamnionitis

Traditional Recommendations
- Broad spectrum IV Abx
  - Beta-lactamase producing aerobes and anaerobes
    - Ampicillin 2 gm Q 6 hours/Gentamicin 1.5 mg/kg Q 8 hours
    - Ampicillin/Sulbactam (Unasyn) 3 g IV Q 6 hours
    - Ticarcillin-Clavulanate (Timentin) 3.1 grams IV Q 4 hours
    - Cefoxitin 2 g IV Q 6 hours
  - Add anaerobic coverage with cesarean delivery
    - Clindamycin 900 mg IV Q 8 hours
    - Metronidazole 500 mg IV Q6-8 (if not breastfeeding)
  - PCN allergy: substitute ampicillin/gent with cephalosporin or ampicillin with vancomycin
  - LIMITED trials comparing antibiotic regimens!

Hopkins 2002 (Cochrane Review), French 2004 (Cochrane Review)

Chorioamnionitis

Gentamicin dosing: Q8 hour vs. daily dosing?
- Single daily dosing more optimal fetal levels
  - 5 mg/kg vs. 120 mg loading dose, then 80 mg Q8 hour
  - Daily dosing: more optimal fetal serum peak levels
  - No adverse effects of daily dose regimen
    - No maternal toxic levels
  - Single daily dosing effective as Q8 hour dosing
    - 5 mg/kg vs. 2 mg/kg, then 1.5 mg/kg Q8 hours
    - Outcome: Tx success=resolution of chorio after 16 hours of tx without development of endometritis
      - 94% vs. 89% Tx success, P=0.53
      - No difference in maternal/neonatal morbidities
        - Neonatal sepsis
        - Newborn hearing screen

Lockwood 2005, French 2004 (Cochrane Review), Lyell 2010
**Chorioamnionitis**

**Postpartum antibiotic doses?**
- One additional dose of broad spectrum combination antibiotic sufficient for PP therapy
  - 292 women
  - Randomization: continue 24 hours PP vs. 1 dose PP
  - Included vaginal and cesarean deliveries
  - CD received additional clindamycin dose
  - IP regimen: ampicillin/gentamicin
  - Outcome: tx failure = elevated temp after 1st PP dose of 1 temp >39.0 or 2 temps >38.4 four hours apart
  - No difference in control (3.5%) vs. study group (4.6%), P=0.64 for treatment failure

Edwards 2003

**Postpartum antibiotic doses?**
- Randomized trial
  - 116 women
  - IP regimen: ampicillin
  - All received 1 dose of gent/clinda at cesarean deliveries
  - Randomization: none vs. continue 24 hours PP afebrile
    - Group 1: No antibiotics PP
    - Group 2: Continue 24 hours PP afebrile
  - No statistically significant difference in endometritis (group 1 = 14.8% vs. group 2 = 21.8%, p=0.32)

Turnquist 1998

**Chorioamnionitis**

**Postpartum antibiotic doses?**
- Retrospective study
  - 423 women (282 VD, 141 CD)
    - Intrapartum regimen ampicillin and gentamycin
    - CD: additional clindamycin or metronidazole dose at cord clamp
    - All received only 1 additional PP scheduled dose
  - Primary outcome: persistent fever requiring antibiotics, surgical intervention, heparin administration
  - Short-term therapy success
    - 279 (99%) of VD vs. 120 (85%) of CD, p <0.001
  - 17 with tx failure responded to antibiotic continuation
  - All 7 more serious complications in CD group
    - Obese subjects, prolonged labor, or prolonged ROM

Black 2012

**Postpartum Endometritis**

**Traditional recommendations**
- PP endometritis: gentamicin/clindamycin
  - Add ampicillin for suspected enterococcus or GBS + due to clindamycin resistance
  - Cure rates 90-97%
  - Alternatives: cefoxitin, ceftizoxime, piperacillin with or without tazobactam, and ampicillin/subbactam
  - B. fragilis clinda resistance → ampicillin/subbactam!!!

**Gentamicin dosing: Q8 hour vs. daily dosing?**
- Daily (5 mg/kg) efficacy/safety = Q8 hour dosing
  - Randomized studies demonstrate equal efficacy
  
Postpartum Endometritis

- Continue on oral antibiotic doses?
  - No difference in oral abx vs. placebo group following completion of IV abx treatment for PP endometritis
    - 163 patients
    - Randomized, double-blind, placebo trial
    - Amoxicillin versus placebo following successful IV abx therapy for PP endometritis
    - No difference in hospital readmissions for recurrent infection in either group
  - Bacteremia: oral may be continued 7-14 days total


Chorioamnionitis and Endometritis

- Traditional Recommendations
  - Chorio: broad spectrum IV Abx
    - Beta-lactamase producing aerobes and anaerobes
      - Ampicillin 2 gm Q 6 hours / Gentamicin 1.5 mg/kg Q 8 hours
    - Add anaerobic coverage with cesarean delivery
      - Clindamycin preferred over metronidazole in breastfeeding women
  - Endometritis: broad spectrum IV Abx
    - Beta-lactamase anaerobe coverage
    - Gentamicin and clindamycin

- Current Treatment Considerations
  - Daily dosing of gentamicin for chorio and endometritis tx
  - Single PP abx dose sufficient for routine VD chorioamnionitis
  - Oral antibiotics not indicated


Cesarean Section: Perioperative Antibiotics

- Traditional Recommendations
  - Single IV dose narrow spectrum prx abx at time of cord clamp to reduce post-op infection
  - Cefazolin 1-2 gm or ampicillin 2 gm

- Comparison 10 antibiotic regimens
  - 1580 CS patients
  - Superior abx in prevention PP endometritis
    - Ampicillin 2 gm, cefazolin 2 gm, piperacillin 4 gm, cefotetan 1 gm
    - Cephalosporin: ~2x increase E. faecalis vag coloniz’n
  - Significantly

Faro 1990; Hopkins 2000 (Cochrane Review); Smaill F 2002 (Cochrane Review)

Cesarean Section: Perioperative Antibiotics

- Cochrane Review 2000
  - 51 randomized trials (1979-1994) comparing at least 2 different abx in women undergoing CS
  - Outcome: reduction in endometritis incidence
  - Conclusion: ampicillin and 1st generation cephalosporins similar efficacy in reducing post-op endometritis
    - No additional benefit to 2nd/3rd gen cep or multiple abx dose

- Cochrane Review 2002
  - 81 randomized trials comparing abx prx in BOTH elective and non-elective CS
  - Prx Abx: fever, endometritis, wound infection, UTI, serious infection incidence SIGNIFICANTLY reduced post CS
  - Endometritis Relative Risk:
    - Elective CS 0.38 (0.22-0.64) and non-elective CS 0.39 (0.34-0.46)
  - Faro 1990; Hopkins 2000 (Cochrane Review); Smaill F 2002 (Cochrane Review)
**Cesarean Section: Perioperative Antibiotics**

- **Cochrane Review 2010**
  - 86 studies: 13000 women
  - Non-emergent and emergent CD
  - Prophylactic antibiotics
    - Febrile morbidity, wound complications, endometritis reduced
    - Reduction regardless of type of CD (elective vs. emergent)
    - Endometritis reduced by ~60% for all CD and ~75% for elective CD
    - Cefazolin and ampicillin similar efficacy
- **MFMU Network**
  - 9000 women
  - Term pre-labor CD
  - Prophylactic antibiotics
    - Reduction in both endometritis and wound complications

  Dinsmore 2009, Smail F 2010 (Cochrane Review), ACOG 2011

**Cesarean Section: Perioperative Antibiotics**

- **Optimal drug timing?**
  - Meta-analysis 6 randomized controlled trials before procedure vs. intraoperative
    - N=2313 women and 2345 newborns
  - Results
    - PP endometritis reduced by 41% (RR 0.59, 95% CI 0.37-0.94)
    - Non-significant reductions in wound infection, maternal febrile morbidity, neonatal sepsis, neonatal septic work-up, and neonatal intensive care unite admission
    - Abx prx for CD before skin incision decreased PP endometritis and possibly other infectious morbidities
    - Neonatal outcomes not affected adversely!

  Baaqee 2013

**Cesarean Section: Perioperative Antibiotics**

- **Optimal drug choices and timing?**
  - Systematic review 15 studies assessing timing or use extended-spectrum antibiotics
    - Abx admin before incision OR use of extended-spectrum regimens (azithromycin or metronidazole) after cord clamp reduced post-CS maternal infection by up to 50%
      - Two strategies NOT compared with each other!
      - Effect on neonatal infection or infection with resistant organisms needs further study
    - Conclusion: cefazolin alone before incision or addition of extended-spectrum regimen (azithromycin/metronidazole) after cord clamp reduced post-CS maternal infection
      - Further studies needed for post-incisional abx addition strategy

  Andrews 2003; Tita 2008; Tita 2008; Constantine 2008; Tita 2009

**Cesarean Section: Perioperative Antibiotics**

- **Optimal drug choices?**
  - Women with history of significant PCN or cephalosporin allergy
    - Anaphylaxis, angioedema, respiratory distress, urticaria
    - **Clindamycin with aminoglycoside**
      - Clindamycin 900 mg IV and gentamicin 5 mg/kg IV
    - Women already on antibiotics
      - GBS prophylaxis (PCN or ampicillin)
        - Consider addition of single dose broad spectrum abx
      - Chorioamnionitis (ampicillin and gentamicin)
        - Add clindamycin or change to ampicillin-sulbactam
        - If B. fragilis resistance to clindamycin → ampicillin-sulbactam!
  ACOG 2011; Kenyon 2013 (Cochrane Review)
**Cesarean Section: Perioperative Antibiotics**

**Optimal drug choices?**
- Women with MRSA colonization
  - MRSA culture-confirmed SSI increased from 16% to 21%
  - MRSA associated with PP infections (esp after CD)
  - MRSA RV colonization in pregnant women 10%
- **CONSIDER** addition of single dose vancomycin to cefazolin preoperative antibiotic prophylaxis
- ROUTINE screening in obstetric patients NOT recommended!


**Perioperative Antibiotics**

**Optimal drug choices?**
- Avoid amoxicillin-clavulanic acid?
  - Concerns about safety
  - 2013 meta-analysis of placebo-controlled randomized trials of antibiotic therapy in women with PPROM
  - Amoxicillin-clavulanic acid associated with necrotizing enterocolitis (RR 4.72, 95% CI 1.57-14.23)

ACOG 2011; Kenyon 2013 (Cochrane Review)

**Cesarean Section: Perioperative Antibiotics**

**Optimal drug doses for increased BMI?**
- Non-pregnant patients
  - Cefazolin 2 g in BMI > 30 vs. 1 g in non-obese (BMI <30)
  - Achieved comparable serum and tissue levels
- Pregnant women undergoing CD
  - 29 subjects: 10 BMI <30, 10 BMI 30-39.9, 9 BMI >40
  - ≥20% obese (BMI 30-39.9) and extremely obese (BMI ≥40) women did not achieve minimal inhibitory concentrations for Gram-negative rods in adipose samples at skin incision even with a 2 g dose!!!


**Cesarean Section: Perioperative Antibiotics**

**Optimal drug doses for increased BMI?**
- ACOG
  - "Higher" dose of prophylactic antibiotics for obese patients (BMI > 30 or absolute weight >100 kg)
- IDSA, SIS, SHEA, ASHP
  - Cefazolin 2 g in <120 kg and 3 g in ≥120 kg
- Medical Letter
  - Cefazolin 1 g in <80 kg and 2 g in ≥80 kg

**Cesarean Section:**

**Perioperative Antibiotics**

### Optimal drug doses?
- Cochrane Review
  - No additional benefit from multiple prophylaxis dose (OR 0.92, 0.79-1.23) for narrow spectrum regimens randomized trials
  - Continuation of broad spectrum regimen for 6-12 hours postoperatively may decrease infection???
    - Institution-specific patient characteristics?
- Repeat dose recommended if significant blood loss (>1500 cc) or operative time >4 hours
  - Repeat dosing: Q 1-2 half-lives of the drug in patients with normal renal function
  - Cefazolin therapeutic level: maintained ~3-4 hours

- Constantine 2008; Tita 2008; Tita 2009

### Optimal pre-incision drug administration time?
- Varies in OBSTETRIC data
  - No consistent time window amongst studies
  - Extrapolate from general surgical literature
    - 2nd generation cephalosporin (cefuroxime)
    - 30-60 minutes most effective in reduction SSI
    - Superior to <30 minutes (aOR 1.95, 1.4-2.8, P<0.001) and 60-120 minutes (aOR 1.74, 1.0-2.9, P=0.035)

- Constantine 2008; Tita 2009; Weber 2008; Garey 2006

### Traditional Recommendations
- Single IV dose narrow spectrum prx abx at time of cord clamp to reduce post-op infection
- Cefazolin 1-2 gm or ampicillin 2 gm

### Summary
- Narrow spectrum, longer half-life abx (cefazolin preferred over ampicillin) before incision associated with reduction post-CS maternal infection

- Hopkins 2002; Andrews 2003; Tita 2008; Tita 2008; Constantine 2008; Tita 2009
**Cerclage**

- Insufficient data for perioperative antibiotic administration

ACOG 2011

**Postpartum Tubal Ligation**

- Insufficient data for perioperative antibiotic administration
  - Exception: vaginal/colpotomy technique
  - Single dose of prophylactic antibiotic should be administered ~ 30 minutes before procedure

ACOG 2009, Smith 1991

**3rd/4th Degree Lacerations**

- Prophylactic antibiotics at time of 3rd and 4th degree perineal laceration repairs
  - 147 patients
  - Randomized to single IV dose of cefotetan or cefoxitin
  - 27% loss at 2-week follow-up
  - 8% of Abx group vs. 24% of placebo developed perineal wound complications by 2 weeks PP (P=0.037)
  - Gross disruption or purulent discharge
  - Findings not replicated in meta analysis

- Treatment consideration
  - Administer single dose IV 2nd generation cephalosporin at time of 3rd or 4th degree perineal laceration repair

Duggal 2008, Buppasiri 2010 (Cochrane Review)

**Placental Extraction**

- Insufficient data for antibiotic administration
  - Antibiotic prophylaxis for reduction of PP infection prevention in placental extraction and/or curettage for retained placenta???
  - Several studies report for CD increased PP endometritis with manual removal of placenta
  - No studies assessing antibiotic prophylaxis!!!
  - Extrapolated from gynecology literature and perinatal HIV literature
Summary

- **GBS**
  - Consider higher vancomycin dosing, especially in obese patients: 20 mg/kg Q 8 hours (maximum of 2 g each dose)

- **Infective endocarditis**
  - Antibiotic prx only in highest risk patients without infection

- **PPROM**
  - Amoxicillin/amoxicillin and erythromycin regimen x 7 days
  - Coverage for GBS!

- **PTL with intact membranes**
  - Antibiotics NOT recommended for pregnancy prolongation
  - Erythromycin may be associated with adverse events
  - Coverage for GBS!

Summary

- **CD preoperative**
  - Cefazolin 1-2 g IV, 30-60 min prior to skin incision
  - Higher dose for obese patients!!!
  - Single dose sufficient for routine cases
  - Add vancomycin to cefazolin in MRSA-colonized patient
  - Re-dose in complicated (large EBL or long OR time) procedures
  - PCN severe allergy: clindamycin and gentamicin

Limited/insufficient data for cerclage, PPTL, placental manual extraction abx prophylaxis

- Antibiotics generally not recommended

- 3rd or 4th degree perineal laceration

- Consider single dose IV 2nd generation cephalosporin

Summary

- **Chorioamnionitis**
  - Limited comparison abx trials
  - Daily dosing of gentamicin
  - Single dose PP sufficient for routine VD chorioamnionitis
  - CD with prolonged labor course/ROM or obese patients likely require more than single PP course

- **PP endometritis**
  - Daily (5 mg/kg) as efficacious/safe as Q8 hour dosing
  - Oral antibiotics not indicated following successful IV treatment

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Genital HSV Suppression

- **Traditional Recommendations**
  - Acyclovir 400 mg TID for HSV suppression in pregnancy after 36 weeks until delivery
- **Valacyclovir prophylaxis**
  - 338 women with history of HSV
  - Randomized valacyclovir 500mg BID vs. placebo
  - 36 weeks until delivery
  - Valacyclovir significantly reduced at delivery
    - HSV shedding (2% vs. 9%, p=0.02)
    - Recurrent genital HSV (4% vs. 13%, P=0.009)
    - Less CD in treatment group

ACOG 2007; Sheffield 2006; Sheffield 2004; Watts 2003; Scott 2002; Scott 2001;

Other Antimicrobial Intrapartum Management Considerations

Genital HSV Suppression

- **Current Treatment Recommendations**
  - Acyclovir 400 mg TID or Valacyclovir 500 mg BID HSV suppression in pregnancy after 36 weeks until delivery
  - Acyclovir less expensive, covered by more insurances
  - Valacyclovir easier compliance dosing

ACOG 2007; Sheffield 2006; Sheffield 2004; Watts 2003; Scott 2002; Scott 2001;
Skin/Soft Tissue Infections
CA-MRSA in Pregnancy
- Retrospective chart review
  - 57 pregnant women with MRSA infections between 2000-2004
- Increasing MRSA infection incidence
- RF for MRSA infection: multiparity, CD, repeat CD
- Gestational age diagnosed
  - 2nd trim (46%) > 1st trim > Postpartum > 3rd trim
- Lesion sites
  - Extremities (44%) > buttocks > breast/mastitis > vulva/groin > abdomen
- Postpartum lesions
  - Breast (40%) > incision (30%) > other soft tissue (30%)
- 96% skin or soft tissue infections
- 58% recurrent episodes
- 63% required in-patient treatment

Laibl 2005

Vulvar Abscess
- 162 women with vulvar abscesses
- 16% (26) patients pregnant
- 64% of cultured abscesses were MRSA
- 40% required inpatient management
- In-patient treatment more common with comorbidities, larger abscess, systemic illness
- No difference in inpatient admission or treatment complications in MRSA group
- Treatment
  - I&D plus TMP/SMX, vancomycin, or clindamycin

Thurman 2008

Vulvar and Soft Tissue Infections Abscess
- Traditional Recommendations:
  - Gram positive coverage for skin/soft tissue infxn in pregnancy
  - Cephalexin 500 mg QID x 10 days
- Summary
  - CA-MRSA emergence in obstetric infections
  - Consider MRSA Coverage
  - MRSA abscess I&D alone highly effective (90% cure rate)
  - Post procedure antibiotics may not substantially improve outcome
- Current Treatment Considerations
  - Be aware of local community infectious characteristics
  - Consider I&D plus TMP/SMX, vancomycin, or clindamycin
    - Especially if not responsive to routine staph aureas coverage
    - If I&D not effective within 7 days, antibiotics initiation important
Mastitis/Breast Abscess

- Rise CA-MRSA mastitis/breast abscesses
- CA-MRSA >10% of community isolates
- Retrospective case series non-puerperal breast abscess
  - 44 women
  - 19% MRSA > Coag neg Staph 16% > MSSA 14%
- Case control postpartum mastitis
  - 27 MSSA and 21 MRSA
  - Increasing incidence of MRSA mastitis infections
  - 95% CA-MRSA of 21 MRSA cases
  - MRSA cases more often multiparous (57%) vs. MSSA (33%)
  - MRSA less likely to receive appropriate/timely antibiotic tx
  - Higher temperature with MRSA vs. MSSA (p=0.05)
  - No significant difference in clinical outcome

Moazzem 2007, Reddy 2007

Mastitis/Breast Abscess

- 127 women hospitalized with puerperal mastitis
- Mastitis only cultures (n=54)
  - MSSA (44%) > S. epi (35%) > MRSA (2%)
- Mastitis + breast abscess cultures (n=35)
  - CA-MRSA most common breast abscess organism
  - MRSA (67%) vs. MSSA (19%)
- Women with CA-MRSA inappropriately treated
  - 56% did NOT receive appropriate antibiotic
- Empiric use of ineffective antibiotic DID NOT adversely affect outcomes

Stafford 2008
Mastitis/Breast Abscess Management

- CA-MRSA increasingly more common in puerperal mastitis and especially abscesses
- Continue first line mastitis treatment in routine cases
- Consider cultures if tx failure, recurrence, high prevalence, RF's
- Consider CA-MRSA therapy
  - Recurrence, tx (beta lactam) failure, abscess, severe infection until cultures obtained
  - Local epidemiology
  - Adjunct drainage or aspiration may be warranted
- Treatment/Management for MRSA mastitis
  - Continue breastfeeding/pumping
  - TMP/SMX = first line (efficacy, cost, compliance)
  - Clindamycin and Linezolid 2nd line alternatives
  - I&D or aspiration/catheter drainage for abscess


Influenza Testing and Treatment

- Antiviral treatment recommended for pregnant women with suspected or confirmed influenza
  - Regardless of trimester of pregnancy!!!
  - Women up to 2 weeks PP (including pregnancy loss)!
- Do not delay treatment
  - Negative rapid influenza diagnostic test
  - Inability to test
  - While awaiting test results

CDC September 2009; CDC April 2010

Antiviral Summary

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<tr>
<th>Agent</th>
<th>Treatment</th>
<th>Chemoprophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oseltamivir</td>
<td>75 mg PO BID x 5 days</td>
<td>75 mg PO QD x 10 days</td>
</tr>
<tr>
<td>Oseltamivir (Acutely ill)</td>
<td>150 mg PO BID x 10 days</td>
<td></td>
</tr>
<tr>
<td>Zanamivir</td>
<td>Two 5-mg inhalations (10 mg total) BID x 5 days</td>
<td>Two 5-mg inhalations (10 mg total) QD x 10 days</td>
</tr>
<tr>
<td>Peramivir (Specific Criteria)</td>
<td>600 mg IV Daily x 5-10 days</td>
<td></td>
</tr>
</tbody>
</table>

CDC 2009, Saleeb 2009