PELVIC INFLAMMATORY DISEASE (PID)

- PID refers to acute infection of the upper genital tract structures in women (uterus, fallopian tubes, and ovaries) and may involve the surrounding pelvic organs.
- early diagnosis and treatment are essential to prevent long-term complications (e.g., infertility, ectopic pregnancy, etc…)

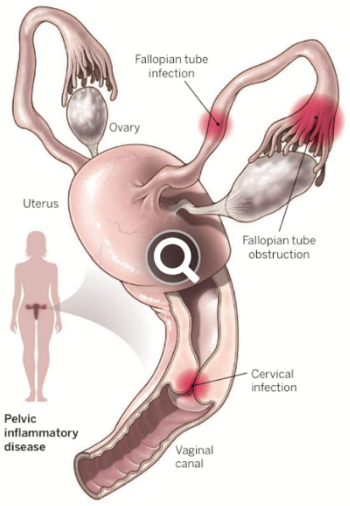


Figure 6. Pelvic Inflammatory Disease and Reproductive Damage

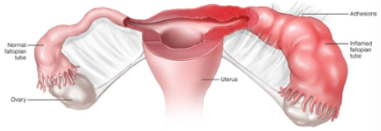


Figure 7. Acute Salpingitis with Pelvic Inflammatory Disease

Microbiology

- PID is an ascending polymicrobial infection mainly caused by the following microorganisms: (1) *Chlamydia trachomatis,* (2) *Neisseria gonorrhoeae,* (3) *Mycoplasma genitalium*
- other pathogens include:
  - anaerobic organisms (vaginal microflora)
  - enteric gram-negative rods
  - *Gardnerella vaginalis* (bacterial vaginosis)

Chlamydia and Gonorrhea

- PID is primarily a disease of sexually active women
- the 2 most important sexually transmitted organisms associated with acute PID are *C. trachomatis* and *N. gonorrhoea*e, which are the main targets for treatment

Anaerobic Bacteria

- anaerobic bacteria which cause bacterial vaginosis are frequently found from upper genital tract of women with acute PID
- current trends suggest adding metronidazole (Flagyl) to ceftriaxone and doxycycline (Vibramycin) to target anaerobic bacteria when treating acute PID, even though these pathogens may not be present

Diagnosis of PID

- The clinical diagnosis of PID is made in sexually active young women or women at risk for sexually transmitted infections (STIs), who present with pelvic or lower abdominal pain and have cervical motion, uterine, or adnexal tenderness on exam
- Occasionally, acute PID can occur in women without recent sexual activity. Treatment is indicated for patients with this presumptive clinical diagnosis of PID, even in findings are subtle or minimal, since the risk of long-term complications is higher if treatment is withheld or delayed

Diagnosis of PID and Criteria for Initiating Presumptive Treatment

Criteria for Initiating Presumptive Treatment for PID — Presumptive treatment for PID in sexually active young women and other women at risk for STDs if they are experiencing pelvic or lower abdominal pain, if no cause for the illness other than PID can be identified, and if one or more of the following minimum clinical criteria are present on pelvic examination:

- **Cervical motion tenderness**
  or
- **Uterine tenderness**
  or
- **Adnexal tenderness**

Additional Criteria - one or more of the following additional criteria can be used to enhance the specificity of the minimum clinical criteria and support a diagnosis of PID):

- Oral temperature >101°F (>38.3°C);
- Abnormal cervical mucopurulent discharge or cervical friability;
- Presence of abundant numbers of WBC on saline microscopy of vaginal fluid;*
- Elevated erythrocyte sedimentation rate;
- Elevated C-reactive protein;
- Laboratory documentation of cervical infection with *N. gonorrhoeae* or *C. trachomatis*

Most Specific Criteria for the Diagnosis of PID - a diagnostic evaluation that includes one or more of the following more extensive procedures might be warranted in some cases:

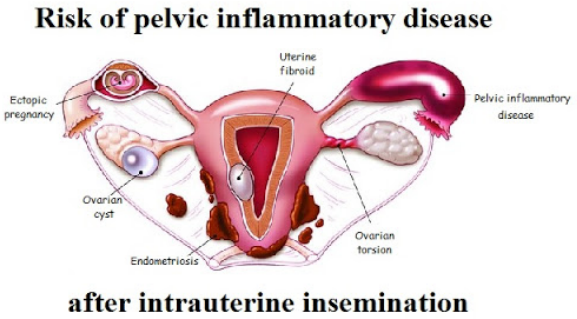
- Endometrial biopsy with histopathologic evidence of endometritis;**
  or
- Transvaginal sonography or magnetic resonance imaging techniques showing thickened, fluid-filled tubes with or without free pelvic fluid or tuboovarian complex, or Doppler studies suggesting pelvic infection (e.g. tubal hyperemia);
  or
- Laparoscopic findings consistent with PID

* Most women with PID have either mucopurulent cervical discharge or evidence of WBCs on a saline wet prep of vaginal secretions. If no WBCs are found on the wet prep, the diagnosis of PID is unlikely.

** Endometrial biopsy is warranted in women undergoing laparoscopy who do not have visual evidence of salpingitis, because endometritis is the only sign of PID for some women.

Indications for Hospitalization

- most women with PID can be treated in outpatient settings
- indications for hospitalization / IV antibiotics include:
  - severe clinical illness (high fever, N/V, abdominal pain)
  - complicated PID with pelvic/tubo-ovarian abscess
  - possible need for invasive diagnostic/surgical evaluation (appendicitis, ovarian torsion, tubo-ovarian abscess)
  - inability to take oral medications due to N/V
  - lack of response or tolerance to oral medications
  - concern for non-adherence to therapy
  - pregnancy



Antibiotic Selection

- antibiotic therapy is the cornerstone of PID treatment
- the therapeutic regimens for PID should provide broad empiric coverage for the wide array of implicated pathogens
- regimen options depend on whether the patient is initially hospitalized or managed as an outpatient, which generally depends on severity of infection
- the selection of a regimen additionally takes into account cost, convenience of administration, safety, formulary availability, and allergy history

Hospitalized Patients

- initial parenteral therapy of PID in hospitalized patients consists of a combination parenteral regimen that provides antimicrobial coverage against a wide range of bacteria, including *C. trachomatis*, *N. gonorrhoeae*, streptococci, gram-negative enteric bacilli (E. coli, Klebsiella spp, and Proteius spp) and anaerobic organisms (e.g., bacterial vaginosis-associated flora)
- the following antibiotic regimens are parenteral regimens recommended by CDC for hospitalized patients admitted with PID:

  (1) Ceftriaxone (Rocephin) 1 GM IV Q24H PLUS Doxycycline (Vibramycin) 100 mg PO/IV Q12H PLUS Metronidazole (Flagyl) 500 mg PO/IV Q12H

  (2) Cefoxitin (Mefoxin) 2 GM IV Q6H OR Cefotetan (Cefotan) 2 GM IV Q12H PLUS Doxycycline 100 mg IV/PO Q12H

- the following antibiotics may be used as alternative regimens for hospitalized patients admitted with PID, according to the CDC:

  (1) Ampicillin-Sulbactam (Unasyn) 3 GM IV Q6H PLUS Doxycycline 100 mg PO/IV Q12H

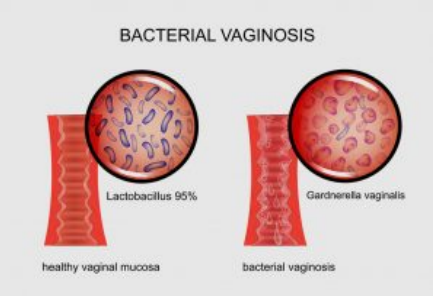
  (2) Clindamycin (Cleocin) 900 mg IV Q8H PLUS Gentamicin loading dose IV/IM (2 mg/kg), followed by a maintenance dose (1.5 mg/kg) Q8H (or single daily dosing 3-5 mg/kg IV/IM daily)

Transition to Oral Therapy

- patients can usually transition from parenteral to oral therapy after 24 hours of sustained clinical improvement, reflected by resolution of fever, N/V, and severe abdominal pain
- oral therapy consists of doxycycline 100 mg PO BID to complete a 14-day course
  - if patients cannot tolerate doxycycline: azithromycin 500 mg PO once, followed by 250 mg PO daily to complete a 7-day course

Transition to Oral Therapy (cont.)

- Metronidazole 500 mg PO BID for 14-days is added to doxycycline (or azithromycin) for (1) women with a pelvic abscess or (2) women with documented *Trichomonas vaginalis* infection or bacterial vaginosis (NOTE: Clindamycin 450 mg PO Q6H is an alternative to Metronidazole)
    - Note: although metronidazole is added for anaerobic coverage for outpatient management of PID, it is not routinely added for women initially treated with parenteral cefoxitin in an inpatient setting, since cefoxitin provides sufficient anaerobic coverage



Outpatient Therapy

- for women with mild to moderate PID who can tolerate oral medications and are expected to reasonably adhere to therapy, the following antibiotic regimen is recommended:

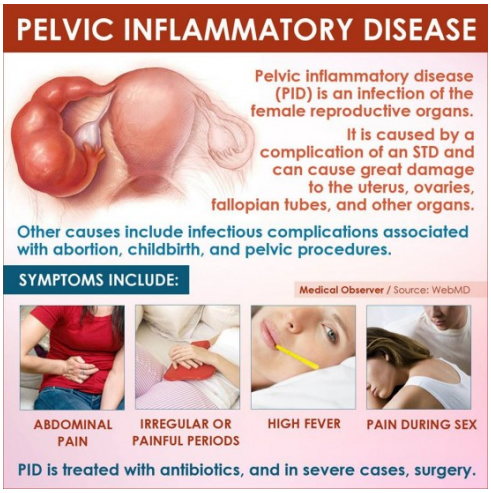
(1) Ceftriaxone 500 mg IM ONCE for patients < 150 kg
(for coverage of gonorrhea)
(Ceftriaxone 1 GM IM ONCE for patients > 150 kg)

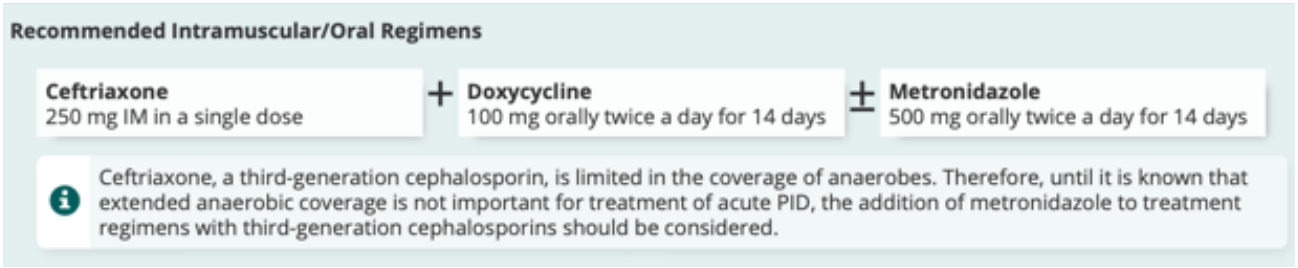
PLUS

(2) Doxycycline 100 mg PO BID for 14 days

PLUS

(3) Metronidazole 500 mg PO BID for 14 days

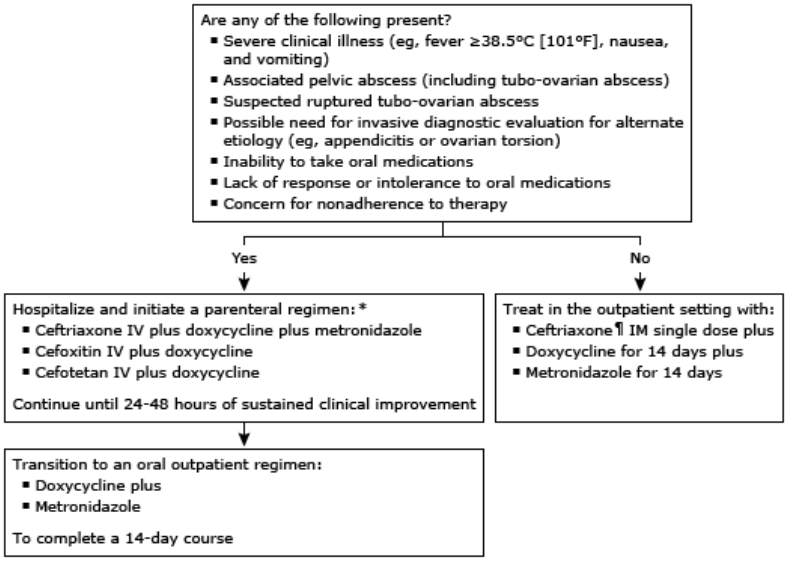




Follow-Up

- if outpatient therapy is selected for PID, it is important follow-up within 48-72 hours to confirm that clinical improvement has occurred (e.g., reduction in abdominal tenderness, reduction in cervical motion tenderness)
- if no clinical improvement has occurred, the patient may require further diagnostic evaluation for complications (e.g., pelvic abscesses) or may require inpatient parenteral therapy

Summary: Antimicrobial Therapy for Pelvic Inflammatory Disease in Adults and Adolescents



Dosing of antimicrobials	
Ceftriaxone IV	1 g intravenously every 24 hours
Cefoxitin IV	2 g intravenously every 6 hours
Cefotetan IV	2 g intravenously every 12 hours
Ceftriaxone IM	500 mg intramuscularly once (if <150 kg)
	1 g intramuscularly once (if ≥150 kg)
Doxycycline$^{\Delta}$	100 mg orally twice daily
Metronidazole$^{\Delta}$	500 mg orally twice daily