Systemic Infectious Disorders

American College of Osteopathic Emergency Physicians 2018 Intense Review

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Disclosures

No conflicts to disclose
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8.1 Bacterial
Bacterial Food Poisoning 8.1

- Recommendation of antibiotics varies if bacterial
  - 3 to 5 days in some instances
Campylobacter

- C. jejuni, C. coli, C. fetus
- Small Gram-negative bacteria
- Fecal–oral transmission
- Most common bacterial cause of diarrhea
- Opportunistic infection in MSM, AIDS patients
Campylobacter

● Signs & Symptoms
  ○ 2-5 day incubation, rapid onset, resolves in 5 to 7 days
  ○ Fever, abdominal cramps, diarrhea, anorexia, malaise, myalgias, headache
  ○ Stool: loose, bile colored, 60-90% bloody, fecal leukocytes

● Diagnosis
  ○ Clinical diagnosis
  ○ Stool culture
  ○ Sigmoidoscopy: inflammatory colitis, similar to IBD
Campylobacter

Treatment

- Antibiotics not indicated when symptoms improving
- Ciprofloxacin 500 mg PO BID x 7 days
- Erythromycin 500 mg PO QID x 7 days
Salmonellosis

- S. enteritidis, S. choleraesuis, S. typhimurium
- Gram negative bacilli
- Contaminated food (poultry & eggs), pets
- Risk factors
  - ↓ gastric acidity, alteration of intestinal flora, sickle cell, immunocompromised
- Penetrate intestinal mucosa, lodge in lamina propria
Salmonellosis

- 8-48-hour incubation
- Resolves in 2-5 days
- Fever, colicky abdominal pain/tenderness, vomiting
- Loose watery diarrhea (mucus & blood), fecal WBCs
- Diagnosis: Stool culture
- Treatment
  - Clinically improving do not require treatment
  - Ciprofloxacin 500 mg BID x 7 days
**Typhoid Fever**

- **Salmonella typhi**
- **Invasive Bacteria**
  - Peyer’s patches, mesenteric lymph nodes, spleen
- **Signs and symptoms**
  - 5-21 day incubation period
  - Sustained fever (103-104° F), malaise (diarrhea uncommon), apathy, confusion
  - Relative bradycardia, splenomegaly, abdominal tenderness, Hepatosplenomegaly, leukopenia, neutropenia
  - **Rose spots** on chest or abdomen (30% of patients)
Typhoid Fever
Typhoid Fever

● Complications
  ○ Pancreatitis, cholecystitis, infective endocarditis, pneumonia, Liver abscess, orchitis or focal infection

● Diagnosis
  ○ S. typhi from blood, stool, or bone marrow

● Treatment
  ○ Ciprofloxacin 500 mg PO (or IV) BID x 7-14 days
  ○ Ceftriaxone 1-2 g q12-24hrs x 10-14 days
Yersinia

- Yersinia enterocolitica
- Gram-negative, aerobic bacteria, Invasive
- Increasing incidence worldwide
- **Children > Adults; Fecal → Oral Transmission**
- Large outbreaks (contaminated milk)
• Fever, colicky abdominal pain, diarrhea, anorexia, vomiting and malaise (10-14+ days)
• Ileocecalitis, lower abdominal pain with minimal diarrhea, mimics appendicitis

● Diagnosis:
  ○ Stool culture, fecal leukocytes
  ○ Ileocecalitis on ultrasound

● Treatment
  ○ No antibiotics if symptoms improving
  ○ Trimethoprim–sulfamethoxazole (TMP/SMX) 160 mg/800 mg PO BID x 7 days
Vibrio

- Vibrio parahaemolyticus, Vibrio vulnificus
- Gram-negative bacilli, coastal seawater organism
- Raw or undercooked seafood
- Signs and symptoms
  - 4-48-hour incubation; resolves in 24 to 48 hours
- Diarrhea, abdominal cramps, fever, nausea, HA
- Diagnosis:
  - Thiosulfate citrate bile sucrose (TCBS) agar culture
- Treatment: Usually self-limited
  - Doxycycline 100 mg PO BID x 7 days if severe
Vibrio cholera

- Noninvasive enterotoxin production
- Signs and symptoms
  - 24-48hr incubation, resolves in 7 days
  - Copious watery diarrhea, abdominal cramps, vomiting, low-grade fever, severe dehydration
- Diagnosis:
  - Fecal leukocytes & guaiac-negative stool (noninvasive)
  - TCBS stool culture
- Treatment
  - WHO oral rehydration formula
  - Doxycycline 100 mg PO BID x 10 days
Hemorrhagic E. coli

- E. coli O157:H7; Children & elderly
- Undercooked beef, raw milk, contaminated water
- Produces Shigella-like toxin, noninvasive
- Signs and symptoms
  - 4-9d incubation; resolves in 7 to 10 days
  - Bloody diarrhea, abdominal cramps, vomiting
- Diagnosis
  - Sorbitol–MacConkey stool culture, latex agglutination Ab
- Treatment: Supportive care, no antibiotics
  - increase incidence of hemolytic-uremic syndrome
Aeromonas hydrophila
• Gram negative facultative anaerobe
• Ubiquitous in fresh & brackish water
• 10-15% of diarrhea in children, immunocompromised
• Signs and symptoms
  ○ Watery (nonbloody) diarrhea, vomiting, fever (2-10 wks)
• Diagnosis: Stool culture
• Treatment:
  ○ TMP/SMX 160 mg/800 mg PO BID x 7 to 14 days
Staphylococcal Food Poisoning

● Enterotoxin forming strain of S. aureus
  ○ Heat-stable toxin, direct CNS effects
● Contaminated ham, eggs, pastries, potato salad
● Signs & Symptoms
  ○ 1-6hrs post-ingestion; resolves in 8 to 24 hours
  ○ Cramping, abdominal pain, violent vomiting
  ○ Variable diarrhea (nonbloody), occasional fever
● Diagnosis
  ○ Clinical (stool cultures noncontributory)
  ○ Food-related outbreaks with short incubation
● Treatment: Supportive care, antibiotics = no value
Clostridium perfringens

- Enterotoxin-mediated infection
- **Most common** acute food poisoning in the US
- Cooked meat/poultry dishes, ingested >24 hours later
- Signs and symptoms
  - 6-24 hours post ingestion of contaminated food
  - Enteritis necroticans: hemorrhagic, necrotizing enterocolitis
    - Abdominal pain, diarrhea, shock, rapidly fatal
- Diagnosis
  - Fecal leukocytes & guaiac-negative
  - Stool cultures noncontributory
- Treatment: Supportive care, antibiotics not indicated
Bacillus cereus

- Spore forming, Gram-positive rod, enterotoxin
- Poorly processed food (boiled rice), unrefrigerated, rewarmed before serving
- Signs & Symptoms
  - Vomiting, abdominal cramping, diarrhea
    - Vomiting predominate: onset 2-3hr; resolves in <10hr
    - Diarrhea predominate: onset 6-14hr; resolves in 20-36hr
- Diagnosis: Isolation in food source, stool cultures
- Treatment: Supportive care, antibiotics not indicated
Scombroid fish poisoning

- History of dark-fleshed fish ingestion
  - Tuna, mackerel, mahi-mahi, bluefish
  - Poor refrigeration
  - Normal marine flora produce histamine-like substances

- Signs and symptoms
  - 20-30 minutes post-ingestion; resolves in 6 hrs
  - Metallic, bitter-tasting fish
  - Facial flushing, injected conjunctiva, diarrhea, headache, palpitations, & abdominal cramps
  - Not an allergic reaction; Clinical Diagnosis

- Treatment: Diphenhydramine 50 mg IV
Ciguatera fish poisoning

- G. toxicus, marine dinoflagellate, unicellular plankton
- Toxin accumulates in coral fish
  - Red snapper, grouper, barracuda, sea bass, mackerel
- Ciguatoxin, heat-stable neurotoxin
  - Not deactivated by cooking/freezing
- Causes >50% of fish poisoning in the US
  - Undetectable in fish
Ciguatera fish poisoning

● Signs & Symptoms
  ○ 2-6-hr incubation; usually resolves in 2-8wks
  ○ Early GI symptoms (vomiting, diarrhea, cramps)
  ○ Later neurologic symptoms (paresthesias, loose painful teeth, ataxia, confusion)
  ○ Dysesthesias (heat/cold sensory reversal)

● Diagnosis: Clinical

● Treatment
  ○ Atropine for severe bradycardia and hypotension
  ○ Alcohol abstention
  ○ Mannitol 1 g/kg IV (controversial for neuro involvement)
Enterocolitis

- **Clostridium difficile**, toxin-producing bacteria
- After antibiotics use (usually nosocomial)
  - Clindamycin, ampicillin, cephalosporins, tetracycline, etc
- Antidiarrheal meds & narcotics increase risk
- Normal flora reduced by antibiotics
  - Toxin destroys colonic mucosa →
  - Pseudomembranous enterocolitis
Enterocolitis

- Signs and symptoms
  - 3 to 4 weeks after discontinuing antibiotics
  - Fever, cramps, watery, bloody diarrhea

- Diagnosis
  - C. difficile toxin assays
  - Stool cultures not diagnostic
  - Sigmoidoscopy for pseudomembranous lesions

- Treatment: Stop causative antibiotic
  - Metronidazole 250mg PO QID x 10-14d
  - Vancomycin 125mg PO QID x 10-14 days
  - Colonic resection for bowel perforation or toxic megacolon
Clostridium botulinum
○ Anaerobic, Gram-positive rod, spore forming

Releases a potent exotoxin

Inhibits release of acetylcholine at NMJ

Transmission
○ Undercooked or poorly preserved food
○ Contaminated “black tar” heroin
○ Honey, corn syrup, soil ingestion in infants
○ Iatrogenic from medical use
Botulism (L) 8.1.1

- Signs and symptoms: Foodborne, adult
  - Onset 2hrs-14 days post-ingestion
  - Dry mouth, lightheadedness, vomiting, **constipation**
  - Diplopia, dysphonia, dysphagia, dysarthria, vertigo
  - **Ptosis**, extraocular palsies, dilated/fixed pupils, decreased/absent gag
  - Extremity weakness, more pronounced in upper extremities
  - Severe: distended bladder, tachypneic, shallow breathing
BABY RECOVERING FROM BOTULISM
ROCKY MOUNTAIN HOSPITAL FOR CHILDREN
Botulism (L) 8.1.1

● Signs and symptoms: Infantile botulism
  ○ Children <1 year old, peaks at 3 months
  ○ Constipation, poor feeding, weak cry, poor head control
  ○ Hypotonia, diminished DTRs, altered facial expressions
  ○ Respiratory failure (50%)

● Diagnosis: Clinical
  ○ GI + Autonomic + Cranial Nerve Symptoms
  ○ Toxin or organism isolated in blood, GI tract, wound, or ingested food product
• Treatment: Supportive care, ICU admission
  ○ Early intubation for potential respiratory compromise
  ○ Serial vital capacities (<12 mL/kg = ventilator support)
  ○ Foley for urinary retention, NGT for ileus
  ○ Antitoxin (administer as early as possible)
    ■ Equine trivalent, effective against toxin A, B and E
    ■ Equine heptavalent (military) effective against all
    ■ Skin test for hypersensitivity, then one 10-mL IV dose
    ■ No effect on bound toxin
    ■ Not indicated for infantile botulism
Treatment (continued)

- Infant botulism
  - Botulinum immune globulin (human): BIG-IV
    - Orphan drug available through California Department of Health
    - (510) 231-7600
  - Alert CDC of possible outbreak
Chlamydia\textsuperscript{(M)} 8.1.2.5

- Obligate intracellular bacterium
Chlamydia pneumonia

- 2-10% of pneumonia, >young adults
- Signs and symptoms
  - URI symptoms, staccato cough, prolonged symptoms
- Diagnosis
  - CXR: single, subsegmental patchy infiltrate
- Treatment:
  - Azithromycin 500 mg PO once, then 250 mg PO x4 days
  - Doxycycline 100 mg PO BID x 10 days
Chlamydia psittaci

- **Birds (parakeets, parrots, macaws, pigeons, turkeys)**
  - Psittacosis

- **Signs & Symptoms**
  - Bird handlers at risk
  - 5-14d incubation
  - Acute febrile illness, nonproductive cough, headache
  - Interstitial pneumonia

- **Complications**
  - Pericarditis, myocarditis, endocarditis, hepatitis
Chlamydia psittaci

● Diagnosis: Clinical diagnosis
  ○ ↑Ab titer (confirms)

● Treatment
  ○ Tetracycline 500 mg PO q 6 hr x 14-21d
  ○ Erythromycin 500 mg PO q 6 hr x 14-21d
Sexually Transmitted Disease

Sexually Transmitted Disease
Chlamydia trachomatis

- Most common bacterial STD, via direct contact
- Linked to Reactive Arthritis
  - 15-35 y/o M “Can’t see, Can’t pee, Can’t climb a tree”
  - 2 to 6 weeks after urethritis or dysentery
  - **Urethritis** (non-gonococcal)
  - **Arthritis** (asymmetric, inflammatory polyarthritis)
  - **Conjunctivitis** (→ iritis, or corneal ulceration)
  - S. flexneri and S. typhi also implicated
Chlamydia trachomatis

- Asymptomatic carriers (2-20%)
- Cervicitis
  - Vaginal discharge, dysuria, abnormal vaginal bleeding
  - Friable, erythematous, congested cervix with d/c
- Pelvic inflammatory disease (PID)
  - Pelvic pain, tenderness, fever, peritonitis, ascites
  - Leukocytosis, ↑ESR, CRP
- Fitz–Hugh–Curtis syndrome
  - Perihepatitis, direct extension of PID
  - RUQ abdominal pain, fever
  - “Violin string” adhesions on laparoscopy
Chlamydia trachomatis

- **Urethritis**
  - 10% males = asymptomatic carriers
  - 6-12d incubation
  - Urethral discharge & dysuria; milder than gonorrhea

- **Epididymitis**
  - Chlamydia > gonococcal
  - Normal testicle, warm, swollen, erythematous scrotum, tenderness posterior/lateral to testicle
Chlamydia trachomatis

- **Trachoma**
  - Developing countries
  - Unilateral conjunctivitis with palpebral edema
  - Entrichiasis (eyelashes turn inwards, scratch cornea)

- **Lymphogranuloma venereum (LGV)**
  - L₁, L₂, L₃ C. trachomatis strains
  - Inguinal lymphadenopathy, pelvic vascular strictures
  - **Groove sign**: adenopathy above & below inguinal ligament
Chlamydia trachomatis

● Diagnosis
  ○ Culture, technically difficult
  ○ PCR

● Treatment
  ○ Uncomplicated (cervicitis, urethritis)
    ■ Azithromycin 1 g PO for 1 day or
    ■ Doxycycline 100 mg PO BID x 7 days
  ○ Complicated: PID
    ■ Doxycycline 100 mg IV or PO BID x 14d
    ■ Treat for presumed gonorrhea coinfection
Gonococcal Disease (H)8.1.2.1

- Neisseria gonorrhoeae
- Encapsulated
- Gram-negative diplococcus
- Coinfection with C. trachomatis
  - 5-25% Males, 35-50% Females
Gonococcal Disease (H) 8.1.2.1

- **Urethritis**
  - 2-7d incubation, urethral discharge & dysuria

- **Epididymitis** (More commonly due to C. trachomatis)
  - Normal testicle, warm, swollen, erythematous scrotum, tenderness posterior/lateral to testicle

- **Rectal gonococcal infection**
  - Transmitted by receptive anal intercourse & cervicovaginal secretions
  - Anal pruritis, tenesmus, purulent discharge, rectal bleeding
Gonococcal Disease (H) 8.1.2.1

● Cervicitis
  ○ Vaginal discharge, dysuria, abnormal vaginal bleeding
  ○ Friable, erythematous, congested cervix with D/C
  ○ Bartholin cyst/abscess

● Pelvic inflammatory disease
  ○ Develops in 10-20% of cervicitis
  ○ Lower abdominal pain, fever, CMT, painful intercourse

● Fitz–Hugh–Curtis syndrome

● Pharyngitis
  ○ Primarily via oral sexual exposure, usually asymptomatic
  ○ Sore throat, tonsillar edema, exudates
Gonococcal Disease (H) 8.1.2.1

● Conjunctivitis
  ○ Autoinoculation, photophobia, purulent exudates, corneal ulcers, blindness
  ○ Symptoms greatly exaggerated compared to common causes of conjunctivitis

● Gonorrhea in pregnancy
  ○ PID & perihepatitis uncommon
  ○ Spontaneous abortion, premature labor, PROM
Disseminated gonococcal infection
- 0.5% to 3% of GC infections
- Fever, malaise, leukocytosis
- Arthritis–dermatitis syndrome (most common)
  - Arthritis: asymmetric polyarthralgias of distal joints
  - ≥ two joints
- Dermatitis: discrete papules & hemorrhagic pustules on extremities, 5-40 lesions
Gonococcal Disease (H) 8.1.2.1

- Gram stain, 95% sensitive for male urethritis
  - Not sensitive for other sites
- Culture, Thayer–Martin agar, PCR
- Test for chlamydia coinfection
- Suspected disseminated gonococcus
  - Sample urethra, cervix, pharynx, rectum, affected joints (increase sensitivity)
  - Skin lesions, unroofed lesions yield purulent fluid (culture)
Gonococcal Disease (H) 8.1.2.1

- Treat for presumed C. trachomatis coinfection
- Urethritis, cervicitis, proctitis:
  - Ceftriaxone 250mg IM x1 & treatment for chlamydia
- Epididymitis
  - Ceftriaxone 250mg IM x1 & doxycycline 100mg PO BID x10d
- Bacteremia
  - Cefotaxime 1g IV q8hrs & doxycycline 100 mg IV q8hrs
- PID, disseminated gonococcus
  - Hospitalization (some cases of PID)
  - Ceftriaxone 1 g IV qd & doxycycline 100mg BID x10d
Syphilis (M) 8.1.2.2

- Treponema pallidum, spirochete
- Sexually transmitted (HIV coinfection & MSM)

Signs & Symptoms
  - Primary syphilis
    - Small papule at inoculation site (10-90d)
    - Chancre painless, indurated ulcer (1-2cm)
    - Nontender inguinal adenopathy
Secondary Syphilis (25% untreated)

- Secondary syphilis (25% of untreated)
  - 6-20 weeks postexposure
  - Fever, chills, malaise, weight loss, lymphadenopathy
  - Rash “great masquerader,” variable appearance
  - Typical: macular/papular, symmetric, trunk, extremities, palms & soles, 0.5-2cm red-brown lesions, pustular
  - Condyloma lata: Large, raised gray/white lesions, moist areas & mucosa
  - Alopecia, hepatitis (↑↑ alk phos), synovitis, nephrotic syndrome
  - Anterior uveitis, chorioretinitis → syphilitic meningitis
Condyloma lata
Tertiary Syphilis (25-40% untreated)

- Gummatous syphilis
  - Large skin ulcers or heaped up granulomatous tissue

- Cardiovascular syphilis
  - Dilated aorta, aortic regurgitation, with murmur or CHF
  - Coronary artery narrowing, thrombosis

- Neurosyphilis
  - Meningitis: within 1 year of primary infection
    - Headache, stiff neck, AMS, uveitis + vision impairment

- Meningovascular: infectious arteritis, ischemic stroke, spinal cord infarct
  - Suspect in young person with ischemic stroke
Gumma

Gummatous lesion that has ulcerated. (19)
Tertiary Syphilis

● General paresis: 10-25 year latency
  ○ Progressive memory & judgment deficits, dementia
  ○ Psychosis, dysarthria, facial and limb hypotonia, tremors

● Tabes dorsalis: 20-year latency
  ○ Posterior columns of the spinal cord
  ○ Ataxia, lancinating pain (sudden brief stabs of pain), paresthesias, epigastric pain, nausea and vomiting
  ○ Argyll–Robertson pupil: accommodates, nonreactive
    ■ Constricts with accommodation
    ■ Doesn’t react to light
Diagnosis of Syphilis

- Dark-field microscopy
- Nontreponemal test: RPR or VDRL
  - sensitive, nonspecific, inexpensive
- Treponemal specific test: FTA-ABS or TPPA
  - confirmatory, high specificity for treponemals, expensive
- CSF: Meningitis, focal neurologic findings, ophthalmic involvement, tertiary syphilis, or HIV with low CD4
  - ↑WBC 10-400 cells/μL, ↑protein 45-200 mg/dL
  - CSF VDRL, CSF FTA-ABS
Diagnosis of Syphilis

• **Primary**: serologic tests often negative, scrapings show treponemes under dark-field microscopy
• **Secondary**: serologic studies or dark-field microscopy
• **Tertiary**: clinical suspicion, confirmed by serologic
• HIV coinfection: False-negative FTA-ABS
Treatment of Syphilis

- **Primary, secondary or early latent**
  - Latent = seroreactivity without evidence of disease
  - Early latent = acquired within past year)
  - Benzathine penicillin G 2.4 million Units IM x1
    - Doxycycline 100 mg PO two times a day for 14 days
  - Reexamine in 6 months (clinically & repeat VDRL/RPR)
  - +/- HIV testing

- **Late latent, unknown duration**
  - Benzathine penicillin G 2 to 4 million units IM weekly for 3 weeks (highly preferred) or
  - Doxycycline 100 mg PO for 30 days
Treatment of Syphilis

● Neurosyphilis
  ○ Aqueous crystalline penicillin G IV 3-4M u q 4 hrs x 14d or
    ■ Procaine penicillin 2.4M u IM daily +
    ■ probenecid 500 mg PO qid x 14d

● Jarisch–Hérxheimer reaction: fever, headache, myalgias within 24 hours of treatment for syphilis.
  ○ Treat with antipyretics
Chancroid (L) 8.1.2.3

- Haemophilus ducreyi; Gram-negative bacillus
- HIV & syphilis coinfections common
- Signs & Symptoms:
  - **Painful papule** develops 4 to 10 days postexposure
  - Becomes a very **painful ulcer**: single or multiple
  - Painful **unilateral bubo** in 50% of patients; may rupture
- Diagnosis:
  - Gram stain: gram-negative bacilli
    - "school of fish" pattern
- Treatment: Azithromycin 1 g PO x1 or
  - Ceftriaxone 250 mg IM x1
Granuloma Inguinale

- Klebsiella granulomatis; Gram-negative bacillus
- Rare in US; common in SE Asia, South America, Australia, and the Caribbean
- Signs & Symptoms:
  - Painless genital papule → **beefy-red ulcer/ulcers**
  - Pseudo-buboes: subcutaneous granulomas
- Diagnosis: Visible **Donovan bodies** on smear
- Treatment: Doxycycline 100 mg PO BID x 3 wks
  - Treat until after all lesions resolve
Herpes progenitalia

- DNA virus: HSV1 & HSV2
- HSV1: mostly oral lesions
- Chronic illness with acute exacerbations
- Primary HSV illness
  - More severe than recurrences
  - 3-4 weeks
  - May be asymptomatic but contagious
Herpes progenitalia \( (L) \) 8.1.2.6

- Signs & Symptoms
  - Painful, grouped, vesicular, or ulcerated lesions on vagina, pre-labia, and labia
  - Fever, abdominal pain, myalgia possible
  - Aseptic meningitis, headache, photophobia possible
  - Recurrent infection
    - Virus dormant in spinal root ganglia
    - Reactivation at irregular intervals, unknown triggers
    - Less severe; resolves in 9-10d
    - No systemic symptoms
Herpes progenitalia (L) 8.1.2.6

- **Diagnosis:**
  - Physical examination
  - Tzanck prep or ELISA

- **Treatment:**
  - Primary: Acyclovir 400 mg PO TID x 10d
    - Valacyclovir 1 g PO BID x 7-10d
  - Secondary: Acyclovir 400 mg PO TID x 5d
    - Valacyclovir 500 mg PO BID x 3d
  - Suppressive daily regimens in patients with frequent attacks
Bacteremia/Sepsis (H) 8.1.3

- Systemic inflammatory response
  - Bloodstream infection
- Sepsis = Suspicion for infection + SIRS
- Systemic inflammatory response syndrome
  - Can occur in the absence of infection
  - ≥2 of the following:
    - Oral temperature >38°C or <35°C
    - Respiratory rate >20/minute or PaCO2 of <32 mmHg
    - Heart rate >90 beats per minute (bpm)
    - WBC >12,000 cells/µL or <4000 cells/µL or >10% bands
### qSOFA (Quick SOFA) Score for Sepsis

Identifies high-risk patients for in-hospital mortality with suspected infection outside the ICU.

**INSTRUCTIONS**
Use to predict mortality, NOT to diagnose sepsis, per 2017 Surviving Sepsis Guidelines.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Use</th>
<th>Why Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altered mental status, GCS &lt; 15</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Respiratory rate ≥ 22</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Systolic BP ≤ 100</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>0 points</th>
<th>Not High Risk</th>
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<tr>
<td>qSOFA Score</td>
<td>If sepsis is still suspected, continue to monitor, evaluate, and initiate treatment as appropriate, including serial qSOFA assessments.</td>
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</tbody>
</table>

2 or 3 points = Positive

“High Risk Assess for evidence of organ dysfunction with blood testing including serum lactate and calculation of the full SOFA Score.”
Bacteremia/Sepsis (H) 8.1.3

- **Diagnosis:** Clinical, laboratory
- **Treatment:** Restore oxygenation & perfusion
  - Cardiac monitor
  - Supplemental oxygen
  - Large-bore peripheral IV access or central line
  - 20-30 mL/kg NS fluid bolus
  - Urine output 1 to 2 mL/kg/hour
  - Source identification & control (drainage, antibiotics)
  - Screen for **severe sepsis** and **septic shock**
Severe Sepsis

- Sepsis + ≥1 signs of organ dysfunction/hypoperfusion
  - Altered mental status, cyanosis, mottled skin
  - Lactate = 4.0 mmol/L (increased short-term mortality)
  - Neurologic (10-70% incidence)
    - GCS <13 correlates with 20-50% increased mortality
  - Cardiovascular
    - Early: ↑CO, ↓SVR (distributive shock)
    - Late: myocardial depression, ventricular dilatation
  - Pulmonary
    - Respiratory failure, common cause of mortality
      - Catabolic state, ↑respiratory demand + ↑respiratory resistance
Septic Shock

- Severe sepsis + hypotension unresponsive to fluid resuscitation (20 to 30 mL/kg crystalloid bolus)
- Warm, flushed skin, flat neck veins, rapid, thready pulse → hypotension, AMS, mottled skin, cyanosis
- Diagnosis: Clinical
- Treatment: Source ID & control
  - Early, appropriate antibiotics may reduce mortality by 30%
  - Steroids: Consider stress dose steroids if persistent
    - Hydrocortisone 100 mg IV q8hrs
Mycobacterial Infections
Tuberculosis\(\text{(H) 8.1.4.1}\)

- Mycobacterium tuberculosis
- Acid-fast bacillus, slow growing
- Transmission: Respiratory droplets 1-5-\(\mu\)m diameter
- Pathogenesis
  - 1: Alveolar macrophage phagocytosis of inhaled bacilli
  - 2: Replication within macrophage/cell lysis
  - 3: Cell-mediated immune response (Primary TB)
    - Dormant bacilli survive for years
  - 4: Reactivation → overwhelms cell-mediated response (Latent TB)
The pathogenesis of tuberculosis in the infected host

Exposure to an Infectious Case of TB

Primary Infection

Primary or Progressive Primary Disease 5%

Latent Infection 95%

Hypersensitivity Reactions

Postprimary TB due to Reactivation 5%

No Disease 90%

Nonrespiratory

Respiratory

New Infections

* The probability of disease is much greater than 5% in patients with a severe immunocompromising condition such as HIV/AIDS.

Long and Schwartzman, Transmission and Pathogenesis of TB, Chapter 3, Canadian Tuberculosis Standards 2007
Tuberculosis (H) 8.1.4.1

- **Primary TB:**
  - Usually asymptomatic, mild fever/malaise, PPD+
- **8-10% convert to active TB (37% with untreated HIV)**
- **Postprimary TB:** (reactivation, secondary TB)
  - Constitutional symptoms: anorexia, weight loss, fatigue, malaise, fever, pallor, cachexia
  - Cough: nonproductive → hemoptysis, pleuritic chest pain
  - Suspect with risk factors, vague symptoms, FUO
  - Initially subtle presentation with HIV coinfection
Tuberculosis (H) 8.1.4.1

- Risk factors
  - HIV infection
  - Close contact with known TB
  - Foreign born from Asia, Africa, or Latin America
  - Low-income, homeless, migrant farm workers, health care workers
  - Elderly
  - Nursing home, correctional facility residents
  - IV drug abuse
Complications of TB

- Pneumothorax
- Empyema
- Pleural effusion
- Bronchopleural fistula
- Superinfection:
  - Aspergillus fumigatus (fungus ball)
- Massive hemoptysis
- Pericarditis
- Lymphadenitis (scrofula)
  - Most common extrapulmonary finding

- Gastrointestinal TB:
  - Most commonly ileocecal, may mimic appendicitis
- Peritonitis
- Ascites
  - 500-2000 WBCs, ↑lymphocytes, ↑protein
- Meningitis
Tuberculosis (H) 8.1.4.1

- **Diagnosis: Chest x-ray**
  - **Primary:** 1% false-negative rate (7-15% with HIV)
    - Pneumonic infiltrate + enlarged hilar/mediastinal lymph nodes
    - Pleural effusion
    - Miliary TB (diffuse 1-3mm nodules)
    - Ghon focus (healed primary lesion)
  - **Postprimary**
    - Upper lobe infiltrate +/- cavitation
    - → Lobar/lung opacification
Tuberculosis\textsuperscript{(H) 8.1.4.1}

- Tuberculin skin test (antigen reaction) PPD
  - ≥5 mm:
    - Positive with HIV/HIV risk factors
    - Close contacts
    - Fibrotic changes on CXR (prior TB)
  - ≥10 mm: positive with other TB risk factors
    - Long-term care resident/employee
    - Homeless shelter resident/employee
    - Hospitals/Healthcare facility
    - Prisons/Jails
  - ≥15 mm: positive with no risk factors
Interpretation

Skin test interpretation depends on two factors:
- Measurement in millimeters (mm) of the induration
- Person’s risk of being infected with TB and progression to disease if infected

The three cut points below should be used to determine whether the skin test reaction is positive. A person with a positive reaction should be referred for a medical evaluation for latent TB infection and appropriate follow-up and treatment if necessary. A measurement of 0 mm or a measurement below the defined cut point for each category is considered negative.

**Induration of ≥5 mm is considered positive in**
- Human immunodeficiency virus (HIV)-infected persons
- Recent contacts of TB case patients
- Persons with fibrotic changes on chest radiograph consistent with prior TB
- Patients with organ transplants and other immunosuppressed patients (e.g., receiving the equivalent of ≥15 mgld of prednisone for 1 month or more)

**Induration of ≥10 mm is considered positive in**
- Recent immigrants (i.e., within the last 5 years) from countries with a high prevalence of TB
- Injection drug users
- Residents and employees* of the following high-risk congregate settings:
  - prisons and jails
  - nursing homes and other long-term facilities for the elderly
  - hospitals and other health care facilities
  - residential facilities for patients with acquired immunodeficiency syndrome (AIDS)
  - homeless shelters
- Mycobacteriology laboratory personnel
- Persons with the following clinical conditions that place them at high risk:
  - silicosis
  - diabetes mellitus
  - chronic renal failure
  - some hematologic disorders (e.g., leukemias and lymphomas)
  - other specific malignancies (e.g., carcinoma of the head, neck, or lung)
  - weight loss of ≥10% of ideal body weight
  - gastrectomy
  - jejunostomy bypass
- Children <5 years of age
- Infants, children, and adolescents exposed to adults at high risk for developing active TB

**Induration of ≥15 mm is considered positive in**
- Persons with no known risk factors for TB

* For employees who are otherwise at low risk for TB and who are tested as part of an infection control screening program at the start of employment, a reaction of ≥15 mm is considered positive. Some health care workers participating in an infection control screening program may have had an induration ≥0 mm that was considered negative at baseline. If these health care workers have an increase in induration size upon subsequent testing, they should be referred for further evaluation.
Tuberculosis (H) 8.1.4.1

- Spontaneous/induced sputum for acid-fast bacilli
  - Insensitive (10,000 bacilli/mL required)
  - Three specimens over 3 days improve sensitivity
- Culture
  - Slow growing, 14-28 day incubation
  - BACTEC system shortens time to diagnosis to 7-14 days
Treatment of TB

- Preventive therapy
  - INH 300 mg/day, 9-10 months min
- Suspected or confirmed pulmonary TB
  - Admit, respiratory isolation, PPD, serial induced sputum
- Confirmed: multidrug therapy, 6 months min
  - Isoniazid 3 to 5 mg/kg (1-2% hepatitis)
  - Rifampin 10 mg/kg (orange body fluids)
  - Pyrazinamide 15 to 30 mg/kg
  - Ethambutol 15 to 25 mg/kg
  - PPD placement for all close contacts (≥5 mm)
Treatment of TB

- HIV-positive
  - INH, rifabutin, pyrazinamide, ethambutol
  - Extrapulmonary TB: 12-month therapy
  - + Prednisone 20-60 mg/kg/day if TB pericarditis/meningitis

- Massive hemoptysis (=600 mL blood in 24 hours)
  - Secure airway (8-0 ETT or larger for bronchoscopy)
  - Place bleeding lung in dependent position
Treatment of TB

- Prevention of transmission
  - Early ID, respiratory isolation for hemoptysis or TB risk factors & pulmonary symptoms
  - Negative pressure, 6-12 air changes/hr
  - Personal respiratory protection devices
  - PPD placement after potential exposure
    - Annually for healthcare workers
  - BCG vaccine not recommended
Atypical Mycobacteria

- Mycobacterium avium complex, M. kansasii
- Opportunistic infection
- 50% of AIDS patients with disseminated disease
- Signs & Symptoms
  - Severe weight loss, diarrhea, fever, malaise & anorexia
  - Rarely causes pulmonary disease
- Diagnosis: Acid-fast stain/Blood culture
- Treatment: Azithromycin 500 mg PO qd x 14d
  - + ethambutol 15 mg/kg qd x 14 days
  - CD4 count <50 cells/mm3, prophylaxis:
    - Clarithromycin or azithromycin
Meningococcemia (H) 8.1.5

- Neisseria meningitidis
- Aerobic, Gram-negative diplococcus
- 2,400-3,000 cases/year in US
- Epidemic outbreaks (military & college dorms)
- Signs & Symptoms
  - Variable presentation (mild → fulminant disease/death)
  - Fever, rhinorrhea, lethargy, myalgia, emesis, diarrhea, cough
Meningococcemia (H) 8.1.5

- Occult bacteremia: (<1% mortality)
  - Vague symptoms with positive blood cultures
  - Usually resolve spontaneously or with oral antibiotics
  - Infrequently progresses to meningococcemia

- Meningococcal meningitis: (2-5% mortality)
  - Headache, fever, seizures, petechial or purpuric rash (50%)
Meningococcemia (H) 8.1.5

- Meningococcemia: (20-60% mortality)
  - Vague symptoms → Multisystem organ failure/death <12hrs
  - Lethargy, cyanosis, hypo/hyperventilation
  - Petechiae & purpura present (50-60%)
    - Ankles, wrist, pressure points in contact with clothing
  - Myocarditis, vasculitis, pulmonary edema, DIC, acute tubular necrosis
Waterhouse–Friderichsen syndrome:
- 10-20% of meningococcemia
- Rapid deterioration, diffuse petechiae/purpura, vasomotor collapse, **bilateral adrenal hemorrhage**
- Poor prognostic signs:
  - seizures, hypothermia, hyperpyrexia, WBC <5000, platelets <100,000, petechiae, purpura, absence of meningitic signs
Meningococcemia (H) 8.1.5

- Diagnosis: Clinical
  - Do not delay therapy for diagnostic tests
- Confirmed by positive culture (<50% positive)
- CSF analysis:
  - Elevated: opening pressure, protein, WBC count, segmented neutrophils, bandemia, +Gram stain
  - Low: glucose
Meningococccemia (H) 8.1.5

- Treatment
  - Cefotaxime 200 mg/kg/day divided q6hrs or
  - Ceftriaxone 100 mg/kg initial bolus, then 100 mg/kg/day divided q12hrs
  - Chloramphenicol 75-100 mg/kg q6hrs
  - Respiratory isolation for suspected cases

- Occult bacteremia: treatment depends
  - Repeat Cx, LP if meningeal signs, admit for observation
Meningococcemia: 

- Supportive measures: Airway, fluids, vasopressors, HD for ARF, FFP for bleeding
- Dexamethasone 10 mg IV q6 hrs x4 days if vasopressors
- **Prophylaxis**: close contacts, household, nursery school, day care center, health care workers (if CPR, intubation, suctioning performed)
  - Rifampin 10 mg/kg q12 hours × 4 doses
  - Ciprofloxacin 500 mg q12 hours × 4 doses
Yersinia pestis; Gram-negative bacillus
- Reservoir: rodents
- Numerous epidemics, 3 pandemics
- Bodily fluids/tissues, or respiratory droplets
- Flea bite inoculates under skin → lymph nodes
• **Signs & Symptoms**
  ○ Fever, chills, headache, malaise, prostration, leukocytosis
  ○ Bubonic (most common form)
    ■ 2-8 days after flea bites
    ■ Regional lymphadenitis → necrosis of lymph nodes (bubo), eschar
    ■ Pneumonia, sepsis
  ○ Primary or secondary form (complication of bubonic form)
    ■ DIC, small vessel necrosis, **gangrene fingers/nose** (“Black Death”)
Plague (L) 8.1.6

- Signs & Symptoms (continued)
  - Pneumonic
    - Bioterrorism
    - Spread by inhalation of droplets or hematogenous
    - Productive cough, chills, body aches
    - Fatality rate high within 48 hours
    - CXR: patchy/confluent infiltrate
Plague\textsuperscript{(L)} 8.1.6

- **Diagnosis:**
  - PCR; Gram, Wright, Giemsa & Wayson stains
  - Antibody titers; Antigen detection by fluorescent assay
  - Confirmatory: Isolation of Y. pestis

- **Treatment:** Droplet precautions
  - Streptomycin, 15 to 22.5 mg/kg IM BID x 10 days
  - Gentamicin 2 mg/kg IV TID x 10d
  - Alternatives: doxycycline, ciprofloxacin, chloramphenicol
Tetanus \((M)\) 8.1.7

- Clostridium tetani
  - Spore-forming, Gram-negative anaerobic bacilli
  - Ubiquitous in soil and dust, animal feces
  - Noninvasive, requires portal of entry, retrograde axonal transport to CNS
  - Release tetanospasmin toxin
    - Blocks inhibitory neurotransmitter release, irreversible
    - Severe muscle spasm & autonomic dysfunction
Tetanus\(M\) 8.1.7

- 70% recall a history of injury
- Incubation: 1 day-months
- Progressive symptoms over 10 days
  - Then diminish, full recovery 4 weeks
- Early:
  - Irritability, muscle weakness, myalgia, muscle cramps, dysphagia, drooling
Delayed:

- Masseter spasm, risus sardonicus
- Muscle spasm → Long-bone fractures, tendon rupture, etc
  - Opisthotonus
- Laryngeal/respiratory spasm → respiratory failure
- Autonomic symptoms = Leading cause of death
  - Tachycardia, hyperthermia, dysrhythmia, myocarditis, pulmonary edema
Tetanus<sub>(M) 8.1.7</sub>

- **Diagnosis: Clinical diagnosis**
  - Cultures insensitive, no confirmatory lab tests available

- **Treatment: Supportive care**
  - Muscle spasm control (Benzodiazepine or propofol)
  - +/- Dantrolene (↓ need for ventilator)
  - Mg infusion: ↓autonomic instability
  - Mechanical ventilation & neuromuscular blockade
    - Avoid succinylcholine due to hyperkalemia
Tetanus (M) 8.1.7

- **Treatment** *(continued)*
  - Combined alpha/beta-antagonists (e.g. labetalol) for HTN
    - Pure beta-blockade → uncontrolled hypertension
  - Morphine or MgSO4 for labile blood pressure
  - Temporary pacemaker if brady (avoid atropine)
Tetanus\(_{(M)}\) 8.1.7

- **Human tetanus immunoglobulin (TIG)**
  - Eliminates circulating toxin, no effect on bound toxin
  - 3,000-6,000 Units IM at separate site from tetanus toxoid
  - Passive immunity, half life = 25 days

- **Prevention of tetanospasmin production**
  - Wound debridement, only after TIG given
  - Metronidazole 500 mg IV q6hrs
Tetanus\(\text{M} 8.1.7\)

- **Vaccination**
  - Inactivated tetanospasmin toxoid
  - Nearly 100% effective after 3 doses
  - Immunity wanes 5-10 yrs
    - Faster in elderly, IVDAs & immunosuppressed
    - Give to all suspected acute tetanus infections
      - And as prophylaxis for routine wounds
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<td>No‡</td>
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<td>TIG</td>
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</tbody>
</table>

- Adults with uncertain history, give primary series, dose at time zero, 4 to 8 weeks and 6 to 12 months, with booster every 10 years
Toxic Shock Syndrome (M) 8.1.8

- S. aureus or Streptococcus pyogenes
- High-absorbency tampons
  - Nonmenstrual TSS now more common
  - Surgical procedures, infections, burns, IVDU, childbirth, nasal packing, HIV coinfection
- Women 15-34 years most common
- Case fatality rate 10% (1980), 1%( 1989-present)
  - 30-50% mortality for streptococcal TSS
Toxic Shock Syndrome

- Toxin absorbed from infection, systemically distributed
- Fever, tachycardia, hypotension
- Rash: nonpruritic, diffuse, macular, blanching erythroderma, flaking desquamation
Staphylococcal TSS

- Temperature >102° F, characteristic rash
- Hypotension: SBP ≤90 mmHg, orthostatic DBP drop
- Involvement of ≥3 systems:
  - Gastrointestinal: V/D
  - Muscular: myalgia or CPK>2x normal
  - Mucous membrane hyperemia
  - Renal: BUN/Cr >2x normal
  - Hepatic: total bilirubin, AST or ALT >2x normal
  - Hematologic: Platelets ≤100,000/mm3
  - CNS: AMS without focal neurologic findings
  - Neg blood/throat/CSF cultures; RMSF, leptospirosis or rubeola titers
Streptococcal TSS

- Isolation of group A strep from body site (sterile or nonsterile)
- Clinical signs:
  - Hypotension AND ≥2 of:
    - Renal impairment
    - Coagulopathy
    - Liver abnormalities
    - Acute respiratory distress syndrome
    - Extensive tissue necrosis
    - Erythematous rash
**TSS Treatment**

- Removal of foreign bodies
- Drainage of infection
- Debridement of infected wounds
- Supportive care:
  - 20 to 30 mL/kg crystalloid bolus
  - Vasopressors for persistent hypotension
  - **Clindamycin** 600 to 900 mg every 8 hours
  - Intravenous immunoglobulin (IVIG) 400 mg/kg, if no response to fluids & vasopressors
Mycoplasma (L) 8.1.9

- Atypical bacterium
- 5-25% bronchitis, 2-10% CAP
- “Walking Pneumonia”
- Cold agglutinin + $\rightarrow$ PCR or EIA assay
- Treatment: macrolides, tetracycline & fluoroquinolone
Fungal$(L)\ 8.2$
Aspergillus fumigates

- Ubiquitous fungus, grows in moist soil $\rightarrow$ inhalation
- Invasive pulmonary disease
  - Angioinvasion $\rightarrow$ thrombosis, dissemination
  - Erosion into blood vessels $\rightarrow$ catastrophic hemorrhage
- Neutropenia, HIV, poorly controlled DM
- Cough, pleuritic chest pain, hemoptysis, hypoxemia
Aspergillus fumigates

- Aspergilloma (Fungus ball) colonization of previously existing cavitary lesion (chronic lung disease)
- Allergic aspergillosis: Hypersensitivity lung disease
  - Wheezing, expectoration of brown mucus plugs, low-grade fever, eosinophilia, transient pulmonary infiltrates
  - Children with asthma or cystic fibrosis - Occurs secondary to persistent exposure to fungus
- Diagnosis: Bronchoscopy/lung biopsy
  - Aspergilloma: CXR cavitary lesion (air crescent sign)
  - Farmer’s Lung: Clinical Dx
Aspergillus fumigates

Treatment

- Invasive pulmonary: Treatment failure common
  - **Amphotericin B, itraconazole**
- Aspergilloma: Surgical resection/lobectomy
- Allergic: Corticosteroids → antifungal treatment
- Farmer’s lung: Remove source
Blastomyces dermatitidis

• Round, thick-walled, dimorphic yeast
• Ohio & Mississippi Valleys
  ○ Construction activities near waterways
• POE: Lungs → hematogenous/lymphatic spread
• Fever, chills, cough, night sweats, hemoptysis
• Respiratory failure, extrapulmonary, ARDS
• Extrapulmonary (Skin, Skeletal, GU)
• Treatment: Amphotericin B
Coccidioides immitis

- Southwestern US; San Joaquin Valley Fever
- No person:person transmission
- Immune response T-cell mediated
- Pneumonia, pleurisy, cough, cyanosis, dyspnea
- Rash: Erythema multiforme, erythema nodosum
  - Good immune response/good prognosis
- Diagnosis: Serology and/or biopsy
- Treatment: Usually self-limited
  - Ketoconazole for severe or prolonged symptoms
    - Treat high-risk patients even with mild disease
    - Amphotericin B if severe in late pregnancy
Histoplasma capsulatum

- Thin-walled dimorphic yeast
- Ohio & Mississippi Valleys
  - Bat, chicken, and bird excrement; Spelunking, excavation
  - T-cell–mediated response
- Symptoms in <5% of infected people
- Acute pericarditis, Arthritis, Erythema nodosum
- Cavitary lesions at lung apices (Like TB)
- Progressive fibrosis→ restrictive lung disease
- Diagnosis: Serology
- Treatment: Itraconazole
  - Amphotericin B (severe, immunocompromised, CNS)
Mucormycosis

- Immunocompromised, DM, trauma
- **Rhizopus** (most common genera)
  - Inhalation of fungus & deposition on nasal passage
- Aggressive, invasive → hemorrhagic necrosis
- Rhinocerebral (HA, nasal stuffiness, facial pain)
  - Progression to orbital/intracranial invasion
  - **Black eschar on hard palate** = hallmark of disease
- Diagnosis: Biopsy
- Treatment: Correct predisposing factors
  - **Amphotericin B**
  - Aggressive nasal debridement
Sporotrichosis

- Sporothrix schenckii, Rose gardener disease
- Gardeners, foresters, animal handlers
  - (animal-to-human transmission)
- Cutaneous: Red raised lesions, advance proximally via lymphatic channels (lymphangitic streaking)
- Diagnosis: Culture/biopsy
- Treatment: Itraconazole or fluconazole
  - Pulmonary: Surgery + Antifungals
  - **Amphotericin B** for severe/disseminated
8.0 SYSTEMIC INFECTIOUS DISORDERS ............................................................ SECTION B

8.3 Protozoan – Parasites
   8.3.1 Malaria ................................................................. L
   8.3.2 Toxoplasmosis ..................................................... L

8.4 Tick Borne Illness
   8.4.1 Rocky Mountain Spotted Fever .................................. M
   8.4.2 Lyme disease ..................................................... M
   8.4.3 Ehrlichiosis ....................................................... M

8.5 Viral
   8.5.1 HIV ................................................................. H
   8.5.2 Infectious mononucleosis ........................................ M
   8.5.3 Influenza ........................................................... M
   8.5.4 Mumps .............................................................. L
   8.5.5 Polio ................................................................. L
   8.5.6 Rabies ............................................................... M
   8.5.7 Rubella .............................................................. L
   8.5.8 Roseola ............................................................. L
   8.5.9 Varicella/zoster .................................................. M
   8.5.10 Herpes simplex ................................................ L

8.6 Travel-Related ................................................................. L

8.7 Prevention
   8.7.1 Prophylaxis ......................................................... M
   8.7.2 Immunizations .................................................... M

8.8 Emerging infections ...................................................... M
Malaria (L)8.3.1

- Plasmodium vivax, P. ovale; P. malariae; P. falciparum (highest mortality rate)
- Vector: female Anopheles mosquito
  - Mosquito bites human; releases sporozoites → liver
  - Direct transfusion of infected cells (e.g., needle-stick)
  - Transplacental
- Sub-Saharan Africa = highest exposure intensity
- Non-falciparum malaria: symptoms cyclic q48-72hr
  - Fevers, weakness, malaise, HA, myalgias → anemia
Malaria

- P. vivax & ovale: latent disease, relapses after months
- P. malariae: regular 72-hour intervals
- Benign quartan malaria: subclinical, persists for years
- P. falciparum: noncyclic, rapidly progressive
  - Blackwater Fever: Abnormal bleeding, circulatory collapse, hypoglycemia, anemia, jaundice; HSM
Malaria Treatment

- **P. malariae, P. vivax, P. ovale**
  - Chloroquine or Primaquine (avoid in G6PD)
  - Prophylaxis in P. vivax or P. ovale to prevent relapses

- **P. falciparum (↑resistance): Chloroquine**
  - If high resistance: Quinine + Doxy
  - Exchange transfusion if severe
Toxoplasmosis

- Toxoplasma gondii; Host: cats
- Ingestion of uncooked, raw meat (cysts); cat or wild animal feces (oocytes)
- **Transplacental**, transfusion or transplantation
- Immunocompromised & Congenital toxoplasmosis
Toxoplasmosis (L) 8.3.2

- Immunocompetent: self-limited, nonspecific illness
  - Single, nontender posterior cervical node
  - Chorioretinitis: 4th to 6th decades, unilateral involvement
  - Resembles mononucleosis or CMV
  - Reinfection without clinically apparent disease

- Congenital toxoplasmosis
  - Mothers acquire infection for 1st time during gestation
  - 85% appear normal at birth
  - Triad: Hydrocephalus, chorioretinitis, cerebral calcifications
  - Disease more severe when acquired early in gestation
Toxoplasmosis

- Chorioretinitis
  - Reactivation of intrauterine or postnatally acquired infection
  - Bilateral disease, retinal scars
  - Hydrocephalus, seizures, hearing loss, jaundice, HSM
- Immunocompromised (e.g. HIV)
  - Severe, life threatening → brain
Toxoplasmosis \( \text{(L)8.3.2} \)
● Diagnosis: Serology, histology, PCR, CT head
● Treatment:
  ○ Immunocompetent
    ■ No treatment unless severe
    ■ Pyrimethamine, sulfadiazine, & folinic acid for 4-6wks
  ○ Toxoplasmic chorioretinitis (consult ophthalmologist)
    ■ Pyrimethamine, sulfadiazine, & folinic acid
    ■ Clindamycin
    ■ Systemic corticosteroids
Toxoplasmosis \((L)8.3.2\)

- **Infection in pregnant women**
  - Spiramycin loading
  - Decreases incidence of fetal infection, continue throughout pregnancy

- **Congenital toxoplasmosis**
  - Sulfadiazine, pyrimethamine, & folinic acid x12mo

- **Pregnant women:** *Avoid contact with cat feces* (cleaning litter boxes)
Tick Borne Illness 8.4

Dermacentor variabilis (American Dog ticks)

Larva

Nymph

Adult Male

Adult Female
Rocky Mountain Spotted Fever

- Rickettsia rickettsii
- Vector: Dermacentor (American Dog) tick
- Hosts: deer, rodents, horses, cattle, cats, & dogs
- Western Hemisphere, 50% mid-Atlantic states
  - 90% April - September
- Highest incidence: 5-9 y/o & males >60yrs
- History of tick exposure (50% recall bite)
- Systemic, small-vessel vasculitis
- Triad (3%): Fever, headache & rash
Rocky Mountain Spotted Fever

- Rash: 1-15 days after exposure, absent in 20%
  - Hands, feet, palms & soles, wrists & ankles (centripetal)
- Gastrointestinal (40-60%), ↑LFT’s, Pulmonary
  - Encephalitis, Lymphocytic meningitis (30%)
- Diagnosis: Clinical, Labs, PCR, Titers
- Treatment:
  - Doxycycline 100 mg PO BID x 7 days
    - Drug of choice in children
  - Chloramphenicol not recommended
Lyme Disease (M)8.4.2

- Most common vector-borne zoonotic infection
- *Borrelia burgdorferi*, spirochete
- Vector: Deer tick (*Ixodes* species)
- Northeast US (up to 3% prevalence)
- <72 hours tick attachment no risk
- 25% if attached >72 hours
Lyme Disease (M)8.4.2

● Primary
  ○ Erythema migrans = most common sign (60-80%)
  ○ Erythematous plaque, central clearing, vasculitis, painless, not pruritic
  ○ Occurs at site of bite, 2-20 days after bite
  ○ Fever, malaise, HA, neck stiffness, myalgia & arthralgia
Lyme Disease (M)8.4.2

● Secondary
  ○ Days-6 months after bite
  ○ Multiple erythema migrans rashes
  ○ Fever, adenopathy, arthritis
  ○ Neuro: HA, stiff neck, photophobia, paresthesias/palsies
  ○ Cardiac: 1st, 2nd, 3rd degree AV block

● Tertiary:
  ○ Arthritis, myocarditis, encephalopathy, polyneuropathy

● Diagnosis: Clinical + epidemiologic features
  ○ Confirmatory tests: PCR, immunoassay, Western blot
Lyme Disease (M)8.4.2

- **Treatment:**
  - Doxycycline
  - Children under age 12 years, pregnant:
    - Amoxicillin or penicillin VK
    - PCN allergic: Cefuroxime or erythromycin 15-30d
  - Primary: 14-21 days PO, Secondary: 30 days PO
  - Tertiary: IV treatment
- High-degree AV block: Temporary pacing
- Jarisch–Herxheimer reaction
  - Fever, HA, myalgias < 24 hours when Tx initiated
Lyme Disease (M)8.4.2

- **Prophylaxis if:**
  - Bitten by deer tick in highly endemic areas
  - Deer tick partially engorged with blood
  - Deer tick feeding >72 hours
  - **Doxycycline 200 mg PO x 1 within 72 hours**
Ehrlichiosis (M)8.4.3

- Ehrlichia chaffeensis; Gram-negative coccobacilli
- Human granulocytic ehrlichiosis (HGE)
  - Predominant in NE, Midwest US
  - Vector: *Ixodes* tick; Reservoir: white-tailed deer
- Human monocytic ehrlichiosis (HME) more common
  - South/Southeast
  - Vector: *Amblyomma* tick, Reservoir: white-tailed deer
- Acute, febrile illness similar to RMSF without:
  - Anemia, leukopenia, vasculitis
- Rash (20%) maculopapular, petechial
- Age typically >40yrs
Ehrlichosis (M)8.4.3

- Rare: Renal/Respiratory failure, encephalitis
- Diagnosis: Indirect immunofluorescent antibody test
- Treatment: Doxycycline 100 mg PO BID x 7-14 days
Viral 8.5
HIV (H)8.5.1

USA

1.2 million people living with HIV (2013)

0.4%-0.9% adult HIV prevalence (2012)

40,630 new HIV infections (2013)

12,960 AIDS-related deaths (2012)

37% antiretroviral treatment coverage (2011)

Source: UNAIDS, CDC and ONAP
HIV (H)8.5.1

- ↑ prevalence: MSM, African Americans, Hispanics
- Transmission via seminal/vaginal fluid, blood products, breast milk, transplacental transmission
- RNA retrovirus
- Targets CD4 lymphocyte
- Immune system ultimately unable to control HIV-infection → opportunistic infections, neoplasms → death
HIV

- Incubation: 10-14 days
- Acute retroviral syndrome (66%)
  - Fever (80-90%)
  - Malaise (>70%)
  - Anorexia or weight loss (15-70%)
  - Myalgias/arthralgias (40-70%)
  - Headache (30-40%)
  - Pharyngitis (>50%)
  - Rash (20-70%)
- Seroconversion 4 to 8 weeks after infection
HIV

- Can be asymptomatic for years
- Early: increase in community-acquired infections
- AIDS = CD4 <200 AND AIDS-defining illness:
  - Cryptococcosis
  - Cryptosporidiosis
  - CMV retinitis
  - Esophageal candidiasis
  - Kaposi sarcoma
  - Pneumocystis jirovecii pneumonia (PJP)
  - Toxoplasmosis
  - Mycobacterium avium complex
  - Disseminated histoplasmosis
38 y/o HIV+ M with cough.
Pulmonary & HIV

- Nonopportunistic infections are most common
  - S. pneumoniae, H. influenzae, S. aureus, viral, etc

- Pneumocystis pneumonia (PJP)
  - Pneumocystis jiroveci (yeast-like fungus)
  - Diagnosis:
    - Hypoxemia
    - ↑ alveolar-arterial gradient
    - ↑ LDH
    - CXR: Diffuse interstitial infiltrate
      - May be normal early in disease
Pneumocystis Pneumonia

Treatment:
- Prednisone if PaO2 < 70 mmHg
- TMP/SMX (Bactrim DS ®) 2 tabs PO TID x 3 weeks
  - IV TMP/SMX if severely ill
- Pentamidine (in sulfa-allergic patients)
Mycobacterium TB

- ↑ Incidence in HIV-infected patients
- ↑ Extrapulmonary symptoms
- ↑ False negative PPD test
- Negative/nonspecific CXR

Treatment:
- Isoniazid, rifampin, pyrazinamide, ethambutol x 6 months
Pulmonary & HIV

- Other pulmonary complications:
  - Cryptococcal pneumonia
  - Histoplasmosis
  - CMV
  - Kaposi sarcoma
  - Lymphoma
38 y/o HIV+ M with throat pain...
Oral candidiasis
○ >80% of AIDS patients affected
○ Plaques w/ erythematous base, easily scraped off
○ Tongue & buccal mucosa most commonly involved
○ Treatment: Fluconazole 150 mg PO qd x 7-14d

Esophageal lesions
○ Dysphagia or odynophagia
○ Candida, CMV, or HSV

Enteric disease
○ Diarrhea = Most common GI symptom (90%)
○ Viral, bacterial, fungal, drug-related
○ Treat underlying cause
Neurological & HIV

● Infectious processes
  ○ Bacterial meningitis
  ○ Cryptococcus neoformans
  ○ CMV
  ○ Progressive multifocal leukoencephalopathy
  ○ Herpes simplex virus (HSV)
  ○ Neurosyphilis
  ○ Tuberculosis

● Noninfectious processes
  ○ CNS lymphoma
  ○ Stroke
  ○ Encephalopathy
  ○ Neuropathy

● Workup of AMS in HIV:
  ○ CT of the brain &
  ○ Lumbar puncture (LP)
38 y/o HIV+ M with a rash...
Dermatological & HIV

● Kaposi sarcoma
  ○ **Violaceous**, pink/papules, plaques, nodules, & tumors
  ○ Treatment: cryotherapy, radiotherapy, chemotherapy

● Varicella zoster
  ○ May involve multiple dermatomes
  ○ Treatment:
    ■ Single dermatomal zoster infection
      ● Outpatient Famciclovir (500 mg PO TID), acyclovir (500 mg PO QID), or valaciclovir (1 g PO BID)
    ■ Admission: Systemic, Ophthalmic zoster, Multidermatomal
HIV Diagnosis

● Acute phase
  ○ HIV nucleic acid amplification or
  ○ HIVp24 antigen
  ○ Combined HIV p24 antigen–antibody test

● After seroconversion
  ○ Enzyme-linked immunoassay (EIA) (99% Sp, 98.5% Sn)
  ○ Confirmatory Western blot (WB) (99.9% Sn & Sp)
  ○ CD4 count: Differentiate between HIV infection & AIDS
Infectious Mononucleosis (M)8.5.2

- Adolescents & Young Adults
- 4-6 wk incubation, secretion in saliva x 1 year
- EBV associated with:
  - African Burkitt Lymphoma
  - Nasopharyngeal carcinoma
- Fever, exudative pharyngitis, posterior LAD, fatigue, jaundice, HSM
- Rash common in patients treated with PCN
- Splenic rupture = rare complication
- Symptoms 1-3 weeks with fatigue ~3 months
Infectious Mononucleosis\textsuperscript{(M)8.5.2}

- **Diagnosis:** Clinical +
  - Labs
    - Atypical lymphocytes (>10%)
    - Heterophile Ab (Monospot) ↑Sn, Sp, + early in disease

- **Treatment:**
  - Supportive care
  - No contact sports
  - Avoid PCN (nonallergic morbilliform rash)
  - Steroids for airway compromise, hemolytic anemia, thrombocytopenia
Influenza (M)8.5.3

- Groups A, B, C (rapid antigenic change)
- Types A & B widespread epidemics/pandemics
- Transmission: Droplet, person:person
- **Most common**: Viral pneumonia in adults
- November–April
- Incubation: 1-4 days
- Fevers, myalgias, coryza, conjunctivitis, HA, nonproductive cough
Influenza (M)8.5.3

● Complications:
  ○ Influenza pneumonia → ARDS)
    ■ Elderly, pregnant, cardiac disease at risk
  ○ Secondary bacterial pneumonia
    ■ Staphylococcal, streptococcal

● Diagnosis: Clinical, Viral culture (Gold Standard)
  ○ Rapid direct antigen assay

● Treatment:
  ○ Antivirals if <48 hours of onset
  ○ Reduce severity & duration (~1 day) of influenza A (not B)
    ■ Oseltamivir 75 mg PO BID x 5d
Vaccination

- Everyone >6 months
- Complication: Guillain–Barré syndrome
  - Data on association between GBS & flu vaccination are variable & inconsistent across flu seasons
    - At most: 1-2 cases/1M doses flu vaccine
- Avoid aspirin in children: Reye syndrome
Mumps (L)8.5.4

- Mumps virus; Incubation 16-18d; Droplet
- Fever, Myalgia, Fatigue → **Parotitis**
- Complications: Meningitis (15%), pancreatitis (4%), deafness, and **orchitis** → infertility (rare)
- Diagnosis: Clinical + Viral Cx, Mumps IgM Ab
- Treatment: Supportive
- Vaccine Preventable
Polio (L)8.5.5

- Poliovirus; Fecal-Oral spread
- Viral prodrome
- Progressive muscle weakness (hours-days)
  - Aseptic meningitis/encephalitis
  - Can involve diaphragm
  - Return to normal 1-2 weeks
- 2016: 37 cases (Afghanistan, Nigeria, Pakistan)
- Vaccine Preventable
Rabies

● Human rabies virus

● Reservoir/transmitter: **Bats** (88% human rabies) **USA**
  ○ Raccoon, skunks, foxes, coyotes, woodchucks
  ○ Worldwide: dogs, cats more common
  ○ Not: rodents, rabbits, hares
  ○ Rabid animals may display aggressive behavior
  ○ ↑50 x transmission risk via bite

● Pathophysiology
  ○ Multiplies within monocytes → across motor end plate
  ○ Replicates in peripheral nerve → CNS via DRG
  ○ Replicates in CNS gray matter → peripheral nerves
Rabies

- **Prodrome:**
  - General, nonspecific, HA, fever, rhinorrhea, myalgias
  - Paresthesias, pain at bite site

- **Full-blown rabies:**
  - Encephalitic “frenzy” form
  - Agitation, hydrophobia, aerophobia, irritability
  - Hemodynamic lability (tachycardia, tachypnea, fever)
  - **Hydrophobia**

- **“Dumb” form:**
  - Limb weakness with spared consciousness initially
Rabies (M)8.5.6

- Coma ≤1 week, death 3-20 days
- Diagnosis
  - Ante mortem, diagnosis helpful in limiting contacts
    - Isolation of virus
    - CSF: nonspecific pleocytosis, rabies virus RNA via PCR
  - Postmortem:
    - Negri bodies (eosinophilic cytoplasmic viral inclusion)
    - Rabies antigen in brain tissue
Rabies

Treatment
- Supportive; case reports of survival
- Human rabies immunoglobulin (HRIG) & human diploid cell vaccine (HDCV) no effect once symptoms developed

Postexposure prophylaxis
- High-risk animals in endemic area: Treat immediately
- Domestic animals in endemic area: Observe animal 10d
- Bat exposure: Treat immediately
  - “Woke up and bat in room”
Rabies (M) 8.5.6

- **Wound care**
  - Scrub/clean/irrigate wound with soap & water
  - Do not suture or close wound

- **Immunoprophylaxis** (safe in pregnancy)
  - Passive immunization: HRIG 20 IU/kg at wound
    - Remainder IM at site away from vaccine
  - Active immunization: HDCV 1 mL IM deltoid
    - Days #0, 3, 7, 14 (& 28 if immunocompromised)
    - If vaccinated: no HRIG, HDCV 1 mL IM days 0 & 3
Rubella (L)8.5.7

- German measles, “third disease”
- Respiratory droplet transmission; Incubation 12-23d
- Contagious 1 week before, 4 days after rash
- Prodromal: eye pain, sore throat, HA, fever, cough, myalgia, nausea, URI symptoms
- Fine maculopapular rash
  - Face → extremities within 24 hrs, lasts 3 days
- Posterior auricular, occipital & posterior cervical LAD
Rubella

- Complications:
  - Peds: Encephalitis, thrombocytopenia, arthritis
  - Adults: myocarditis, orchitis, neuritis, erythema multiforme

- Congenital rubella syndrome:
  - Hearing loss, cataracts, retinopathy, mental retardation, cardiac abnormalities
  - Highest risk if infected before 12 weeks’ gestation

- Diagnosis: Clinical

- Treatment: Supportive care
  - Vaccination: before 15 months
    - No evidence of decreased immunity with age
Roseola (Measles)\(^{(L)8.5.8}\)

- Transmission: Respiratory droplets
- Contagious 3-5 days before, 4 days after rash
- Prodromal phase:
  - **Cough, coryza, conjunctivitis**, fever >101°F
  - **Koplik spots**: White papules w/ erythematous base, “grains of sand” pathognomonic
    - Buccal mucosa, present before the rash
- Exantheme phase:
  - Maculopapular, confluent, head → extremities
  - Lasts >3 days
Complications
  ○ Otitis media, pneumonia, laryngotracheitis
  ○ Meningoencephalitis, **subacute sclerosing panencephalitis (SSPE)** (1 in 10,000, brain inflammation)
  ○ Myocarditis/pericarditis; Thrombocytopenia purpura

Diagnosis: Clinical + measles IgM, measles Ab

Treatment: Supportive care
  ○ Vitamin A
  ○ Vaccine for postexposure prophylaxis

Hospitalization: Respiratory distress, encephalopathic
Varicella/Zoster \( (M) \) 8.5.9

- Transmission: direct contact, airborne, transplacental
- VZV latent in dorsal root ganglia
- Reactivation years after initial infection
- Chicken pox
  - Late winter/early spring, <10 years, lifelong immunity after
  - Fever, malaise; Rash: Maculopapular → vesicular
  - “Dew drop on rose petal” appearance
  - 3 days, scab forms; Multiple stages of healing
  - Contagious: 2d before rash→all lesions have crusted
Varicella/Zoster

- Severe/disseminated disease:
  - Adult onset
  - Immunocompromised children
  - Neonate <10 days
  - Mothers in perinatal period, congenital varicella syndrome

- Complications: Sepsis, encephalitis, pneumonia
Herpes Zoster (Shingles)

- Reactivation infection, lifetime incidence 20%
- Risk factors:
  - Increasing age, immunosuppression, spinal surgery
- Prodrome (1-3d): paresthesias, pain, fever, malaise
- Rash: Dermatomal \( \leq 3 \text{ consec.} \), Unilateral, Vesicular
- Thoracic/lumbar = Most common
- 2 week duration; Contagious
Herpes Zoster (Shingles)

- Ophthalmic branch of trigeminal nerve
  - **Hutchinson sign**: Vesicles on tip of nose = nasociliary n.
    - Inevitable ocular involvement
  - Keratitis: Dendritic lesions on fluorescein examination

- Ramsay–Hunt syndrome
  - Bell palsy, vesicular lesions at external auditory meatus/TM

- Post-herpetic neuralgia
  - Incidence increases with age, common, difficult to treat
Herpes Zoster (Shingles)

- Diagnosis: Clinical + Tzanck smear/culture
- Treatment:
  - No aspirin to children (Reye syndrome)
  - Chicken pox: Treat Adults, Acyclovir 800 mg PO/IV qid
    - Vaccine, Live attenuated: Children <12 months**
    - >12 years, two doses 4-8 weeks apart
    - Postexposure prophylaxis in nonimmune host
  - Herpes zoster: Acyclovir 800mg qid or valacyclovir, 1 g TID
    - Decreases severity/duration
Herpes Zoster (Shingles)

- Indications for Admission/IV acyclovir:
  - Multiple dermatomes/disseminated disease
  - Ophthalmic branch of trigeminal nerve involvement
- Post exposure: prevents/reduces severity if <72 hours
  - Exposed at risk & infectious for 21 days
  - Exposure criteria:
    - Household contact, prolonged face-to-face contact, indoor playmate >1 hour
Herpes Simplex

- HSV1, HSV2 via direct contact
- Latent in dorsal root ganglia, humans only reservoir
- Primary: Vesicular rash on erythematous base
  - Greatest viral shed during primary episode
  - Virus can be shed when asymptomatic
- Recurrence: Common
  - Triggered by fever, UV light, friction, sexual intercourse, menstruation, stress, or fatigue
Herpes Simplex (L)8.5.10

- Herpes labialis: HSV1 most common
  - Gingivostomatitis (most common form in children), fever, lymphadenopathy, multiple vesicular lesions
  - Recurrence 60-90%, mild symptoms

- Ophthalmic HSV
  - Follicular conjunctivitis, blepharitis, corneal opacities
  - Common cause of blindness in Third World
  - Recurrence possible
  - Fluorescein stain: branching dendritic ulcers
Herpes Simplex\textsuperscript{(L)8.5.10}

- Herpetic whitlow
  - Painful vesicular lesions on finger
    - Mistaken for bacterial infection (do not incise and drain);
    - Health care workers at risk
Genital herpes (young adults/adolescents)

- HSV2 (70-95%, occasionally HSV1); Incubation: 8-16d
- Primary infection:
  - Painful vesicle clusters on a red base
  - Fever, inguinal adenopathy, vaginal discharge
  - Aseptic meningitis (especially women)
- Secondary/recurrence:
  - Prodrome of pain and paresthesias
  - Shorter, milder course
HSV encephalitis

○ Most common acute, nonepidemic encephalitis
○ Fever, focal neurological signs (temporal lobe), HA, meningismus, lethargy, confusion
○ Prompt treatment decreases morbidity/mortality
Diagnosis:
- Tzanck smear, **multinucleated giant cells**
- Viral culture (definitive)
- Encephalitis:
  - CSF: nonspecific mononuclear pleocytosis
  - Culture usually negative; PCR = best assay
  - MRI: 80% **temporal lobe** findings
  - Biopsy of lesion with culture
Herpes Simplex

**Treatment:**
- HSV: Acyclovir 400 mg PO TID 7-10d, best if <72 hrs
- Acyclovir 400 mg BID = suppressive
- Encephalitis: Acyclovir IV 10 mg/kg every 8 hours

**Admission:**
- Severe pain/dehydration (gingivostomatosis)
- Systemic symptoms/Meningitis
- Ophthalmic keratitis → Consult ophthalmology
  - Topical steroids contraindicated
Contraindications:
- Influenza (≥6 months inactivated, ≥18 years live)
  - Egg anaphylaxis
  - GBS history
- MMR
  - Gelatin anaphylaxis
  - SCID*
- Rotavirus
  - Hx of intussusception
- ADaP <7 years; Tdap ≥7
- Tdap safe in pregnancy

<table>
<thead>
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<th>Condition</th>
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<th>Inactivated</th>
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<tr>
<td>Allergy to component</td>
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<td>Encephalopathy</td>
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<td>Pregnancy</td>
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<td>V*</td>
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<td>Immuno-suppression</td>
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<td>Severe illness</td>
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<td>Recent blood product</td>
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<td>V</td>
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C=contraindication
P=precaution
V=vaccinate if indicated
*except HPV
**MMR and varicella containing (except zoster vaccine) only
● Live, attenuated vaccines:
  ○ Vaccinia (smallpox)
  ○ Measles, mumps, rubella (MMR combined vaccine)
    Varicella (chickenpox)
  ○ Influenza (nasal spray)
  ○ Rotavirus
  ○ Zoster (shingles)
  ○ Yellow fever

● Inactivated/killed vaccines:
  ○ Polio (IPV)
  ○ Hepatitis A
  ○ Rabies
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<th>Vaccine</th>
<th>Birth</th>
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- Range of recommended ages for all children
- Range of recommended ages for catch-up immunization
- Range of recommended ages for certain high-risk groups
- Range of recommended ages for non-high-risk groups that may receive vaccine, subject to individual clinical decision making
- No recommendation
8.8 Emerging Infections

- SARS: Coronavirus; Pandemic 2002-3
  - Travel from Hong Kong, China, Taiwan
  - Droplet, person:person, fomites w/ autoinnoculation
  - Contagious 2-10d post-exposure
  - Flu-like illness → Severe sepsis/Respiratory Failure
  - Poor prognostic factors:
    - Male, ↓Na, ↑LDH, Age >60
  - Diagnosis: PCR or isolation of SARS-CoV
  - Treatment: Supportive care
8.8 Emerging Infections

● West Nile Virus
  ○ Vector: Culex mosquito; Reservoir: infected birds (crows)
  ○ Endemic: Middle East, Africa, Europe
  ○ West Nile Fever (80%) - viral syndrome
  ○ West Nile Encephalitis - Aseptic meningitis
    ■ Movement disorders/Parkinsonian tremor
    ■ Acute flaccid paralysis
  ○ Guillain-Barré Syndrome
  ○ Diagnosis: CSF viral profile, ↑protein; send WNV PCR
  ○ Treatment: Supportive
    ■ IVIG for GBS
    ■ Focus on prevention with mosquito abatement
8.8 Emerging Infections

Dengue Fever

- Vector: Aedes aegypti, A. albopictus
- **Hawaii**, SE Asia, South America
- 16% febrile illness in travels from endemic regions
- Incubation: 2-8 days after mosquito bite
- Viral syndrome with **severe muscle/back pain**
  - “Breakbone Fever”
- Maculopapular rash, LAD, hemorrhage
  - Dengue Hemorrhagic Fever (<15 y/o)
- Diagnosis: Viral culture
- Treatment: Supportive care
Thank you!