Infectious Diseases Jeopardy

This Little Piggy (209-10)  FLIES, FLEAS and MORE FLU’S  BUGS IN THE NEWS  ID DETECTIVE  PROBLEMS WHERE THE SUN DON’T SHINE  INFECTION TRIVIA

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This Little Piggy - $100

- Which statement is true regarding the 2009-10 H1N1 (swine) influenza outbreak?

☐ 1. Most infections occur in the elderly.
☐ 2. Children under the age of 10 have a low risk of infection due to prior vaccination.
☐ 3. H1N1 is circulating at rates similar to seasonal H3N2 and influenza B.
☐ 4. H1N1 has been the predominant influenza virus in circulation in the US.
☐ 5. All of the above.

Answer – This Little Piggy - $100

- (4) **H1N1 is the predominant influenza virus in circulation in the US.**
  - Near complete replacement of other seasonal strains so far (H3N2, B, etc).
- **Highest infection rates in children and young adults.**
- **Lower risk of infection in elderly.**
  - Possibly due to cross protection from prior infections.
- **CDC: 50 million H1N1 infections in US.**
  - 213,000 hospitalizations.
  - 10,000 deaths.
This Little Piggy - $200

• What clinical features have been seen with the ongoing H1N1 influenza outbreak?

☐ 1. Pregnant women and children <2 yrs are at high risk for severe illness.
☐ 2. Obesity, asthma and DM are risk factors for severe illness.
☐ 3. Elderly patients are less likely to become infected if exposed.
☐ 4. Most symptomatic patients have fever and URI type symptoms.
☐ 5. All of the above.

Answer – This Little Piggy - $200

☐ (5) All of the above.
• Pregnant women, children <2 yrs, obesity, asthma, DM, chronic health conditions are risk factors for severe illness.
• Most symptomatic patients have fever and URI type symptoms.
Clinical Features

- Mild illness in most individuals.
- Incubation period 1-7 days (usually <4 days).
- Fever, chills, H/A, URI sx (cough, sore throat, rhinorrhea, SOB), fatigue, myalgias, vomiting, diarrhea.
- Secondary household attack rate <20 % (lower than with seasonal flu).
- Low attack rate in older individuals.
  - ?Pre-existing immunity from prior infection with similar virus.

Signs and Symptoms in Hospitalized Patients with H1N1 (CDC, n=268)

- Fever 93 %
- Cough 83 %
- Shortness of breath 54 %
- Fatigue/weakness 40 %
- Chills 37 %
- Myalgias 36 %
- Rhinorrhea 36 %
- Sore throat 31 %
- Headache 31 %
- Vomiting 29 %
- Wheezing 24 %
- Diarrhea 24 %

Novel H1N1 Confirmed and Probable Case Rate in US  (April-July), By Age Group
(source=CDC)
What is true regarding treatment of H1N1 (swine) influenza?

1. Oseltamivir (Tamiflu), Zanamavir (Relenza) and peramivir are treatment options for H1N1.
2. Inhaled peramivir is a superior treatment agent.
3. Widespread Tamiflu resistance has been seen.
4. All infected persons should be rx’d with antivirals.
5. Tamiflu prophylaxis is recommended for all exposed individuals.

Treatment

- Oseltamivir 75 mg BID x 5 days.
- Higher doses and longer courses in some settings.
- Zanamavir 10 mg (two inhalations) BID x 5 days.
- Treatment recommended for:
  - Hospitalized patients.
  - Patients at higher risk for complications.
  - Children < 2 years of age.
  - Pregnant women and women up to 2 weeks post-partum.
  - Chronic medical conditions (chronic lung, cardiac, renal, neuro, metabolic dz, asthma) or immunocompromised host.
  - Persons < 19 yrs on long term aspirin.
- Since most cases are mild in severity, not everyone needs antiviral treatment.
Antiviral Prophylaxis

- Appropriate for HCW’s and other high risk individuals exposed to secretions of infected patient.
  - Face-to face contact within (?three ?six ?ten) feet of patient without wearing a mask.
  - Direct contact with secretions.
- Oseltamivir (Tamiflu) 75 mg daily or zanamivir (Relenza) 10 mg (two inhalations) daily for 10 days.

Antiviral Resistance

- Prior experience with drug resistance in influenza.
- 186 oseltamivir resistant H1N1 isolates have been reported worldwide.
  - 50 in US; 5 from California.
  - Two clusters in immunocompromised patients identified (person-to-person spread likely).
- Concerns over inducing resistance by widespread prophylaxis.
  - Limit prophylaxis to high risk individuals only.
  - Avoid widespread prophylaxis out of fear.
Peramivir
• IV neuraminidase inhibitor.
• Investigational; not FDA approved.
  – Studies on efficacy pending.
• Authorized by DHHS for treatment of hospitalized patients with H1N1 who:
  – Unable to be treated with PO oseltamivir or inhaled zanamavir.
  – Unresponsive to PO or inhalation rx.
• Adult dose: 600 mg daily for 5-10 days.

This Little Piggy - $400
• Which is true regarding H1N1 vaccination?

☐ 1. There is a severe H1N1 vaccine shortage.
☐ 2. Pregnant women should receive the injectable vaccine.
☐ 3. The intranasal live virus vaccine has a 10 fold increased risk of Guillian Barre syndrome.
☐ 4. H1N1 vaccine should not be given at the same time as injectable seasonal flu vaccine.
☐ 5. None of the above.
☐ 6. All of the above.

Swine Flu Vaccine
☐ (2) Pregnant women should be given the injectable vaccine.
  – Live virus not indicated in pregnancy.
• Initial H1N1 vaccine shortage due to production and distribution issues now resolved.
  – 195 million doses vaccine to be distributed.
  – By mid-December, 50 million people had been vaccinated.
  • Attenuated live virus nasal spray.
  • Injectable single dose preservative free.
  • Injectable multi-dose vials with preservatives.
• Okay to vaccinate for H1N1 and seasonal flu at the same time as long as one or both vaccines are injectables.
  – Should not give both intranasal vaccines together.
Swine Flu Vaccine

- Initial candidates for vaccination:
  - Pregnant women.
  - Household contacts for children < 6 months.
  - Health care workers.
  - Children 6 months-24 yrs old.
  - Persons 25-64 yrs with high risk health conditions.
- One dose for persons >10 years of age.
  - Two doses needed for younger kids.
- Live virus: Only non-pregnant pts 2-49 years of age.
  - Pediatrics.
  - Household contacts of infants under 6 months (including breastfeeding mothers).
  - HCW’s who don’t take care of severely immunocompromised patients (bone marrow transplants, etc).

Flies, Fleas and More Flu’s - $100

- Before H1N1, what event(s) occurred recently with seasonal flu?

1. Vaccine components were poorly matched with circulating strains.
2. Seasonal H1N1 strain became resistant to oseltamivir (Tamiflu).
3. H3N2 became resistant to amantadine.
4. There was a vaccine shortage due to bacterial contamination of a factory in England.
5. All of the above.

Answer - Flies, Fleas and More Flu’s - $100

- (5) All of the above
  - 2007-8: Circulating H3N2 and B strains were not well matched with vaccine components.
  - Vaccine shortages and limited availability.
  - 2008-9: 98% of seasonal H1N1 strains resistant to oseltamivir.
    - Up from 11% resistance in 2007-8.
    - Still susceptible to zanamivir (Relenza), amantadine and rimantadine.
  - H3N2 resistant to amantadine and rimantadine.
  - ?? Rx of documented/suspected non-swine H1N1:
    - Zanamivir or combination oseltamivir/rimantadine.
A 55 year old traveler from S. America has a tender draining lump on her neck. She feels like "something is moving inside it". What is the treatment and the diagnosis?

- 1. Topical petroleum jelly for myiasis.
- 3. Topical permethrin for cutaneous leishmaniasis.
- 5. Psychiatric evaluation.

(1) Topical petroleum jelly for myiasis (Botfly).

- Human infection due to Diptera fly larvae.
- Botfly (Dermatobia hominis) larvae penetrates human skin and undergoes development in subdermal tissue.
- Obligate tissue parasite; may infest necrotic tissue.

- Usually one larva found in each lesion.
- Patients report an insect bite that enlarges over time to one to three cm in diameter.
  - Sensation of irritation, crawling, or pain.
  - Scant serosanguinous drainage.
- Cure = Removal of the intact larvae.
  - Occlude the opening (petroleum jelly or strips of bacon)
  - Gentle extraction of intact larva when it protrudes its abdomen to reach air.
  - Secondary bacterial infection can occur.
Flies, Fleas and More Flu’s - $300

Which statement is true regarding H5N1 avian influenza?

1. The current swine flu pandemic resulted from mutation of an H5N1 avian flu strain.
2. Avian flu causes 10% mortality in humans.
3. Person to person transmission of avian flu is uncommon.
4. Domestic poultry are immune to avian flu due to antibiotic supplement of their feed.
5. H5N1 is the only influenza strain that can infect birds.

Answer – Flies, Fleas and More Flu’s - $300

(3) Person to person transmission of H5N1 is uncommon.

- Current avian flu outbreak = H5N1 subtype.
- Prior outbreaks of avian flu: H7N7, H1N1.
- Migratory aquatic birds responsible for H5N1 spread.
  - Aquatic birds → domestic fowl → humans.
  - Poultry infections widespread (>49 countries).
- Disease in humans.
  - Fever, cough, SOB, lymphopenia, pneumonia.
  - Mortality rate=50%.
  - Rare person to person transmission (NEJM 1/27/05).
H5N1 Human Cases
(as of 1/28/10)

- 471 human cases, 282 deaths.
- Since Jan 2003, human cases in 15 countries:
  - East Asia and the Pacific:
    - Cambodia, China, Indonesia, Thailand, Lao People's Democratic Republic, Vietnam, Pakistan, Bangladesh, Myanmar.
  - Europe and Eurasia:
    - Azerbaijan, Turkey.
  - Near East, Africa:
    - Djibouti, Egypt, Iraq, Nigeria.

Countries with Confirmed Human Cases of H5N1 since 2003 (as of 9/09)

H5N1 Vaccine

- H5N1 vaccine produced by Sanofi Pasteur and Novartis.
  - Inactivated human H5N1 isolate.
  - Two doses one month apart for persons 18-64 yrs.
  - Immunogenic in studies.
    - Protective against pandemic strain.
  - Not commercially available.
  - Stockpiled by WHO and US government.
    - WHO states 100 million two dose courses available immediately.
    - Global production capability by 2010 = 4.5 billion courses.
Flies, Fleas and More Flu’s - $400

This early use of Personal Protective Equipment was seen during:

1. Smallpox - 1700’s
2. Bubonic Plague - 1600’s.
5. Typhus - 1400’s.

Answer - Flies, Fleas and More Flu’s - $400

(2) Bubonic Plague - 1600’s.

• Several plague epidemics throughout history.
  • 1st recorded epidemic: Byzantine Empire 6th century.
  • 1340’s: Swept through Europe (“Black Death”) killing 1/3 population.
  • 1600’s: Multiple outbreaks in London.
  • 1665 6 “Great Plague” of London.
    • 100,000 died (20% population)
  • Last major plague outbreak.
• Worldwide: 1000-3000 cases/yr (WHO).
• US: 10-15 cases/year.

Answer - Flies, Fleas and More Flu’s - $400

• Pathogen = Yersinia pestis.
  • Spreads to humans by infected rat flea (Xenopsylla cheopis).
  • Fever, chills, hypotension, myalgia, sore throat, LAN, skin rash, N/V, abd pain, cough, SOB (pneumonic plague).
  • Lymph node swelling (“bubo”):
    • Inguinal (60%), axillary (30%), cervical (10%), or epitrochlear (10%).
  • Extremely tender, erythematous, and surrounded by a boggy hemorrhagic area.
  • Mortality 40-60% if untreated.
Bugs in the News - $100

• Following the massive 2010 Haiti earthquake, which infection(s) are of major concern?

☐ 1. Measles.
☐ 2. Rubella
☐ 3. Tetanus.
☐ 4. Respiratory illnesses.
☐ 5. Diarrheal illnesses.
☐ 6. All of the above.

Answer – Bugs in the News - $100

☐ (6) All of the above.

• 7.0 magnitude earthquake struck Port-au-Prince Jan 12, 2010.
• Massive destruction of city and essential infrastructure.
• 200,000 dead; 300,000 injured; 1.2 million left homeless.
  – Decomposing bodies piled in the streets.

2010 Haiti Earthquake

• Severe shortages of food, water, medical supplies, fuel, medical personnel, sanitation equipment, rescue equipment.
• All hospitals in Port–au-Prince destroyed or severely damaged.
  – Remaining hospital facilities overwhelmed.
Disaster Concerns Following the 2010 Haiti Earthquake

- Displaced persons living in close quarters.
  - Measles, diphtheria, resp infections.
- Inadequate sanitation.
  - Diarrheal organisms.
- Inadequate wound care.
  - Bacterial infections, tetanus, etc.
- Mosquito borne illnesses.
  - Malaria, dengue.

International Response to the 2010 Haiti Earthquake

- Massive international relief effort.
  - Food, water, sanitation, housing.
  - Rescue and medical teams.
  - Management of dead bodies.
    - Tens of thousands buried in mass graves.
    - Field hospitals; Hospital ships.

Vaccination Program Following 2010 Haiti Earthquake

- 250,000 children in 7 temporary settlements.
  - Measles, diphtheria, rubella, tetanus and pertussis.
- Tetanus vaccination of 200,000 people who suffered injuries.
Bugs in the News - $200
• Massive flooding in the Philippines in late 2009 was followed by an increase in which infection?
  □ 1. Leptospirosis.
  □ 2. Free living amoebae.
  □ 3. Cryptosporidium.
  □ 4. Shigellosis.
  □ 5. Leishmaniasis

Answer – Bugs in the News - $200
□ (1) Leptospirosis.
  • October 2009: Back to back cyclones which initially left 1000 people dead.
  • Massive flooding of towns, cities and rural areas.
    – Hundreds of thousands people initially displaced.
    – Large areas of standing, stagnant water.
    – People returned to flooded homes and villages.
  • Surge in number of people with Leptospirosis.
    – >2000 confirmed cases; >150 deaths.

Leptospirosis
• Caused by bacteria *Leptospira*.
• Endemic in cattle, pigs, horses, dogs, rodents, and wild animals.
  – Bacteria shed in urine.
• Humans become infected by ingestion or direct contact with contaminated water.
  – Incubation period: 2 days to 4 weeks.
  – 1st phase: Fever, chills, H/A, muscle aches, vomiting, diarrhea.
  – 2nd phase: Kidney and/or liver failure, meningitis (Weil’s Disease)
  – Rx: Penicillin or tetracycline.
  – Prevention: Avoid direct contact with water contaminated with animal urine.
Leptospirosis in the US

- Occasional reports and clusters associated with contact to bodies of contaminated fresh water.
  - 775 contestants swam in Lake Springfield.
  - 90 people became ill.
    - Fever, chills, headache, diarrhea, eye pain/redness.
    - Leptospirosis confirmed by serologies.

Bugs in the News! - $300

- The recent 2009 outbreak of fever and diarrhea due to *S. typhimurium* in children has been linked to contact with:
  1. Hedgehogs.
  3. Spinach.
  4. Milk and dog food from China.
  5. Video game consoles.
  6. Fresh air and exercise.
Answer - Bugs in the News! - $300

• (2) African dwarf frogs.
• 85 people from 31 states identified with S. typhimurium gastroenteritis.
• Median age = 5 yrs old. 79% less than 10 years of age.
• Fever, diarrhea, abdom pain lasting 4-7 days.
• Epidemiologically linked to contact with water frogs and aquariums that contain water frogs.
• Cultures of aquariums confirmed organism.

S. typhimurium from Frogs: US Map

S. typhimurium from Frogs: Epi Curve
Other Salmonella Outbreaks

• 2009: S. typhimurium linked to peanut butter manufactured at Peanut Corp. of America plant.
  – 714 persons in 46 states.
  – 116 hospitalizations; 8 deaths.
  – Illness associated with King Nut peanut butter and peanut paste from Peanut Corp. of America plant in Georgia.
    • Organisms cultured from unopened jars and crackers.
    • Massive recall of >1000 products containing peanut butter (crackers, snack bars, etc.).
Many Other Salmonella Outbreaks in the News

  - Salmonella Saintpaul; 35 patients in 7 states.
  - Multiple growers; linked to contaminated seeds.
- 2007-8: Peter Pan peanut butter.
  - Salmonella tennessee.
  - 425 cases reported. 20% hospitalized; No deaths.
  - Organisms cultured from open jars and at plant.
- 2007: Banquet brand pot pies.
  - 272 isolates of Salmonella I 4,[5],12:i:- isolated from sick humans in 35 states.
  - 65 hospitalizations, no deaths.

Dog Food Contamination: (Not Salmonella This Time!)

- March 2007: Dog food recall.
  - Wheat gluten from China contaminated with melamine (rat poison).
  - Menu Foods: supplied tainted product added to >100 brands.
- Total numbers unknown:
  - >100 animal deaths.
  - >500 cases of renal failure.
  - May be much higher, but no good statistics.

Bugs in the News! - $400

- Due to a deteriorating health system and inadequate clean water, Zimbabwe recently suffered from an outbreak of:
  1. Cholera.
  2. Malaria.
  3. Dengue fever.
  4. Typhoid fever.
  5. Shigellosis.
Answer - Bugs in the News! - $400

- (1) Cholera.
  - 98,424 reported cases since Aug 2008
  - 4,276 deaths.
  - Causes of current outbreak:
    - Poor health infrastructure.
    - Inadequate clean drinking water
    - Poor hygiene.
    - Severe shortages of medicines, equipment and staff at health facilities.
  - WHO sent personnel, medications, oral rehydration salts, etc.
  - Number of new cases declining recently.

Cholera

- *Vibrio cholerae*.
- Transmission: Contaminated food and water; shellfish.
- Severe diarrhea ("rice water" stools); severe fluid/electrolyte depletion.
  - Vomiting, muscle cramps, prostration.
- 3-5 day illness.
- Rx: Rehydration (oral or IV).
  - ORS= Oral Rehydration Solution (KCl, NaCl, glucose, citrate).
  - Antibiotics reduce infectivity
    - Doxycycline, TMP/SMX, furazolidone.
- Vaccine available, but low efficacy and not recommended by WHO.

Photomicrograph of *Vibrio cholerae* with Leifson Flagella Stain

Cholera Cases and Deaths in Zimbabwe (November 20, 2008-February 12, 2009)

Map of Cholera Outbreaks in Sub-Saharan Africa in 2008, Showing Numbers of Suspected Cases per Country

Zimbabwe: Sewage in Streets
Zimbabwe: Cholera Graveyard

WHO Workers in Zimbabwe

ID Detective - $100
• In 2008 over 1400 people in the US were infected with *Salmonella* Saintpaul due to contamination of:
  1. Tomatoes.
  2. Serrano and jalapeno peppers.
  3. Cantaloupes and melons.
  4. Prewashed bags of spinach.
  5. Packaged chicken.
2008 *Salmonella* Saintpaul Outbreak

- May 2008: New Mexico Dept. of Health reported 4 cases of *Salmonella* Saintpaul.
  - Over next several weeks reports arrived from 43 states.
  - 1442 infected persons identified (April-August).
- Initial investigation;
  - Illness linked with eating tomatoes grown in Mexico or Florida.
  - June: CDC and FDA advised public to not eat red raw tomatoes grown or handled in Mexico or Florida.
  - Major economic agriculture impact.
- Further investigation found illness also after eating salsa, guacamole (made with canned tomatoes).
- Focus turned to fresh peppers.
  - July: CDC and FDA advised public not to eat jalapeno or serrano peppers (tomatoes OK).
  - Source found to be contaminated irrigation water used for growing jalapeno and serrano peppers in Mexico.
Cases infected with the outbreak strain of *Salmonella* Saintpaul, United States, by state, as of August 25, 2008

**ID Detective - $200**

- Increased home foreclosures in Southern California have been linked to an increase in which infection? (hint:....)

  - 1. Leptospirosis.
  - 3. West Nile Virus.
  - 4. Dengue fever.
  - 5. MRSA.

  (hint:....)

**Hint:** Aerial photo of Bakersfield neighborhood. Red arrows are neglected, green swimming pools.
Answer - ID Detective - $200

- (3) West Nile Virus.
  - Kern County, CA 2007:
    - Marked increase in WNV infected birds.
    - 276% increase in human WNV cases.
    - 300% increase in mortgage foreclosures in Kern County, CA.
  - Abandoned homes with unmaintained swimming pools, hot tubs and ornamental ponds.
    - Excellent breeding grounds and habitats for mosquitoes.

Swimming Pools Treated by Kern Mosquito Vector and Control District (KMVCD)

West Nile Virus

- Single stranded RNA Flavivirus.
- First isolated 1937 in West Nile district of Uganda.
  - Occasional outbreaks in Asia, Africa, Europe.
  - First detected in US (New York City) in 1999.
  - Mosquito-bird-mosquito cycle.
    - Infected birds viremic for 1-4 days.
    - Over 200 types of birds infected.
  - Crows and jays may become ill and die.
  - Transmitted to humans by mosquito bite.
  - Humans, horses, etc “dead-end” hosts.
  - Rarely: blood transfusions, organ transplants, transplacental, breast feeding.
West Nile Virus: Clinical Features

- 2-14 day incubation period.
- 80% of infections asymptomatic.
- West Nile Fever: Fever, Headache, Fatigue, Skin rash, Adenopathy, Orbital pain.
- Severe disease: CNS (meningitis, encephalitis, flaccid paralysis).
- More common in older individuals.
- Dx: (+) IgM antibody serum/CSF, CSF lymphocytic pleocytosis and increased protein.
- PCR less useful since only transient viremia.
- Treatment: Supportive.
West Nile Virus: Cases Reported to CDC

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2008 WNV Cases in US

West Nile Virus: Prevention
ID Detective - $300

• Consuming raw spinach in the summer 2006 was associated with severe diarrhea due to what organism?

☐ 1. Escherichia coli 0157:H7
☐ 2. Shigella dysenteriae type 1
☐ 3. Entamoeba histolytica
☐ 4. Salmonella typhimurium DT:104
☐ 5. Cryptosporidium parvum
☐ 6. Spinachilia diarrheae

Answer - ID Detective - $300

• Sept 2006; Clusters of E. coli 0157:H7 in WI, OR & NM.
• 199 reported cases from 26 states.
• 80% of cases became ill between Aug 19 and Sept 5.
  • 102 patients (51%) hospitalized.
  • 31 (16%) developed hemolytic uremic syndrome.
  • Three deaths.
  • 22 (11%) children under 5 years old.
• Illness linked to consuming raw spinach from washed, pre-packaged bags.
  • E. coli with identical DNA found in spinach bags and patient samples.
  • Traced to farm in San Juan Bautista CA.

States with E. coli 0157:H7 Linked to CA Grown Spinach

Number of cases: 1-4, 5-9, 10-14, ≥15
Other E. coli 0157:H7 Outbreaks

- Dec 2006: 71 cases E. coli 0157:H7 from 5 states linked to Taco Bell restaurants.
  - Shredded lettuce responsible.
- Oct, 2007: 40 cases E. coli 0157:H7 from 8 states linked to ground beef.
  - 21 million pounds hamburger recalled.
- Nov, 2007: 21 cases E. coli 0157:H7 from 10 states linked to frozen pizza.

**ID Detective - $400**

The largest waterborne outbreak in the US occurred in Milwaukee in 1993 due to which organism?

- 1. Shigella dysenteriae.
- 2. Vibrio cholerae.
- 4. Cryptosporidium.
- 5. Entamoebae histolytica.
- 6. Cheeseheadia viridae.

**Answer - ID Detective - $400**

- (4) Cryptosporidium.
- In March 1993, 403,000 people developed acute watery diarrhea over a two week period.
  - Cryptosporidium isolated from stools samples.
- Investigation revealed Cryptosporidium had contaminated city's water supply.
  - City had two water treatment plants.
    - Water treated by flocculation, sedimentation, filtering and chlorination.
    - Increased turbidity noticed in water from southern plant.
  - Heavy rains overflowed sewage treatment plants, contaminated rivers that fed towards the water intake pipes in Lake Michigan.
  - Ongoing cycle of sewage → water supply → sewage → etc.
Answer - ID Detective - $400

- Epidemiology:
  - Contamination confirmed by identifying cryptosporidium from ice blocks prepared during episode of illnesses.
  - Timing of infection determined by surveying visitors to Milwaukee (who had been in city <48 hours).
- Residents advised to boil water and throw out all ice.
  - Fear of accidental scalding.
  - Economic effects on industry, dentists (water drills), restaurants, etc.
- No direct deaths reported.
- Infected residents caused minor outbreaks in other cities (contamination of swimming pools, etc).
- Lessons learned: increased filtration at many municipal water treatment plants.

‘Problems Where the Sun Don’t Shine’ $100

- A 25 year old bisexual man with a 1 cm single non-tender genital ulcer and a skin rash is most likely to have ....
  1. Syphilis.
  2. Chancroid.
  3. HPV type 6.
  4. Chlamydia trachomatis.
  5. Herpes simplex virus type 2.
  6. Big trouble.

Answer - ‘Where the Sun Don’t Shine’ $100

- (1) Syphilis and HSV-2 are the most common causes of genital ulcer disease in the US.
  - Syphilis more often a single ulcer.
  - Chancroid less common.
- Increasing syphilis rates in MSM.
- Appropriate tests include RPR and HSV test (culture, PCR, DFA or type specific serology).
- Recent reports of lymphogranuloma venereum (LGV) in clusters of MSM.
  - Proctitis and inguinal adenopathy.
‘Problems Where the Sun Don’t Shine’ $200

• Which statement is true regarding *Neisseria gonorrhoeae*?
  1. Most strains are resistant to cefixime.
  2. Quinolone resistance has increased in the US – especially in MSM.
  3. Disseminated gonococcal infection (DGI) typically presents with copious genital discharge.
  4. Single dose quinolone therapy GC is effective for GC and *C. trachomatis*.
  5. All of the above.

Answer - 'Where the Sun Don’t Shine’ $200

- (2) Quinolone resistance has increased – especially in MSM.
  - QRNG = Cipro MIC >1.0 µg/ml
  - Up to 40% resistance in some populations.
- Quinolones no longer recommended by CDC unless strain is known to be susceptible.
- Empiric rx of GC:
  - Cefixime 400 mg PO or ceftriaxone 125 mg IM.
  - Cefpodoxime 400 mg or cefuroxime 1 gm PO also effective.
  - Alternatives:
    - Spectinomycin 2 gm IM
    - Cipro, Oflox, or Levo only if susceptible.
- DGI caused by AHU (-) strains cause minimal local symptoms.
  - More common in complement deficiency.

Note: PenR = penicillinase producing *N. gonorrhoeae* and chromosomally mediated penicillin-resistant *N. gonorrhoeae*; TetR = chromosomally and plasmid-mediated tetracycline-resistant *N. gonorrhoeae*; QRNG = ciprofloxacin-resistant *N. gonorrhoeae*.
Gonococcal Isolate Surveillance Project (GISP) — Percent of *Neisseria gonorrhoeae* isolates with resistance or intermediate resistance to ciprofloxacin, 1990–2008

Note: Resistant isolates have ciprofloxacin MICs ≥ 1 µg/ml. Isolates with intermediate resistance have ciprofloxacin MICs of 0.125 – 0.5 µg/ml. Susceptibility to ciprofloxacin was first measured in GISP in 1990.

Gonococcal Isolate Surveillance Project (GISP), Percent of *Neisseria gonorrhoeae* Isolates with Decreased Susceptibility or Resistance to Ciprofloxacin in Five California STD Clinics, 1990–2007

Note: Resistant isolates have MICs ≥ 1 µg ciprofloxacin/mL. Isolates with decreased susceptibility have MICs of 0.125 – 0.5 µg ciprofloxacin/mL.

STD Clinic Sites: Long Beach, Los Angeles (added in 2003), Orange, San Diego, San Francisco

Gonococcal Isolate Surveillance Project (GISP) — Percent of *Neisseria gonorrhoeae* isolates with resistance to ciprofloxacin by sexual behavior, 2001–2007
A 22 year woman treated for Chlamydia with azithromycin 1 gm PO tests positive for Chlamydia 3 months later. What is the likely explanation?

1. The strain is resistant to azithromycin.
2. The 2nd test is a false positive NAAT.
3. She failed initial treatment, and should be rx'd with doxycycline 100 mg BID x7 days.
4. She became reinfected by an asymptomatic sex partner that had not been treated initially.
5. She has lymphogranuloma venereum (LGV).

Answer - ‘Problems Where the Sun Don’t Shine’ - $300

1. (4). She became re-infected by an asymptomatic partner that had not been treated initially.
2. The patient AND her partner(s) should have been treated for Chlamydia initially.
   - Expedited partner therapy (EPT)
     - Allows rx of partners without “good faith exam”.
     - Reduces risk of re-infection.
     - Endorsed by CDC; legal in many states.
3. Rx all partners within 60 days.
4. Education should accompany medications.

Note: As of January 2000, all 50 states and the District of Columbia had regulations requiring the reporting of chlamydia cases.

Nucleic Acid Amplification Tests:
Sensitivities of Samples

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Cervical Swab</th>
<th>Urine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymerase chain reaction</td>
<td>85-99%</td>
<td>87-99%</td>
</tr>
<tr>
<td>Ligase Chain Reaction</td>
<td>82-99%</td>
<td>77-99% (F)</td>
</tr>
<tr>
<td>Transcription Mediated Amplification</td>
<td>83-99%</td>
<td>66-99% (F)</td>
</tr>
<tr>
<td>Strand Displacement Amplification</td>
<td>93-99%</td>
<td>80-99% (F)</td>
</tr>
</tbody>
</table>
Treatment of *Chlamydia trachomatis*

- 2006 STD Treatment Guidelines:
  - Azithromycin 1 gm PO x 1 dose or,
  - Doxycycline 100 mg PO BID x 7 days.
  - Resistance not described.
  - Alternatives: Erythromycin base 500 mg QID x 7 days, or EES 800 mg QID x 7 days, or Ofloxacin 300 mg BID x 7 days, or Levofloxacin 500 mg qD x 7 days.
  - Test of cure not needed, but retest 2-3 months later to see if reinfected.

**Expedited Partner Therapy**

- Rationale: Untreated infection in males is a risk factor for repeat infection in women and eventual PID.
- Randomized trial of EPT vs. standard referral for pts with GC or Chlamydia.
  - EPT: meds given to patient to deliver to partner or delivered by staff.
  - Std. referral: Partner advised to seek care.
- Primary outcome = persistent or recurrent infection 3 to 10 weeks after treatment.
  

**Expedited Partner Therapy**

- Conclusions: EPT decreases rate of reinfection and treatment failures.
- Many states now allow rx without “good faith” exam for patients partner(s).
  - CDC endorsement
  - Most appropriate patients = females.
  - Most appropriate partners = males who are uninsured and/or unlikely to come in for therapy.
- Number of doses should be limited to number of partners in past 60 days.
- Education should accompany medication.
'Problems Where the Sun Don’t Shine' - $400

• Which statement is true regarding genital herpes?

  1. HSV type-2 causes all symptomatic genital herpes.
  2. HSV is contagious only when lesions are present.
  3. HSV causes cervical cancer.
  4. Topical acyclovir is optimal treatment for severe genital herpes.
  5. Suppressive oral antivirals may reduce transmission to sex partners.
  6. All of the above.

Answer - 'Problems Where the Sun Don’t Shine' $400

• (5) Suppressive antiviral (valacyclovir) has been shown to HSV reduce transmission to sex partners.
  – Suppression reduces symptomatic outbreaks and asymptomatic shedding.
  – Other antivirals (acyclovir, famciclovir) may also be effective in reducing transmission, but not well studied.

Proportion of Susceptible Partners with Symptomatic Genital Herpes

Transmission of HSV to Susceptible Partners

Placebo

Valacyclovir

500 mg once daily

% with HSV-2 Infection

3.6% (27/741)

1.9% (14/743)

48% reduction

\( P = 0.054 \)

RR: 0.52 (95% CI: 0.27, 0.97)

Valacyclovir Provided Benefit Over Placebo Across All Levels of Condom Use

Symptomatic Acquisition

Placebo

Valacyclovir

\[ \begin{array}{c|c|c|c|c}
\text{Condom use} & \text{Never [all months]} & \text{Sometimes} & \text{Nearly Always [all months]} \\
\hline
\text{Placebo} & 6/250 & 8/313 & 3/288 \\
\text{Valacyclovir} & 2/140 & 1.0% & 0.0% (0/141) \\
\end{array} \]

ACOG Guidelines for Suppressive Therapy of HSV

Summary of Recommendations for Suppressive Therapy Use in GYN Patients (Level A):

“Women with frequent recurrences should be offered suppressive therapy.”

“For couples in which one partner has HSV-2 infection, suppressive antiviral therapy should be recommended for the partner with HSV-2 to reduce the rate of transmission.”

ACOG Practice Bulletin No. 57

November 2004
Topical Therapies

- Acyclovir ointment (Zovirax).
  - Poorly absorbed; ineffective in normal hosts.
  - Superior to placebo in compromised hosts.
  - Not recommended.
- Penciclovir (Denavir).
  - Superior to placebo for herpes labialis.
  - Not evaluated for genital herpes.
- Doconasol (Abreva).
  - Superior to placebo for herpes labialis.
  - Not evaluated for genital herpes.
- L-lysine.
  - Not shown to be effective.

Infectious Disease Trivia - $100

- Mary Mallon, an Irish immigrant in the US, became known in 1907 as.......who?

  1. Mary Queen of Scots.
  2. Typhoid Mary.
  3. The Merry Widowmaker.
  4. Bloody Mary.
  5. Proud Mary.
  6. Merry Brandybuck of the Shire.

Answer - Infectious Disease Trivia - $100

- (2) Typhoid Mary
  - Mary Mallon (1869-1938) immigrated to US 1884.
  - Worked as a cook in New York City 1900-07.
    - At seven locations, people developed typhoid fever; two deaths.
  - George Soper (typhoid researcher) traced outbreaks to her.
  - Arrested by NYC Health Department
    - Jailed in isolation for three years.
    - Eventually released - she agreed to not work as a cook.
  - Changed her name to "Mary Brown".
    - Took a job as a hospital cook.
    - 25 people developed typhoid (1 died).
    - Re-arrested in 1915 and kept quarantined until she died.
    - At autopsy, live typhoid bacilli isolated from her gallbladder.
  - In total, 47 people known to be infected, three deaths.
In the 1840’s, Ignaz Semmelweis made what important observation?

1. Covering a cough with a handkerchief decreased the spread of influenza.
2. Extermination of rats reduced plague.
3. Women who delivered babies by midwives were more likely to survive than women delivered by physicians.
4. Salvarsan was effective treatment for syphilis.
5. Cowpox inoculation prevented smallpox.

Answer - Infectious Disease Trivia - $200

- (3) 1847 Ignaz Semmelweis was at the Maternity Department of the Vienna Lying-in Hospital. – High incidence (25%) of puerperal fever.
- Observed that women who delivered by midwives had lower mortality rates than those delivered by MD’s or students.

Ignaz Semmelweis, 1815-1865

- 1840’s: General Hospital of Vienna
- Divided into two clinics, alternating admissions every 24 hours:
  - First Clinic: Doctors and medical students
  - Second Clinic: Midwives
Semmelweis observed that physicians and medical students went from autopsy room directly to delivery room. 

- Postulated that “cadaveric particles” were transferred on the hands.
- Insisted on all students vigorously disinfect their hands with lime chloride before deliveries.

Results: Puerperal infection rate dropped from 17% to 1%.

- Hypothesis NOT accepted by medical profession until many years later.

Hand scrub with chlorinated lime solution

Hand hygiene basin at the Lying-In Women’s Hospital in Vienna, 1847.

Hand Hygiene: Not a New Concept

Maternal Mortality due to Postpartum Infection
General Hospital, Vienna, Austria, 1841-1850

~ Hand antisepsis reduces the frequency of patient infections ~

Infectious Disease Trivia - $300

In May 2007, a 31 yr old lawyer from GA created panic when he returned from his honeymoon in Europe and was allowed to enter the US with what disease?

☐ 1. MDR TB (thought to be XDR-TB).
☐ 2. Multi-drug resistant HIV.
☐ 3. Avian influenza.
☐ 4. SARS.
☐ 5. Ebola hemorrhagic fever.
☐ 7. European bedbugs.

Answer - Infectious Disease Trivia - $300

• (1) Multi-drug resistant (MDR) TB
  – Initially thought to be XDR-TB.
  • Found to have an abnormal CXR in Jan 2007.
  • Work-up revealed active TB.
    – Bronchoscopy (+) for MTB. Treatment begun.
  • Planned to get married in Europe in May.
    – Advised by MD’s to NOT leave US.
    – Ignored advice, May 12 traveled Atlanta → Paris → Athens → Greek Islands → Rome.
    – Tests reveal isolate XDR-TB (Resistant INH, rifampin, quinolone, and injectable).
    – Patient contacted by CDC and told not to travel further until they figured out what to do (!?).

Answer - Infectious Disease Trivia - $300

• Patient panics – wanted to get back to US!
  – Flies Rome → Prague → Montreal.
  – Drives across Canada-US border.
    – Border guard ignores computer warning to stop him at the border.
    – Patient checks himself into NY hospital.
  • CDC alerted (they were not very happy….).
  • Flown by CDC on isolation plane from New York → Atlanta → Denver General Hospital.
  • Repeat testing reveals isolate is only MDR (resistant to INH and rifampin), and not XDR-TB.
  • Surgical resection of infected lung July 17, 2007
    – Plan for two years medical therapy.
  • CDC eval: No airline passengers infected.
MDR & XDR Tuberculosis

- MDR = resistant to INH and rifampin.
- XDR = "extensively" drug resistant TB.
  - Resistant to INH, rifampin, quinolones and at least one injectable agent (capreomycin, kanamycin, or amikacin).
- 2005 XDR outbreak in HIV (+) pts in S. Africa.
  - 53 patients; 55% had not been treated previously.
  - 95% mortality.
- XDR strains detected in at least 17 countries (including US).
  - Estimated 10% MDR TB is XDR.
- Rx = Early detection, proper isolation, optimal treatment, DOT.

Primary MDR TB
United States, 1993–2007*

*Updated as of April 23, 2008.

No. of Cases  Percentage

1993 1995 1997 1999 2001 2003 2005 2007
0 100 200 300 400 500

No. of Cases
Percentage

Primary MDR TB in U.S.-born vs. Foreign-born Persons, United States, 1993–2007*

*Updated as of April 23, 2008.

% Resistant

U.S.-born  Foreign-born
XDR TB Case Count defined on Initial DST† by Year, 1993–2007*

*Drug susceptibility test.
†Reported incident cases as of April 23, 2008.
Extensively drug-resistant TB (XDR TB) is defined as resistance to isoniazid and rifampin, plus resistance to any fluoroquinolone and at least one of three injectable second-line anti-TB drugs.

FIGURE: Number of reported cases of extensively drug-resistant tuberculosis (XDR TB)* — United States, 1993–2006

* XDR TB defined as resistance to at least isoniazid, rifampin, any fluoroquinolone, and at least one of the three injectable second-line anti-TB drugs.
† Excludes New York City.

Infectious Disease Trivia - $400

• Which is a true statement regarding SARS (severe adult respiratory syndrome)?

- 1. Infection rates have increased yearly since 2003.
- 2. Interferon/ribavirin is standard therapy.
- 3. Like avian influenza, birds are the natural reservoir and source of transmission.
- 5. Human-to-human transmission occurs by respiratory droplets.
Answer - Infectious Disease Trivia - $400

(5) Human-human transmission by respiratory droplets.
- Also by direct contact with secretions (less common).
- Etiology = coronavirus (SARS-CoV).
- First reported in Asia in November 2002.
- Epidemic linked to palm civet (Paguma larvata).
- Bats likely reservoir and original source.
- 2003 outbreak: 8,098 cases, 774 deaths.
- 8 confirmed cases in US, all acquired outside US.
- Fever, headache, myalgias, pneumonia.
- Incubation period 2-10 days.
- No documented effective treatment.
- 2004: Eight lab acquired cases in China.
Natural Disasters

Following Hurricane Katrina in 2005 an increase in which infections was observed?

1. Vibrio and norovirus.
2. Dengue fever and malaria.
3. Cholera and botulism.
4. Leptospirosis and St. Louis encephalitis.
5. All of the above.

Answer - Natural Disasters

(1) Following Hurricane Katrina there was an increase in both Vibrio and norovirus infections.
   - Katrina made landfall 8/29/05
   - 8/29-9/11: 22 cases of Vibrio infections in evacuees (5 deaths).
     • Wound infections, sepsis, gastroenteritis.
     • V. vulnificus, V. parahaemolyticus, non toxigenic V. cholerae.
       - No cases of toxigenic V. cholerae
Answer - Natural Disasters

- Norovirus outbreak at Houston Astrodome.
  - Approx 24,000 evacuees present.
  - Between 9/2-9/12: 1,169 cases of acute gastroenteritis in evacuees.
    - Also cases in relief workers, police, etc.
    - Norovirus identified in 50% of specimens.
- Risk factors: Crowding, insufficient sanitation in lavatories, insufficient hand-washing facilities, delays in cleaning soiled areas and bedding.
- Successful mgmt = Enhanced infection control measures, cohorting cases for 48 hours.
Norovirus

- Increasingly recognized cause of diarrhea.
- 23 million cases/yr in U.S.
  - 50% of all cases food borne diarrhea.
- Highly contagious, non-enveloped virus.
- Spread easily by fecal-oral, contaminated food/water, droplets from vomitus, hands of HCWs.
- Vomiting, diarrhea, cramps, low grade fever.
  - 12-48 hour incubation.
  - Symptoms last 24-60 hours.
  - 1/3 cases asymptomatic.
- Hospital and nursing home outbreaks.
- Cruise ship outbreaks.