

## Microorganisms

tiny organisms that can only be seen with a microscope



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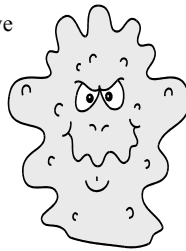
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## Defininitions

- Non-pathogenic- do not cause disease.
- Pathogenic- disease producing.
- Normal flora- microbes that normally live in/on body surfaces.
- Can normal flora cause disease?
- Examples:
- Antibiotics destroying normal balance, allows one group to flourish.



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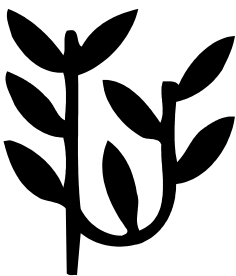
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## Pathogens grow best:



- At body temperature
- Where light is limited
- Where there is moisture
- Where there is a food supply.
- Where oxygen needs can be met, or unmet (anerobic)

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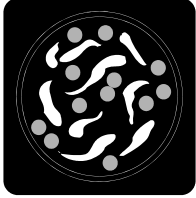
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## Microbes are classified as:



- Bacteria- simple one-celled microbes named according to their shapes and arrangements.
- Viruses- smallest microbes classified according to DNA/RNA, and clinical properties.
- Fungi molds and yeasts are opportunistic parasites.
  - Parasites live on other organisms without benefit to host. Causes disease when immune system is impaired.
- Protozoa- one celled organisms that have a nucleus/classified by how they move.

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## Chain of Infection



- Causative agent- pathogens
- Reservoirs (source)
  - humans:
    - cases are people with acute illness
    - carriers are people who have and transmit the disease but are asymptomatic
  - animals, environment, fomites (objects)
- Portals of Entry
  - skin/ mucus membranes, resp., GU, GI, Circ.
- Portals of Exit- body secretions
  - sputum, semen, vaginal sec., draining wounds
  - urine, feces, blood, saliva, tears.

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## Chain of Infection (con't)



- Transmission of disease (spread)
  - airborn- particles suspended in air or trapped in dust are breathed in.
  - droplet- moist particles from coughing/sneezing/talking/singing only travel approx. 3 ft. from source
  - contact - direct and indirect
    - direct- contact with ill person
    - indirect- contaminated items
- Host- becomes infected with disease because they lack resistance to the agent.

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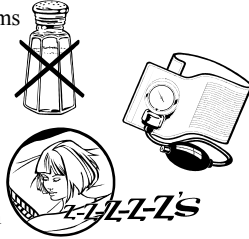
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## Risk Factors for infection

- Number /strength of organisms
- General health of individual
- Age, sex, and heredity
- Condition of immune system



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## Serious Infections in Health Care

- Methicillin-resistant *Staphylococcus aureus* (MRSA) normal flora. Contact/droplet isolation - gown, gloves, mask.

- normally found on skin, mucus membranes, upper resp tract, intestinal and G/U tracts.
- Transmitted mainly by health care workers hands, (can survive up to 3 hrs. on hands.)
- 40% of adults and most children become transient nasal carriers. Must be treated with topical and oral ATB.



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## Serious Infections (con't)

Vancomycin-resistant enterococci (VRE) normal flora of large intestine, mouth, and vagina. Gloves/gown required.

- Can live for weeks on surfaces.
- Spread by direct/indirect contact.
- Resistant to all ATB
- Doctor may choose to keep patient in contact isolation until normal flora can repopulate and replace the VRE strain.



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## Preventing the spread of MRSA and VRE

- Proper hand washing
- Use antiseptic soap
- Institute contact isolation precautions
  - private room, dedicated equipment, gloves/gown/mask/face shields, and disinfect the environment.
  - If you must bring in non-dedicated equipment- place it on a prepared surface, and wipe it with appropriate disinfectant before you leave the room.

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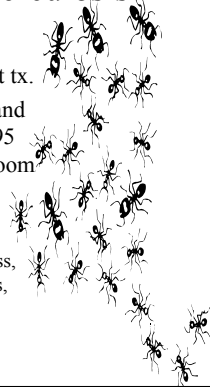
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## Mycobacterium tuberculosis

- Resistant to ATB. Tx. 6mo.-2yrs.
- No longer contagious in 2-3 wks. Post tx.
- Airborn Precautions- gloves, gown, and FIT Test for hepa mask, or N95/PFR95 respirator masks. Negative pressure room required.
- Symptoms
  - Fatigue, loss of appetite/weight, weakness, fever in afternoon/evenings, night sweats, hemoptysis, coughing.



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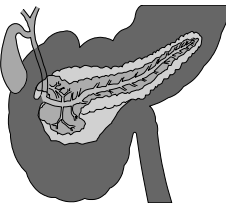
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## Hepatitis- inflammation of the liver viruses include A,B,C,D,E,&G

- Most common form is Hepatitis A
- A and E are contagious
- Chronic Persistent Hepatitis- when inflammation lasts for more than 6 months.
- Person's infected with any of the viruses may not have S/S
- Use Standard Precautions with all forms.



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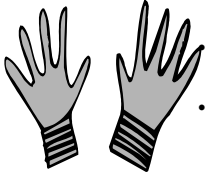
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## Hepatitis A - most common form

- Standard/Contact precautions.



- Older persons more likely to have S/S
- If S/S occur they are abrupt
  - fever, fatigue, loss of appetiti, nausea, abdominal pain, dark urine, jaundice.
- Transmitted by fecal-oral, food, H2O, rarely bloodborn. Stable in environment for months
- Risk groups = household/sexual contact, homosexuals, iv drug users.
- Prevention: good hygiene, sanitation.
  - Hepatitis A Vaccine > 2 yrs. 2 doses 6-12 months apart = 20 yr. Immunity
  - Immune Globulin - post exposure

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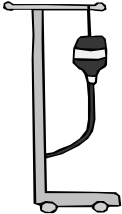
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## Hepatitis B 200-300 million carriers worldwide



- Symptoms include- poor appetite, N/V, headaches, weakness, jaundice, dark urine, light-colored stools.
- Transmission- spread by infected blood/body fluids- 1 mo. on surfaces at room temperature.
- Prevention- immunization series (combination vaccine Twinrix for A and B, (D probably also) (3 doses age 18 > don't share toothbrushes, razors, needles, instru. CDC- 100X greater of transmitting Hep. B through percutaneous than HIV. Condoms Treatment- Rest and good diet. Interferon for chronic disease. Approx. 5-10% become chronic.

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## Hepatitis C An Emerging Epidemic



- Mode of Transmission-After 1990 IV drug use surpassed transfusion associated hepatitis C, "straws."
  - Can be sexually transmitted, <5%
- 85% will become chronically infected, at risk for cirrhosis, cancer
- Prevention: No immunization exists.
  - Can be a carrier without symptoms.
- Treatment: Interferon, or combination Interferon/Ribavirin.

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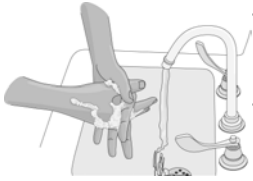
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## Clostridium Difficile- gram-positive spore-forming, anaerobic bacillus



- Leading cause of nosocomial diarrhea.
- Oral-fecal route (healthcare workers hands) after ATB therapy makes bowel susceptible to infection.
- Organism releases 2 toxins into colon which adheres to the mucosa and causes diarrhea.
- Symptoms usually appear during ATB tx. or up to 8 wks after completing ATB.

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## Symptoms associated with C. difficile



- Watery or bloody diarrhea, fever, abd. pain/cramping.
- Severe- 8 or more profuse, watery, green, foul-smelling stools/day, N/V, anorexia.
- Stool specimen sent for DX.
- TX- D/C ATB allow normal flora to recover, works 15-25%
- Serious infections will require Metronidazole, or Vancomycin.

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