Chapter Thirteen: Protecting Against Infectious Diseases and STIs, plus special section on Reducing Risks for Chronic Diseases and Infections - Dr. Dave Shrock

**Chapter Thirteen**

**Protecting Against Infectious Diseases and Sexually Transmitted Infections**

**11th edition:** pages 396-432  
**12th edition:** pages 397-427  
**Special section:** Reducing risks and coping with chronic diseases and conditions  
**11th edition** pages 424-432  
**12th edition:** pages 428-437

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*we live in a filthy world!*

- pathogens or infiltrates constantly embattle our body
- some stay with us continually, lying low until our immune system is more susceptible through:
  - stress
  - poor life choices
  - wear and tear

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**pathogens: routes of transmission**

**12th** p. 399-400; **11th** p. 397 (table 13.1)

- **airborne:** inhaling
- **foodborne:** food prep. and consumption
- **Vector borne or animal borne:** bites, ticks/insects, contact
- **waterborne:** drinking, food prep. and cleaning
- **people borne & contact:** hands, phones, keyboards, doors, money, documents, sexual contact
- **Preinatal:** occurs in uterus when baby passes through birth canal

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**risks we can control**

**12th** pp. 399-400; **11th** pp. 397-88

- **stress:** chronic stress weakens our immune system
- **nutrition:** fresh foods are rich in antioxidants and necessary compounds to keep our bodies healthy...also preparing foods correctly is important
- **physical activity:** bolsters our immune system, keeps our body healthy
- **sleep:** we need an ave. of 7-8 hours each night
- **drug use:** effects our body’s resilience and immune system
- **personal hygiene:** cleanliness of self and environment...hand washing!
- **Fact:** 70% of diseases are the result of poor life choices

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**hard to control risk factors**

**12th** pp. 399-400; **11th** pp. 398-89

- **heredity:** single greatest factor influencing our longevity
- **aging:** after 40, our immune system begins to wear down
- **environmental conditions:** pollution, waste, general filth around us
- **organism resistance:** particularly virulent or mutated organisms overwhelm our immune system
- **Epidemiological Triad of Disease:** all must be conducive to overcoming the body’s defense system

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**types of pathogens and how our body fights back**

**12th** pp. 400-402, **11th** pp. 398-400, *(figure 13.2)*
is it a cold or the flu?

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>COLD</th>
<th>FLU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>Rare</td>
<td>Prominent</td>
</tr>
<tr>
<td>Headache</td>
<td>Rare</td>
<td>Usual, often severe</td>
</tr>
<tr>
<td>General aches</td>
<td>Slight</td>
<td>Can last up to 5-7 days</td>
</tr>
<tr>
<td>Fatigue, weakness</td>
<td>Common</td>
<td>Early and present</td>
</tr>
<tr>
<td>Runny nose</td>
<td>Rare</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Sneezing</td>
<td>Rare</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Sore throat</td>
<td>Common</td>
<td>Soreness</td>
</tr>
<tr>
<td>Coughed</td>
<td>Rare</td>
<td>Soreness</td>
</tr>
<tr>
<td>Hoarseness</td>
<td>Rare</td>
<td>Soreness</td>
</tr>
<tr>
<td>Sneezing</td>
<td>Rare</td>
<td>Soreness</td>
</tr>
<tr>
<td>Nasal drainage, cough</td>
<td>Rare</td>
<td>Soreness</td>
</tr>
<tr>
<td>Fever, chills, nausea, vomiting</td>
<td>Rare</td>
<td>Soreness</td>
</tr>
</tbody>
</table>

**Don’t go to the doctor or emergency rooms unless you have lengthy symptoms... rest – fluids – sleep – time are the best cures**

how our body’s fight back

- first line of defense: the epithelial cells or skin
- ‘antigens’ or a pathogen invades our body, causing a reaction of ‘antibodies’
- some antibodies or lymphocytes are produced in our lymph nodes
- white blood cells also are a key defense
- when our bodies are attacked, it builds memory or ‘immunity’
- auto immune diseases are when the body’s defenses turn on itself by mistake...HIV, lupus, rheumatoid arthritis

how our body’s fight back, con’t

- fever: our body’s temperature rises from 98°F because of the toxins given off by the pathogen, but also is a protection, destroying some pathogens
- pain: direct pain occurs at the site, or referred pain is where the source may be somewhere else...a warning mechanism that the body’s under siege or hurt
- sneezing: our body’s violent attempt to expel pathogens
- vaccines: principle of acquired immunity where you have a small amount of the pathogen is injected in your body and by destroying a manageable amount, builds a memory or immunity

our body’s immune response

- Antigens directly invade the body, causing a reaction of antibodies
- Antibodies attack the antigen and destroy it
- Macrophages engulf and destroy the pathogen
- Lymphocytes destroy the virus
- T-cells activate macrophages

Keeping Defenses Healthy

- Limit exposure to germs
- Exercise regularly
- Get enough sleep
- Eat healthy foods
- Don’t overuse antibiotics
- Manage stress
who’s at highest risk

The viruses responsible for the most common infectious illnesses tend to pick on those least capable of fighting back:

- Children and their families: Youngsters are not only more vulnerable to infections, they are also more prone to certain complications, particularly ear infections.
- The elderly: Statistically, fewer older men and women are likely to catch a cold or flu, yet when they do, they face greater danger than the rest of the population.
- Smokers and those with respiratory problems: Smoke directly destroys the cells in the airways that normally protect against bacteria and viruses.
- Those who live or work in close contact with someone sick: Healthcare workers, who treat high-risk patients, nursing home residents, and others living in close quarters, such as students in dormitories, face greater odds of catching colds and flu.
- Residents or workers in poorly ventilated buildings: Both rectified and poor indoor air quality in the winter may be closely linked with disease transmission.

types of pathogens

- **Bacteria**: single celled plant like organisms
  - several thousand species, only approx. 100 cause diseases in humans
  - often not the bacteria, but the toxins they give off make us sick
  - Staphylococci, ‘staph infections’: always present on the skin when there is break in the skin, they can enter
  - Streptococcal, ‘strep infections’: five types of microorganisms…pharyngitis or strep throat is the most common
  - Pneumonia: once was leading cause of death in the US until antibiotics…still a threat worldwide
  - Tuberculosis, ‘TB’: bacterial infiltration often respiratory system once a major killer…still a threat worldwide

- **Viruses**: 1/500th the size of bacteria
  - not identified until 20th century…over 150 cause disease in humans
  - takes over a host cell…difficult to treat
  - common colds: responsible for the most days off work. Colds are ‘endemic’…always present until the immune system wears down…most contagious during the first 24 hours
  - influenza ‘flu’: more severe than a cold. Cold like symptoms, children under 5 yrs. and elderly often are in danger
  - mononucleosis ‘mono’: starts like a cold and progresses to lymph nodes, jaundice, aching joints. Treatment is lengthy
  - Hepatitis: three stains now: A, B, C cause inflammation of the liver, fever, headaches, jaundice. Passed through food, water, and Type B through body fluids…unprotected sex
  - measles: viral infection in young children passed via inhalation.

emergent-resurgent disease dangers

- new threats are evolving due to:
  - mushrooming world population and poverty
  - disintegration of health care on a global basis
  - highly mobile populace
  - pathogens mutating at faster rates, more resistant
  - risky human behavior: drugs, sexual practices
  - aging world population
  - Ebola: originated in Central Africa, and killed over 10,000 this past year
  - e-coli: a digestive enzyme in an animal’s stomachs, passed to humans through incorrect slaughter methods
  - Lyme Disease: infection contracted from ticks
  - SARS (Severe Acute Respiratory Syndrome): viral respiratory illness
  - West Nile virus: spread from infected mosquitoes
  - MRSA: antibiotic resistant staph infection sweeping across US
  - Valley Fever: Central valley and Arizona – air borne fungus causing respiratory illness and wide spread infection
  - bioterrorism: not new, but a mobile threat

sexually transmitted infections

- STI’s or STD’s have plagued humans from earliest times
- today there are 20 known types...
- 65 million in the US have an incurable STI
- 25% of active 16-25yr olds have an STI
- most are preventable!
- modes of transmission:
  - unprotected sexual intercourse
  - oral genital contact
  - genital to hand contact
  - mouth to mouth contact

Excellent chart in books:

STI Attitude and Belief scale:

- Men and Women
  - Some harm or dangers from sex
  - Sexing is fun when not harming
  - Fairness or honesty

- Men: affair
  - Same bed, affairs
  - Losing or losing

- Women: affair
  - Supportive or strong
  - Blaming from the side of losing, negative, and not supportive
HIV/AIDS

12th pp. 412-27; 11th pp. 410-20

HIV/AIDS: a shifting epidemic
- human Immunodeficiency virus, the virus which causes AIDS: acquired immune deficiency syndrome
- since 1981 when AIDS was first recognized, 78 million have become infected, with 5 million new cases worldwide each year
- 21 indicator diseases, main indicator is the drop in the body’s immune system
- HIV gains entry into the body via fluids: semen, vaginal secretions, blood, sharing of needles, etc.
- Potential vaccine: Pre-Exposure Prophylaxis (PrEP) has had promising results lessening contraction of HIV… expense of $1300 per month is a limiting factor.
- Possible cure: drug called Selzentry prevents the HIV virus from entering the T-cells of our immune system developed from mutated human genes.

Special Section: Reducing Risks and coping with Chronic Diseases and Conditions

11th edition pp. 425-432
12th edition: pp. 428-437

asthma

Special Section: 12th pp. 430-31; 11th pp. 247
- a long term chronic respiratory inflammatory disorder blocked or restricted airflow to the lungs
- cause by pollutants, particulate matter in the environment, exercise, cold dry weather, and smoke can trigger an attack
- most common chronic disease of childhood 13% of all student have asthma, 21% in the central valley. More than 5,000 die annually each year, and asthma cases have risen since 1985
- many medications on the market, inhalers help bring quick relief by opening airways

allergies

Special Section: 12th pp. 431-32; 11th pp. 427-28
- allergies are the body’s hypersensitivity reaction to relatively harmless pathogens called allergens
- most common allergens are molds, animal dander, pollens, ragweed, and dust
- the central valley is one of the worst locales in the U.S. for allergens and asthma
- the body often produces ‘histamines’ a chemical which dilates the blood, increases mucus, swells tissue, and effects there respiratory system
- allergies can begin as a child, but often grow worst with age
- studies now show that overly clean homes may cause children to be more sensitive to allergies and asthma

digestion related disorders

Special Section: 12th pp. 433-35; 11th pp. 431
- Irritable Bowl Syndrome: Symptoms are pain, bloating, abdominal discomfort. Causes could be stress, food sensitves, hormones. Treatment involves diet, medication, relaxation and stress management. 10-15% of adults in U.S. suffer from IBS
- Crohn’s Disease: Chronic inflammation of the small intestine. Genetic, environmental, and autoimmune reactions are primary causes effecting primarily young adults. Symptoms include diarrhea, abdominal pain, weight loss, fatigue. Diet and medication are primary management tools
- Ulcerative Colitis: Often first flares in teens, though grows increasingly worst and can continue for life. Nausea, vomiting, fever are primary symptoms. Diet modification, anti-inflammatory drugs are used. Higher risks of colon cancer are also linked.

headaches

Special Section: 12th pp. 432-33; 11th pp. 431
- 25% of ER visits are headache related visits. Ages 18-44 years are more likely to visit ER’s than any other group
- Tension Headaches: 90% of women/70% of men suffer from tension headaches at some point in their lives. Caused by muscle contractions or tension. Last 30min to one week. Triggers are stress, depression, poor posture, lack of sleep. OTC pain relievers are most common treatment
- Migraine Headaches: 1 in 7 Americans, mostly womenuffer from these rare vascular headaches. Thought to be genetically related, vascular problems, hormones main are triggers. Stress management, trigger reduction, hormone therapies are remedies
- Cluster Headaches: Adult males in their 20’s are susceptible to these rare type of headache causing excruciating pain. Last 40-90min during REM Sleep. Oxygen therapy, drugs, event surgery are remedies.
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Lupus

- An autoimmune disease, producing antibodies which attacks the kidneys, brain and heart and other healthy cells in the body
- 90% of cases are young females, women of color are at double risk.
- Common signs of lupus are:
  - Red rash or color change on the face often in the shape of a butterfly across the nose and cheeks
  - Painful or swollen joints
  - Unexplained fever
  - Chest pain with deep breathing
  - Swollen glands
  - Extreme fatigue (feeling tired all the time)
  - Pale or purple fingers or toes from cold or stress
  - Sensitivity to the sun
  - Depression, trouble thinking, and/or memory problems

Lupus, con’t

- no cure has yet been found for this sometime fatal disease. With treatment individuals can lead full lives.
- Most often diagnosed during a woman’s reproductive years
- treat with steroids, though long term effects unknown. Other treatments to control are being developed.

Repetitive Motion Disorders

Special Section: 12th pp. 435; 11th pp. 431-32

- group of physical ailments such as carpal tunnel syndrome, bursitis and tendonitis
- symptoms often are intense burning pain when typing or moving of the hands, wrists, elbows, shoulders, and sometimes knees, neck, hips or back
- caused by repetitive movement done incorrectly or with poor positioning or support
- education showing proper movement, correct ‘ergonomic’ work stations (chairs, desks, keyboards), physical therapy, varying tasks, and taking breaks often help relieve and/or prevent RMI’s

Arthritis

Special Section: 12th pp. 434; 11th pp. 433

- nations primary crippler
- effects 1 in 7, or 38 million Americans
- Osteoarthritis: a degenerative joint disease associated with wear and tear on the body, aging, diet, weight, and posture are contributors
- Rheumatoid Arthritis: an autoimmune disease involving chronic inflammation. Occurs at any age, though often between 20-45, and more often in women. Symptoms range from stiffness, swelling of joints, and can be progressive or sporadic. Those inflicted also suffer from a greater risk of CVD ailments.

Lower back pain

Special Section: 12th pp. 434-35; 11th pp. 431

- 85% of all Americans experience lower back pain at some time in their lives. The major cause of disability for those between 20-45 in the U.S. 90% occur in the lower lumbar spine
- tips to moderate or avoid lower back pain:
  - maintain an ideal weight
  - exercise and maintain good abdominal strength and balance
  - get a good work station chair and mattress
  - left objects properly respecting your back
  - avoid high heels and wear supportive shoes
  - be flexible…try yoga or Pilates as a component of your fitness programme

Promise of Stem Cells

11th p. 380 (chapter 12 - not in 12th edition)

- Controversial harvesting of cells from discarded Invetro fertilization processes
- The use of human cells or human fetal tissue troubles many people on ethical grounds. Under the Bush administration, the federal government limited research on pre-existing harvested stem cells
- California OK’d a multi-million proposition for stem cell research in the fall of 2004. Huge research lab at UC Davis built in 2008
First identified in 2012, CRISPR is a naturally occurring bacterium that defends our bodies against invading pathogens.

Now being harnessed to edit strands of living genomes, in addition to modifying damaged DNA by adding new DNA.

Implications for agriculture and eventually editing the human genomes sequences to edit out identified mutated genome sequences that cause disease. Controversial as this could also be used to create 'designer humans'.

CRISPR could be the most significant medical breakthrough since antibiotics introduction in the 1930's.