Course Learning Outcomes for Unit III

Upon completion of this unit, students should be able to:

1. Examine the nutritional aspects of pharmacology and herbal substances.
2. Evaluate the concept and study of toxicology.
3. Examine the purpose of a proper diet.
4. Analyze the effects of substance abuse.
5. Discuss antibacterial, miscellaneous antibacterial agents, and antiviral agents.

Reading Assignment

Chapter 9:
Nutritional Aspects of Pharmacology and Herbal Substances

Chapter 10:
Toxicology

Chapter 11:
Substance Abuse

Chapter 12:
Antibacterial and Antiviral Agent

Unit Lesson

Welcome to Unit III. Unit III, similar to Unit II, will have different areas of focus, but the connecting concept is the effect that is produced on the body system. The unit will focus on the discussion of nutrients, herbal supplements, poisons (toxicology), addictive drugs (substance abuse), antibacterial drugs, and antiviral drugs.

Nutrients

Nutrition is defined as the process by which the body is able to take in and utilize food and other sources in order to promote growth and repair tissues. The body generally requires a variety of nutrients for energy, growth, repair, and basic processes. The seven basic food components that provide these nutrients are proteins, fatty acids, carbohydrates, fiber, vitamins, minerals, and water. All of which have their own distinctive purpose in the body to support normal metabolism, growth, reproduction, or other body functions. Nutrients are further subdivided into macronutrients and micronutrients. Macronutrients (e.g., carbohydrates, fats, proteins, water, and macrominerals: sodium, chloride, potassium, and calcium) are needed in large amounts and make up a large amount of the diet. Micronutrients are the vitamins (water soluble B and C and fat soluble A and D) and essential trace minerals (microminerals) that are required in very small amounts by the human body. The deficiency of these micronutrients can lead to changes in the structure and function of tissues and organs or cause deficiency or disease. Compared to essential trace mineral, which are defined as having a required intake of less than 100 mg a day, major minerals (e.g. calcium, phosphorus, sodium potassium, magnesium, and chlorine) are required in varying amounts.

The purpose of a proper diet is to achieve and maintain a favorable body composition and the ability to achieve maximal physical and mental work. Every five years the Food and Nutrition Board issues a recommended dietary allowance (RDA) based on its review of the scientific literature for human requirements for the 45 essential nutrients. Nutritional support can be achieved in the form of oral supplementation with energy and protein rich foods, enteral nutrition to supplement or replace oral feedings for those that require intensive protein and caloric intake, or parenteral nutrition (partial or total) that is administered intravenously.
It is important to recognize that drugs can interact with food or certain dietary items. For instance, drugs interactions with foods, herbs, and other natural substances have the ability to alter the activity of a particular drugs. The presence of food has the capacity to reduce the absorption of anti-infective agents or the potential for hypertensive crisis to occur with the combination of tyramine containing foods (e.g. cheese and wine) and monoamine oxidase inhibitors (e.g. phenelzine and isocarboxazid). Also, the reported presence of food additives or contaminants may have impact on medical conditions or produce health concerns, but these have been labeled as trivial.

Herbal supplements are considered to be any mixture of ingredients that are primarily plant-based and designed to improve health or treatment of certain conditions. The Food and Drug Administration does not consider herbs to be drugs rather food products. The Dietary Supplement Health and Education Act of 1994 attempted to regulate herbal products as a part of its overall description of dietary supplements. Manufacturers must label them clearly as "dietary supplements but do not have to demonstrate the effectiveness of these products before they are sold.

Poisons

A poison is defined as any agent that (in relatively small amounts) can cause death or serious bodily harm. In general, all drugs are potential poisons if used improperly or in dosages that are greater than what is typically recommended. The immediate identification of a poisoning is vital to providing an appropriate antidotal therapy, and the most accurate identification is through the chemical analysis of body liquids. The most commonly identified and influential factors for gauging poisoning risk are age, location, access, containers, or supervision. Some of the most common poisonings involve non-prescription drugs, household products, solvents, pesticides, and poisonous plants. Some of the most observable poisoning cases involve lead, mercury, acetaminophen, methyl glycol and ethylene glycol, formaldehyde, or salicylates, to name a few. There are specific antidotal therapies for only a few poisons, and they generally work by reducing the concentration of the toxic substance in the body to combine with the poison or increase its rate of excretion. Some notable poisons and their corresponding antidotes are acetaminophen and N-Acetylcysteine, opiates and naloxone, methanol and ethanol, and benzodiazepines and flumazenil. The best method to address the problem of poisoning is to provide quality, in-depth education and clear directions/steps for poison prevention.

Substance Abuse

Substance abuse can be regarded as a major public health issue in today’s society. It has the potential to affect every level of a person’s life, and it is generally labeled as abuse when it begins to produce a significant distress in an individual’s life. An individual is considered to be substance-dependent when they display three of the following signs: tolerance; withdrawal; desire to quit; excessive time spent on abuse; fewer occupational, recreational, or social activities; or continued use while understanding the physiological and psychological effects. A substance abuse disorder includes substance abuse and dependence. Addiction is defined as the progressive, chronic abuse of a substance that causes a person to use the substance repeatedly despite serious health and social consequences. Addictive drugs can include cannabinoids (e.g., marijuana), depressants (e.g., barbiturates, benzodiazepines), dissociative anesthetics (e.g. ketamine, phenylcyclohexylpiperidine), stimulants (e.g., amphetamines, cocaine), anabolic steroids, and dextromethorphan. It has been reported that the earlier in life an individual begins abusing drugs, the higher the chance they will have a long-term substance abuse disorder. The existence of a substance abuse generally prevents individuals from seeking proper treatment based specifically on the reason that they choose to initially abuse the substance.

Click here to view a video on the addictive substance cocaine.

Substance abuse has the potential to impact an individual’s mental state, predisposing him or her to anxiety, insomnia, or depression. The physical effects of substance abuse may include diseases related to risky sexual behavior (e.g., hepatitis, HIV, STDs) and drug overdoses, which can lead to seizures, coma, or death.

Drugs can also cause automobile accidents, suicide, or violent behavior. Prevention and treatment in the form of detoxification or psychological training can be employed to combat substance abuse.
Infections and Viruses

Infection is regarded as the most common cause of death for many individuals; this can affect both the very young and the very old who have chronic or critical illnesses, as this makes them more susceptible. The microorganisms that are known to cause infection and disease are called pathogens; the major microorganisms are bacteria, viruses, fungi, and parasites. Antibacterial agents (e.g., penicillins, cephalosporins, aminoglycosides, tetracyclines, and macrolides) can inhibit the growth of or kill microorganisms when given in sufficient concentrations. Systematic antibacterial agents can be bactericidal (kill microbes) or bacteriostatic (inhibit microbial growth).

A superinfection may result from the disruption of the nonpathogenic microorganism within the human body that is attributed to the use of antibiotics. Oral penicillins and cephalosporins often cause bacterial superinfections in the bowel, with the most common being pseudomembranous colitis. There are miscellaneous antibacterial agents (e.g., vancomycin, clindamycin, or chloramphenicol) are used as second-line because of selectivity toward organisms and toxicity issues but can be useful with the emergence of resistance to first-line antibacterial agents. The treatment of tuberculosis may require as many as four different drug combinations that can be divided into first and second-line antituberculotic agents based on efficacy, activity level, and related adverse effects. Therapy can be initiated with ethambutol, isoniazid, rifampin, and pyrazinamide for two months, followed by isoniazid and rifampin for an additional or minimum of four months.

Click here to access the video on acyclovir.
Click here to access the video on ciprofloxacin.

The presence of viruses is known as a cause of much of the morbidity and mortality in the worldwide population, but the number of available agents for treatment is low. Only a few antiviral drugs have been successfully used in the United States, which include acyclovir, amantadine, didanosine, ribavirin, zanamivir, ganciclovir, and zidovudine. These agents are known to treat many viral diseases, such as measles, mumps, rubella, chicken pox, or smallpox. In addition, antiviral agents can be used as monotherapy or in combination to treat the human immunodeficiency virus (HIV). Highly active antiretroviral therapy (HAART) has been shown to lead to a reduction in viral load, increase CD4 lymphocyte count, delay the onset of AIDS, and prolong survival. While HAART therapy may be associated with harsh side effects and the potential for drug resistance, they are recognized as the standard of therapy for HIV infection.

Click here to view the video on HIV.

Suggested Reading

Go to www.myhealthprofessionskit.com (companion website for course textbook)
Click here to access the PDF of the Chapter 9 Presentation.
Click here to access the PDF of the Chapter 10 Presentation.
Click here to access the PDF of the Chapter 11 Presentation.
Click here to access the PDF of the Chapter 12 Presentation.
Below are some additional resources that you may find helpful as you work on the coursework for Unit III:

- The Substance Abuse and Mental Health Services Administration: [http://www.samhsa.gov](http://www.samhsa.gov)
- National Foundation for Infectious Diseases: [http://www.nfid.org/publications](http://www.nfid.org/publications)


- Chapter 13: Poisoning, Overdoses, and Intoxications, p.212
- Appendix D: Common Herbal Supplements, p.414

**Learning Activities (Non-Graded)**

For additional practice before you begin your graded work, complete the following Apply your Knowledge: Critical Thinking Questions in your textbook:

- 9.1: Apply your knowledge Questions:1-9
- 9.2: Apply your knowledge Questions:1-4
- 9.3: Apply your knowledge Questions:1-7
- 9.4: Apply your knowledge Questions:1-5
- 9.6: Apply your knowledge Questions:1, 3, 4, 5, 6
- 10.1: Apply your knowledge Questions:1, 4, 6, 8
- 10.2: Apply your knowledge Questions:1-5; 8-11
- 10.3: Apply your knowledge Questions:1-3
- 11.1: Apply your knowledge Questions:1-5
- 11.2: Apply your knowledge Questions:1-5
- 11.5: Apply your knowledge Questions:1-5
- 12.1: Apply your knowledge Questions:1-5
- 12.2: Apply your knowledge Questions:1-4
- 12.3: Apply your knowledge Questions:1-5
- 12.4: Apply your knowledge Questions:1-5
- 12.5: Apply your knowledge Questions:2, 3, 5

Non-graded Learning Activities are provided to aid students in their course of study. You do not have to submit them. If you have questions, contact your instructor for further guidance and information.