DNH 216
Pharmacology

COURSE OUTLINE

Prerequisites:
Completion of all First Semester DNH Courses

Course Description:
Studies the chemical and therapeutic agents used in dentistry, including their preparation, effectiveness, and specific application.

Semester Credits: 2  Lecture Hours: 2
DNH 216 Pharmacology

Course Outcomes

At the completion of this course, the student should be able to:

1. Apply knowledge from the previous semester to the concepts of pharmacology presented in this course.
2. Utilize the information presented to augment your current knowledge in treatment planning and treatment modifications for clinical situations.
3. Gain an understanding of the significance and impact of pharmacotherapeutic agents on the overall health status of the clients in your clinical caseload.
4. Recognize the impact of interaction of the prescription and OTC drugs taken by the client with drugs used in dental treatment.
5. Recognize the impact of research and release of new drugs on the study of pharmacology as a science.
6. Recognize the need for ongoing education in this area due to the advent of new drugs and manifestations of diseases.
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Textbook:

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Clinical Practice of the Dental Hygienist by Esther M. Wilkins. 11th edition
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Course Objectives:

Chapter 1- Introduction: Information, Sources, Regulatory Agencies, Drug Legislation, and Prescription Writing
   1. Discuss the history of pharmacology and its relationship to the oral health care provider.
   2. Define the ways in which drugs are named and the significance of each.
   3. Describe the acts and agencies within the federal government designed to regulate drugs.
   4. Identify the four phases of clinical evaluation involved in drug approval and the five schedules of drugs
   5. Describe the elements of a drug prescription.

Chapter 12 – Vitamins and Minerals
   1. Explain the body’s need for vitamins and minerals.
   2. Summarize and explain how vitamins are classified.
   3. Name and describe the water- and fat-soluble vitamins, including sources, recommended amounts, roles, deficiencies, adverse reactions, and clinical considerations.
   4. Describe the sources, recommended amounts, roles, deficiencies, and toxicity of the minerals iron, zinc, and calcium.
   5. Discuss the clinical considerations of vitamins and minerals, and provide several examples of their relevance to dental treatment.

Chapter 24 – Pregnancy and Breast Feeding
   1. List the two main concerns in the administration of drugs during pregnancy.
   2. Define teratogenicity and outline the Food and Drug Administration (FDA) categories of drugs for pregnancy.
   3. Name several types of local anesthetic, antiinfective, and antianxiety agents, and state their indications or contraindications for pregnant women.

Chapter 2 – Drug Action and Handling
1. Differentiate dose, potency, and efficacy in the context of the actions of drugs.
2. Explain the pharmacologic effect of a drug.
3. Discuss the major steps of pharmacokinetics: absorption, distribution, metabolism, and excretion.
4. Summarize the various routes of drug administration.
5. Provide example of factors that may alter the effect of a drug.

Chapter 3 – Adverse Reactions
1. Define an adverse drug reaction, and name five categories of reaction.
2. Discuss the risk-to-benefit ratio of the use of a drug for therapeutic effect and its potential adverse reactions.
3. Explain how the toxic effects of drugs are evaluated.

Chapter 26 – Natural/Herbal Products and Dietary Supplements
1. Discuss why people choose herbal products over traditional medicine.
2. Discuss the federal legislation governing herbal and dietary products.
3. Discuss Good Manufacturing Practice (GMP) and the standardization of herbal products.
4. Explain the adverse effects associated with herbal products and their impact on oral health care.
5. Explain the drug interactions associated with herbal products and their impact on oral health care.
6. Discuss the herbal supplements that are used in oral health care.
7. Explain the dental hygiene considerations associated with the use of herbal products.

Chapter 25 – Drug Abuse
1. Define an adverse drug reaction, and name five categories of reaction.
2. Discuss the risk-to-benefit ratio of the use of a drug for therapeutic effect and its potential adverse reactions.
3. Explain how the toxic effects of drugs are evaluated.

Chapter 4 – Autonomic Drugs
1. Identify the major components and functional organization of the autonomic nervous system.
2. Discuss the pharmacologic effects, adverse reactions, contraindications, and dental considerations of cholinergic agents.
3. Discuss the pharmacologic effects, adverse reactions, contraindications, and dental considerations of anticholinergic agents.
4. Identify the major components of the sympathetic nervous system.
5. Discuss the pharmacologic effects, adverse reactions, contraindications, and dental considerations of adrenergic agents.
6. Explain the workings of adrenergic blocking agents and neuromuscular blocking agents.

Chapter 5 – Nonopioid (Nonarcotic) Analgesics
1. Describe pain and its purpose and the main components.
2. Discuss the chemistry and pharmacokinetics, pharmacologic effects, adverse reactions, toxicity, drug interactions, and uses of aspirin.
3. Define the term nonsteroidal anti-inflammatory drug (NSAID), and discuss the chemistry, pharmacokinetics, pharmacologic effects, adverse reactions, toxicity, drug interactions, and uses of these drugs.
4. Discuss the properties, pharmacologic effects, drug interactions, and uses of acetaminophen.
5. Explain the disease known as gout, and summarize the drugs used to treat it.

Chapter 6 - Opioid (Narcotic) Analgesics and Antagonists
1. Explain the classification, mechanism of action, and pharmacokinetics of opioids.
2. List and describe the pharmacologic effects and potential adverse reactions of opioids.
3. Discuss the addiction potential of opioids, including treatment.
4. Name and explain the analgesic actions of the most common opioid agonists.
5. Discuss the actions and provide examples of the mixed opioids.
7. Apply the use of opioids to dentistry.

Chapter 9 – Local Anesthetics
1. Discuss the history and reasons for the use of local anesthetics in dentistry.
2. Explain the mechanism of action, pharmacokinetics, pharmacologic effects, and adverse reactions of local anesthetics.
3. Describe the types and workings of each of the drugs used in local anesthetic solutions, and summarize the factors involved in the choice of a local anesthetic.
4. Briefly discuss the use of and types of topical anesthetics used in dentistry.

Chapter 11 – Antianxiety Agents
1. Discuss the value of patient relaxation in dentistry.
2. Describe the mechanism of action, interactions, and dental relevance of the benzodiazepines and barbiturates.
3. Name and briefly describe the mechanism of action of the nonbenzodiazepine nonbarbiturate sedative-hypnotics and the nonbenzodiazepine-nonbarbiturate receptor agonists.
4. Name a melatonin receptor agonist, and summarize its actions.
5. Explain the workings of the centrally acting muscle relaxants and how they are used.
6. Discuss some general precautions about which the dental practitioner should be aware with the use of antianxiety agents.

Chapter 17 – Psychotherapeutic Drugs
1. Name and describe the three categories of functional disorders discussed in this chapter.
2. Outline some basic precautions that the dental health care professional should keep in mind when treating patients with psychiatric disorders.
3. Summarize the basic mechanism of action, pharmacologic effects, adverse reactions, drug interactions, and uses of the antipsychotic agents.
4. Describe the mechanism of action, pharmacologic effects, adverse reactions, drug interactions, uses, and dental implications of the tricyclic antidepressants.
5. Describe the mechanism of action, pharmacologic effects, adverse reactions, drug interactions, uses, and dental implications of the selective serotonin reuptake inhibitors.
6. Name several other types of antidepressants.
7. List several drugs used to treat bipolar disorder.

Chapter 10 – General Anesthetics
1. Summarize the history of general anesthesia in dentistry.
2. Describe how general anesthesia works and the stages and planes involved.
3. Compare and contrast the classifications of general anesthesia.
4. Discuss the use of nitrous oxide in dentistry, including how it works, the pharmacologic effects, adverse reactions, and contraindications.
5. Name and describe several types of halogenated hydrocarbons.
6. Identify and describe several other types of general anesthesia.

Chapter 7 – Anti-infective Agents

1. Outline the history and basic principles of infection and its relevance to dentistry.
2. Summarize the principal indications for the use of antimicrobial agents.
3. Name and describe the major adverse reactions and disadvantages associated with the use of anti-infective agents.
4. Discuss penicillin, macrolides, tetracyclines, cephalosporins—their chemical makeup, properties, mechanisms of action, uses, and potential adverse reactions—and name several specific types.
5. Name and describe several other types of antibiotics and antiinfectives.
6. Discuss the use of anti-infective agents in dentistry.
7. Describe the drugs used to treat tuberculosis and the difficulties this disease presents.
8. Summarize the concept and practice of antibiotic prophylaxis in dentistry.

Chapter 8 – Antifungal and Antiviral Agents

1. Name several types of antifungal agents, and discuss their indications in dentistry and potential adverse reactions.
2. Discuss the treatment of herpes simplex.
3. Describe the various drugs and drug combinations used to treat acquired immunodeficiency syndrome (AIDS).

Chapter 15 – Cardiovascular Drugs

1. Identify several dental issues in the treatment of patients with cardiovascular disease.
2. Describe heart failure, and identify drugs commonly used to treat it, including the mechanisms of action, pharmacologic effects, adverse reactions, and uses of each.
3. Define arrhythmia and dysrhythmia, and how the heart maintains its normal rhythm.
4. Describe the mechanisms of action, pharmacologic effects, adverse reactions, and uses of antiarrhythmic agents, and identify the issues to consider in dental treatment.
5. Define angina pectoris, and describe the types of drugs used to treat it; identify the dental implications of these drugs.
6. Describe the various types of antihypertensive agents, including the mechanisms of action, pharmacologic effects, adverse reactions, and uses of each. In addition, identify potential drug interactions and the dental implications of these drugs.
7. Define hyperlipidemia and hyperlipoproteinemia, and summarize the types of drugs used to restore cholesterol homeostasis in the body.
8. Describe the role of warfarin in blood coagulation and the potential adverse reactions and interactions associated with its use.
9. Identify several other drugs that affect blood coagulation.

Chapter 16 – Anticonvulsants
1. Define epilepsy, and briefly summarize the various types of seizures.
2. List and describe general adverse reactions to anticonvulsants.
3. Summarize the pharmacologic effects, adverse reactions, and drug interactions of the main anticonvulsants—carbamazepine, valproate, phenobarbital, and phenytoin.
4. Name two miscellaneous anticonvulsants, and describe the workings of each.
5. Provide several examples of new types of anticonvulsants, including the mechanism of action, indications, and adverse reactions of each.
6. Outline the dental treatment of patients with epilepsy.

Chapter 18 – Autocoids and Antihistamines
1. Define histamine and discuss its pharmacologic effects, adverse reactions, and uses.
2. Describe the dental implications, pharmacologic effects, adverse reactions, toxicity, and uses of the antihistamines.
3. Name and discuss the mechanism of action of non-sedating histamine (H₁)-receptor antagonists.
4. Categorize the prostaglandins and thromboxanes and outline their pharmacologic effects, uses, and dental implications.
5. List several other types of autocoids and describe how they work.
Chapter 19 – Adrenocorticosteroids
1. Define adrenocorticosteroids, and describe how the body releases them.
2. Summarize the classification, administration, mechanism of action, and pharmacologic effects of adrenocorticosteroids.
3. Describe the various adverse reactions and uses of adrenocorticosteroids, including their application to dentistry.
4. Differentiate several examples of corticosteroids.
5. List several dental implications to the use of steroids.

Chapter 20 – Other Hormones
1. Outline the functions of the anterior and posterior glands.
2. Provide an overview of the thyroid hormones and the conditions known as hypothyroidism and hyperthyroidism and the anti-thyroid drugs.
3. Define diabetes mellitus, list and describe the two types of this disease, its complications, issues involving dentistry, cautions and contraindications in the treatment of patients with diabetes, and the effects of drugs on complications of diabetes.
4. Name and describe the types of drugs used to treat diabetes.
5. Summarize the major female and male sex hormones, and name and describe several types of hormonal contraceptives.

Chapter 22 – Respiratory and Gastrointestinal Drugs
1. Summarize the two groups of respiratory diseases.
2. Name and describe the mechanisms of action of several types of drugs used to treat respiratory diseases.

Chapter 21 – Antineoplastic Drugs
1. Define antineoplastic agents.
2. Summarize the use, mechanisms of action, and classification of antineoplastic agents.
3. Describe several adverse drug effects associated with antineoplastic agents.
4. Discuss the dental implications of patients planning to take or actively taking antineoplastic drugs.

3. Discuss the types of drugs used to treat respiratory infections, including the
implications to dentistry.
4. Summarize the most common types of gastrointestinal (GI) diseases.
5. Name and describe the types of drugs used to treat GI diseases, including any implications to dentistry.
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Topical Description:

UNIT 1: INTRODUCTION TO PHARMACOLOGY, VITAMINS & MINERALS, PREGNANCY & BREAST FEEDING, DRUG ACTION & HANDLING, ADVERSE REACTIONS, NATURAL/HERBAL PRODUCTS & DIETARY SUPPLEMENTS AND DRUG ABUSE – WEEKS 1-2

A. History
B. Pharmacology and Oral Health Care Providers
C. Sources of Information
D. Drug Names
E. Federal Regulations and Regulatory Agencies
F. Clinical Evaluation of a New Drug
G. Drug Legislation
H. Prescription Writing
I. Measurements of Vitamin Needs
J. Water-soluble and Fat-soluble Vitamins
K. Selected Minerals & Drug Induced Vitamin Deficiencies
L. Pregnancy Teratogenicity & FDA Pregnancy Categories
M. Characterization of Drug Action
N. Mechanism of Action of Drugs
O. Pharmacokinetics
P. Routes of Administration and Dose Forms
Q. Definitions and Classifications
R. Clinical Manifestations of Adverse Reactions
S. Toxicologic Evaluation of Drugs
T. Natural/Herbals Products & Dietary Supplement Safety
U. Limited Regulation, Drug Interactions
V. Drug Abuse Definitions
W. Identifying the Drug Abuser or Impaired Health Care Worker
UNIT 2: AUTONOMIC DRUGS – WEEKS 4-5

A. Anatomy
B. Parasympathetic Autonomic Nervous System
C. Sympathetic Autonomic Nervous System
D. Functional Organization
E. Neurotransmitters
F. Drug Groups

UNIT 3: NON OPIOIDS, OPIOIDS & ANTAGONISTS, LOCAL ANESTHETICS – WEEK 7

A. Non opioids
B. Define Pain
C. Non-opioid Classification
D. Salicylates
E. Nonsteroidal Anti-inflammatory Drugs
F. Acetaminophen
G. Nonopioid Drugs Used to Treat Gout
H. Opioid (Narcotic) Analgesics and Antagonists
I. Opioid History
J. Opioid Terminology
K. Opioid Classification
L. Opioid Mechanism of Action
M. Opioid Pharmacokinetics
N. Opioid Pharmacologic Effects
O. Opioid Adverse Reactions
P. Specific Opioids
Q. Dental Use of Opioids
R. Local Anesthetic Chemistry
S. Local Anesthetic Mechanism of Action
T. Local Anesthetic Pharmacokinetics
U. Local Anesthetic Pharmacologic Effects
V. Local Anesthetic Adverse Reactions
W. Local Anesthetic Vasoconstrictors & Topical Anesthetics
UNIT 4: ANTIANXIETY, PSYCHOTHERAPEUTICS, GENERAL ANESTHETICS, ANTIINFECTIVES, ANTIFUNGALS, AND ANTIVIRALS – WEEKS 8-9

A. Definitions
B. Benzodiazepines
C. Barbiturates
D. Nonbenzodiazepine-Nonbarbiturate Sedative-Hypnotics
E. Nonbenzodiazepine-Nonbarbiturate Receptor Agonists
F. Melatonin Receptor Agonist
G. Centrally Acting Muscle Relaxants
H. General Comments about Antianxiety Agents
I. Psychiatric Disorders
J. Antipsychotic & Antidepressant Agents
K. History & Classifications of General Anesthetics
L. General Anesthetic Mechanism of Action
M. General Anesthetic Adverse Reactions
N. Dental Infection “Evolution”
O. History of Antiinfectives
P. Definitions of Antiinfectives
Q. Identification of Antiinfectives
R. Culture and Sensitivity
S. Resistance
T. Indications for Antimicrobial Agents
U. General Adverse Reactions and Disadvantages Associated with Antiinfective Agents
V. Rational Use of Antiinfective Agents in Dentistry
W. Antifungal Agents
X. Nystatin, Imidazoles, and Other Antifungal Agents
Y. Antiviral Agents
Z. Herpes Simplex, AIDS, and Other Antiviral Agents
UNIT 5: CARDIOVASCULAR DRUGS, ANTICONVULSANTS, ANTIHISTAMINES, ADRENOCORTICOSTEROIDS & OTHER HORMONES, RESPIRATORY & GASTROINTESTINAL DRUGS, AND ANTINEOPLASTICS – WEEKS 11-14

A. Dental Implications of Cardiovascular Disease
B. Cardiac Glycosides
C. Antiarrhythmic Agents
D. Antianginal Drugs
E. Antihypertensive Agents
F. Antihyperlipidemic Agents
G. Epilepsy
H. Drug Therapy of Patients with Epilepsy
I. Non-seizure Uses of Anticonvulsants
J. Histamine
K. Antihistamines (H₁-Receptor Antagonists)
L. Peripheral (Nonsedating) H₁-Receptor Agents
M. Other Autocoids
N. AdrenocorticoSteroid Classification, Definitions, and Uses
O. AdrenocorticoSteroid Mechanism of Action
P. AdrenocorticoSteroid Pharmacokinetics
Q. AdrenocorticoSteroid Pharmacologic Effects
R. AdrenocorticoSteroid Adverse Reactions
S. Hormones: Pituitary, Thyroid, Pancreatic, Female, Male
T. Agents that Affect Hormone Systems
U. Respiratory Drugs
V. Drugs Used to Treat Respiratory Diseases
W. Gastrointestinal Drugs
X. Drugs Used to Treat Gastrointestinal Diseases
Y. Antineoplastic Uses
Z. Antineoplastic Mechanism of Action
AA. Antineoplastic Classification
BB. Antineoplastic Drug Effects