

# Component III: Clinical

## Module C: Pharmacology

### Topic 1: Introduction to Pharmacology

#### Statement of Purpose

To prepare the learner with basic knowledge and skills necessary to carry out his/her role and responsibilities in administering medications to a patient.

#### Student Learning Outcomes

Upon completion of this topic, the learner will be able to:

1. Spell and define the key terms.
2. Discuss pharmacological principles for routes that the Medical Assistant must know to safely administer medications.
3. Describe the differences between chemical, trade and generic drug names.
4. Name the regulatory agencies that historically have affected the manufacture, sale and prescribing of medications.
5. List and identify the categories for controlled substances and give an example of each.
6. Describe the sources of drugs.
7. Explain how drugs are categorized by action and the effect on the human body.
8. List factors that influence dosage and drug action.
9. List sources for information on pharmacology.
10. Identify the Medical Assistant's role in administering medications.
11. List and explain the components of a prescription.
12. Describe and demonstrate calling in a prescription to a pharmacy.

#### Terminology

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|---|--------------------------------------|
| 1. Accumulation                           | 16. Half life                        |
| 2. Additive                               | 17. Idiosyncratic                    |
| 3. Antagonism                             | 18. Intraarticular                   |
| 4. Antagonistic                           | 19. Intraosseous                     |
| 5. Chemical name                          | 20. Intrathecal                      |
| 6. Classification of drugs                | 21. Inscription                      |
| 7. Controlled Substance Act (CSA)         | 22. National Formulary (NF)          |
| 8. Drug                                   | 23. Physicians' Desk Reference (PDR) |
| 9. Drug action                            | 24. Potentiation                     |
| 10. Drug excretion                        | 25. Prescription                     |
| 11. Drug Enforcement Administration (DEA) | 26. Signature                        |
| 12. Drug interaction                      | 27. Superscription                   |
| 13. Drug metabolism                       | 28. Synergism                        |
| 14. Food and Drug Administration (FDA)    | 29. Trade name                       |
| 15. Generic name                          | 30. United States Pharmacopeia (USP) |

#### References

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4. Lindh, W., Pooler, M., Tamparo, C. & Dahl, B., (2013). *Comprehensive Medical Assisting Administrative and Clinical Competencies* (5<sup>th</sup> Ed.). Clifton Park, NY: Delmar, Cengage Learning.
5. Kronenberger, J., Southard D. L., & Woodson, D. (2012). *Comprehensive Medical Assisting* (4<sup>th</sup> Ed.). Philadelphia, PA: Lippincott, Williams & Wilkins.
6. Booth, K.A., Whicker, L.G., Wyman, T.D., & Moaney-Wright, S. (2011). *Medical Assisting: Administrative & Clinical Competencies with Anatomy and Physiology*. (4<sup>th</sup> Ed.). New York, NY: McGraw-Hill Company, Inc.
7. Dennerll, J.T., & Davis, P.E. (2010). *Medical Terminology: A Programmed Systems Approach* (10<sup>th</sup> Ed.). Clifton Park, NY: Delmar, Cengage Learning.
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Content Outline/Theory Objectives	Suggested Learning Activities
<p><b>Objective 1</b>  <b>Spell and define key terms.</b></p> <ul style="list-style-type: none"> <li>A. Review the terms listed in the terminology section.</li> <li>B. Spell the terms listed accurately.</li> <li>C. Pronounce the terms correctly.</li> <li>D. Use the terms in their proper context.</li> </ul>	<ul style="list-style-type: none"> <li>A. Games: word searches, crossword puzzles, Family Feud, Jeopardy, bingo, spelling bee, Hangman, and Concentration.</li> <li>B. Administer vocabulary pre-test and post test.</li> <li>C. Discuss learning gaps and plan for applying vocabulary.</li> <li>D. Joint Commission: Review list of “Do Not Use” abbreviations (Clinical C:1.1)</li> </ul>
<p><b>Objective 2</b>  <b>Discuss pharmacological principles for routes that the Medical Assistant must know to safely administer medications.</b></p> <ul style="list-style-type: none"> <li>A. Purpose of pharmacology knowledge <ul style="list-style-type: none"> <li>1. Will assist Physician and other providers with prescription orders, medication refills and patient instruction regarding medication schedules.</li> <li>2. Administering medications requires knowledge of basic medication action, side effects, interactions and how the prescribed medication should be administered.</li> </ul> </li> <li>B. Resources needed to give medications <ul style="list-style-type: none"> <li>1. Study of prescription drugs.</li> <li>2. Vast array of books and web-based resources that support safe medication administration practice.</li> </ul> </li> <li>C. Drug Action, absorption and drawbacks <ul style="list-style-type: none"> <li>1. Oral <ul style="list-style-type: none"> <li>a. Most cost effective method to administer.</li> <li>b. Absorption in digestive system.</li> <li>c. Drawbacks <ul style="list-style-type: none"> <li>1) Stomach enzymes may destroy.</li> <li>2) Absorption is poor in stomach due to food.</li> <li>3) Acid.</li> </ul> </li> </ul> </li> <li>2. Parenteral route <ul style="list-style-type: none"> <li>a. Delivery of medication by injection into muscle, tissue, veins, arteries, intraarticular, intraosseous and intrathecal.</li> <li>b. More quickly absorbed than oral route.</li> <li>c. Drawbacks, repeated intramuscular injections can cause a sterile abscess.</li> <li>d. Injections into veins, arteries, intraosseous and intrathecal outside the MA scope of practice.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Have students develop a list of at least four drug reference resources (websites may be included).</li> </ul>

<ul style="list-style-type: none"> <li>3. Mucous membrane absorption <ul style="list-style-type: none"> <li>a. Routes include mouth, throat, nose, eyes, rectum, vagina, respiratory tract and urinary tract.</li> <li>b. Drawback, very rapid absorption.</li> </ul> </li> <li>D. Topical <ul style="list-style-type: none"> <li>1. All methods on skin including ointments, creams, lotions and dermal patches.</li> <li>2. Concerns, patient education to clean area before placing new dose.</li> </ul> </li> <li>E. Drug distribution is the transportation of a drug throughout the body once it is absorbed.</li> <li>F. Drug action, how a drug works in the body dependent on the type of medication.</li> <li>G. Drug metabolism, how a drug is converted for excretion from the body.</li> <li>H. Drug excretion <ul style="list-style-type: none"> <li>1. Removal of drug from the body.</li> <li>2. Renal excretion the most common method.</li> <li>3. Half-life is the combination of metabolism and excretion of half of the drug dose.</li> <li>4. Half-life is used to calculate the dosage schedule.</li> </ul> </li> <li>I. Accumulation <ul style="list-style-type: none"> <li>1. No accumulation occurs if the drug is adequately excreted from the body before another dose is given.</li> <li>2. If a second dose is given early enough so that the first dose has not been entirely eliminated, the drug concentration will start to build up and could cause adverse effects.</li> </ul> </li> <li>J. Idiosyncratic, when drug has an unexpected or contradictory effect.</li> <li>K. Drug interaction is possible when two or more medications are taken. <ul style="list-style-type: none"> <li>1. May be beneficial or detrimental.</li> <li>2. Antagonistic, one of the drugs shortens or decreases the intensity of the other.</li> <li>3. Synergistic, one drug increases or lengthens the action of the other.</li> <li>4. Potentiation, action of one drug causing increased action of the other drug.</li> </ul> </li> </ul>	
<p><b>Objective 3</b>  <b>Describe the differences between the chemical, trade and generic drug names.</b></p> <ul style="list-style-type: none"> <li>A. Chemical name <ul style="list-style-type: none"> <li>1. First name given to drug.</li> <li>2. Identifies chemical components.</li> <li>3. Begins with lower case letter.</li> </ul> </li> <li>B. Generic name <ul style="list-style-type: none"> <li>1. Assigned by manufacturer.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Have the students develop drug cards on frequently used medications. <ul style="list-style-type: none"> <li>1. All three names of drug</li> <li>2. Action of drug</li> </ul> </li> </ul>

<ul style="list-style-type: none"> <li>2. Used during research and development.</li> <li>3. Begins with lower case letter.</li> </ul> <p>C. Trade name</p> <ul style="list-style-type: none"> <li>1. Used in marketing.</li> <li>2. Registered by the U.S. Patent Office <ul style="list-style-type: none"> <li>a. Exclusive rights to manufacturer for 17 years.</li> <li>b. Followed by time when other manufacturers may use the formula.</li> </ul> </li> <li>3. Begins with capitalized letter.</li> </ul>	<ul style="list-style-type: none"> <li>3. How absorbed</li> <li>4. Uses</li> <li>5. Route</li> <li>6. Picture of drug</li> <li>7. Other</li> </ul> <p>D. Give several examples of familiar drugs and demonstrate how the names differ for each drug.</p>
<p><b>Objective 4</b>  <b>Name the regulatory agency and acts that historically have affected the manufacture, sale and prescribing of medications.</b></p> <ul style="list-style-type: none"> <li>A. Food and Drug Administration (FDA) <ul style="list-style-type: none"> <li>1. Pure Food and Drug Act <ul style="list-style-type: none"> <li>a. 1906 passage.</li> <li>b. 1938 amendment.</li> </ul> </li> <li>2. Federal Food, Drug and Cosmetic Act (new name under 1938 amendment) <ul style="list-style-type: none"> <li>a. Tests and approves food, drugs and cosmetic products for the market.</li> </ul> </li> </ul> </li> <li>B. Controlled Substance Act <ul style="list-style-type: none"> <li>1. 1970 Initiation.</li> <li>2. Drug mandates regarding drugs that have the potential for abuse.</li> <li>3. Regulations for prescribing, refilling, dispensing and use of drugs with potential for abuse.</li> </ul> </li> <li>C. Drug Enforcement Administration (DEA) <ul style="list-style-type: none"> <li>1. Enforces the Controlled Substance Act.</li> <li>2. Regulates the sale and use of controlled drugs.</li> <li>3. DEA number must be written on all prescriptions for controlled substances.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Have student develop a list of drugs kept in locked area of the clinical setting.</li> <li>D. <a href="http://www.fda.gov/">www.fda.gov/</a></li> </ul>
<p><b>Objective 5</b>  <b>List and identify the categories of controlled substances and give an example if each.</b></p> <ul style="list-style-type: none"> <li>A. Control Substance Schedules <ul style="list-style-type: none"> <li>1. Schedule I Drugs <ul style="list-style-type: none"> <li>a. High potential for abuse.</li> <li>b. No accepted medical use in United States.</li> </ul> </li> <li>2. Schedule II Drugs <ul style="list-style-type: none"> <li>a. High potential for abuse.</li> <li>b. Accepted medical use in the United States.</li> </ul> </li> <li>3. Schedule III Drugs <ul style="list-style-type: none"> <li>a. Low to moderate potential for physical dependence.</li> <li>b. High potential for psychological dependency.</li> </ul> </li> <li>4. Schedule IV Drugs <ul style="list-style-type: none"> <li>a. Possible physical dependency.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Have students look up drugs related to each schedule category.</li> <li>D. Have students bring a blank form for controlled drugs used in the clinical setting to share with the class. Have them enter names of schedule II drugs.</li> <li>E. Discuss how patient's name is entered, what is done if drug is lost or contaminated</li> </ul>

<ul style="list-style-type: none"> <li>b. Possible psychological dependency.</li> <li>5. Schedule V Drugs <ul style="list-style-type: none"> <li>a. Lowest potential for abuse.</li> </ul> </li> <li>B. Storage of controlled substances <ul style="list-style-type: none"> <li>1. Separate from other drugs.</li> <li>2. In well-constructed metal box or compartment.</li> <li>3. Secured per organization's protocol.</li> <li>4. Log of drug use data <ul style="list-style-type: none"> <li>a. Patient name.</li> <li>b. Address.</li> <li>c. Date of administration.</li> <li>d. Drug name.</li> <li>e. Dose.</li> <li>f. Route/method of administration.</li> <li>g. Drug wasted.</li> </ul> </li> </ul> </li> <li>C. Narcotic records <ul style="list-style-type: none"> <li>1. Keep meticulous records when administering, destroying and accounting for narcotics.</li> <li>2. Records kept for two years.</li> <li>3. Inventory every two years.</li> <li>4. DEA notified if there is a theft.</li> </ul> </li> </ul>	<p>and how narcotic count is completed.</p> <p>F. Have students complete Activity Grid for schedule drugs.</p>
<p><b>Objective 6</b>  <b>Describe the sources of drugs.</b></p> <ul style="list-style-type: none"> <li>A. Plant sources <ul style="list-style-type: none"> <li>1. Leaves.</li> <li>2. Roots.</li> <li>3. Stems.</li> </ul> </li> <li>B. Animal sources <ul style="list-style-type: none"> <li>1. Pancreas.</li> <li>2. Urine of pregnant mares.</li> <li>3. Adrenal glands.</li> </ul> </li> <li>C. Mineral sources <ul style="list-style-type: none"> <li>1. Sulfur.</li> <li>2. Magnesium.</li> </ul> </li> <li>D. Synthetic drugs <ul style="list-style-type: none"> <li>1. Chloromycetin.</li> <li>2. Sulfathiazole.</li> </ul> </li> <li>E. Genetically engineered pharmaceuticals <ul style="list-style-type: none"> <li>1. Insulin.</li> <li>2. Interferon.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> </ul>
<p><b>Objective 7</b>  <b>Explain how drugs are categorized by action and the effect on the human body.</b></p> <ul style="list-style-type: none"> <li>A. Variety of drug classifications <ul style="list-style-type: none"> <li>1. Principle action on the body.</li> <li>2. Treat or prevent specific disease or condition.</li> <li>3. Action on specific organ or body system.</li> <li>4. Form of drug preparation.</li> </ul> </li> <li>B. Clinical uses of drugs <ul style="list-style-type: none"> <li>1. Diagnostic</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Have students look up at least two drugs that fit into each category.</li> <li>D. Place on or add to drugs on the drug cards created.</li> </ul>

- a. To diagnose a health problem.
  - b. Example, allergy testing.
- 2. Palliative
  - a. To provide relief from symptoms.
  - b. Example, pain medication.
- 3. Prophylactic
  - a. To prevent health problems and/or symptoms.
  - b. Example, immunization.
- 4. Replacement
  - a. To replace substances needed to maintain health.
  - b. Example, insulin or thyroid replacement.
- 5. Therapeutic
  - a. To treat and cure.
  - b. Example, antibiotics.
- C. Drugs frequently used to treat different conditions because of multiple effects
  - 1. Diuretics
    - a. Urinary system, primary.
    - b. Cardiovascular, secondary.
  - 2. Broad-spectrum antibiotics.
- D. Classification of drugs based on action or effects on body
  - 1. Amphetamine.
  - 2. Analgesic.
  - 3. Anesthetic.
  - 4. Angiotensin-converting enzyme inhibitor.
  - 5. Antacid.
  - 6. Anthelmintics.
  - 7. Antianginal.
  - 8. Antiarrhythmic.
  - 9. Antibiotic.
  - 10. Antidiabetic agent.
  - 11. Antidiarrheal.
  - 12. Anticoagulant.
  - 13. Anticonvulsant.
  - 14. Antidepressant.
  - 15. Antidote.
  - 16. Antiemetic.
  - 17. Antifungal.
  - 18. Antihistamine.
  - 19. Antihypertensive.
  - 20. Anti-inflammatory.
  - 21. Antiarthritic.
  - 22. Antiseptic.
  - 23. Antineoplastic.
  - 24. Antitussive.
  - 25. Astringent.
  - 26. Beta-adrenergic blocking agent.
  - 27. Bronchodilator.
  - 28. Calcium channel blocking agent.

<ul style="list-style-type: none"> <li>29. Cathartic.</li> <li>30. Contraceptive.</li> <li>31. Cytotoxic agent.</li> <li>32. Decongestant.</li> <li>33. Diuretic.</li> <li>34. Expectorant.</li> <li>35. Hemostatic.</li> <li>36. Hormone.</li> <li>37. Hypnotic.</li> <li>38. Immunosuppressive.</li> <li>39. Laxative.</li> <li>40. Miotic.</li> <li>41. Muscle relaxant.</li> <li>42. Mydriatic.</li> <li>43. Narcotic/Opioid.</li> <li>44. Psychostimulant/Stimulant.</li> <li>45. Styptic/antihemorrhagic.</li> <li>46. Vaccine.</li> <li>47. Vasoconstrictor.</li> <li>48. Vasodilator.</li> <li>49. Vitamin/supplement.</li> </ul>	
<p><b>Objective 8</b>  <b>List factors influencing dosage and drug action.</b></p> <ul style="list-style-type: none"> <li>A. Age.</li> <li>B. Sex.</li> <li>C. Weight.</li> <li>D. Past medical history.</li> <li>E. History of drug tolerance.</li> <li>F. Physical or emotional condition.</li> <li>G. Drug idiosyncrasies or allergies.</li> <li>H. Type of action desired or produced.</li> <li>I. Route of administration.</li> <li>J. Time of administration.</li> <li>K. Interactions of drugs <ul style="list-style-type: none"> <li>1. Synergistic.</li> <li>2. Potentiating.</li> <li>3. Antagonistic.</li> <li>4. Additive.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Ask students to look up meaning of interaction words and make note cards for each with name on front and meaning on back.</li> </ul>
<p><b>Objective 9</b>  <b>List sources for information on pharmacology.</b></p> <ul style="list-style-type: none"> <li>A. United States Pharmacopeia (USP) and National Formulary (NF) <ul style="list-style-type: none"> <li>1. Publication every five years.</li> <li>2. Authoritative book establishing standards for drugs.</li> <li>3. Detailed information on each drug.</li> </ul> </li> <li>B. Physicians' Desk Reference (PDR) <ul style="list-style-type: none"> <li>1. Most common reference used by medical personnel.</li> <li>2. Published annually.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Pharmacology Abbreviations (Clinical C:1.9a)</li> <li>D. Pharmacology Abbreviation exercise (Clinical C1.9b)</li> <li>E. Provide reference manuals for classroom activities.</li> </ul>

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| <ul style="list-style-type: none"><li>3. Divided into six sections<ul style="list-style-type: none"><li>a. Manufacturer index (name, address, emergency phone of manufactures.)</li><li>b. Brand and generic name index (spelling of drug names.)</li><li>c. Product category index (category listing).</li><li>d. Product identification guide (identify pills).</li><li>e. Product information (details about drugs).</li><li>f. Dietary supplementation (herbal preparations and nutritional supplements).</li></ul></li><li>4. Additional information<ul style="list-style-type: none"><li>a. Certified poison control<ul style="list-style-type: none"><li>1) Name.</li><li>2) Address.</li><li>3) Phone number.</li></ul></li><li>b. Key to controlled substance categories.</li><li>c. Vaccine adverse reporting system.</li></ul></li><li>5. Other drug manuals for health professionals published each year<ul style="list-style-type: none"><li>a. Mosby's drug reference.</li><li>b. Delmar's drug reference.</li></ul></li></ul> |  |
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<p><b>Objective 10</b>  <b>Identify the Medical Assistant's role in administrating medications.</b></p> <p>A. Medical Practice Act.  B. State Laws</p> <ol style="list-style-type: none"> <li>1. Medical Assistant laws and regulations.</li> <li>2. Governed by the Medical Board of California.</li> <li>3. Classification as unlicensed health professional.</li> <li>4. Noninvasive technical support services.</li> <li>5. Supervision under a licensed Physician, surgeon or podiatrist.</li> <li>6. In a medical office or clinic settings only.</li> <li>7. Oral, sublingual, topical, vaginal, rectal routes and inhalation route of administration <ol style="list-style-type: none"> <li>a. Patient-specific.</li> <li>b. Routinely administered to specific patient.</li> <li>c. MA requirement of no less than ten (10) clock hours of training in administering inhalation medication.</li> <li>d. Competence demonstration to Physician, podiatrist, or instructor.</li> </ol> </li> <li>8. Injection and skin tests <ol style="list-style-type: none"> <li>a. Physician on-site.</li> <li>b. MA requirement of no less than ten (10) hours of training in administering intramuscular, subcutaneous and intradermal injections.</li> <li>c. Competence demonstration to a Physician, podiatrist or instructor.</li> </ol> </li> <li>9. Venipuncture by skin puncture for the purpose of withdrawing blood <ol style="list-style-type: none"> <li>a. Requirement that Physician be on-site.</li> <li>b. MA requirement of no less than ten (10) hours of training in venipuncture or skin puncture.</li> <li>c. Competence demonstration to Physician, podiatrist, or instructor.</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Medical Assistant Laws and Regulations  <a href="http://www.mbc.ca.gov/">www.mbc.ca.gov/</a></li> <li>D. Provide students with a copy of the latest information regarding administration of medications.</li> <li>E. Have students find and look up the website for California Board of Medical Quality Assurance.</li> <li>F. Have students review the Medical Assistant page that lists medication administration scope of practice.</li> </ol>
<ol style="list-style-type: none"> <li>h. Quantity</li> <li>c. Name of drug.</li> <li>d. Dosage form.</li> <li>e. Amount per dose.</li> <li>5. Subscription <ol style="list-style-type: none"> <li>a. Directs pharmacist how to compound the drug.</li> <li>b. Designates number of doses to be dispensed.</li> </ol> </li> <li>6. Signature <ol style="list-style-type: none"> <li>a. Means "mark".</li> <li>b. Gives instructions to patient regarding when and how to take medications.</li> </ol> </li> <li>7. Physician's signature, address and phone</li> </ol>	<ol style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Provide a sample prescription pad or make an overhead as a sample.</li> </ol>

<p>number.</p> <p>8. Registry/license number/DEA number if controlled substance prescribed.</p> <p>9. Number of times prescription may be refilled.</p>	
<p><b>Objective 12</b>  <b>Describe and demonstrate calling in a refill prescription to a pharmacy.</b></p> <p>A. List all of the elements needed to call a refill prescription to a pharmacy.</p> <p>B. Have prescription approved by the Physician.</p> <p>C. Have the patient information from the chart.</p> <p>D. Have the prescription from the Physician.</p> <p>E. Call the pharmacy and give relevant information.</p> <p>F. Have the pharmacy staff repeat the prescription back.</p> <p>G. Document in the chart when the refill was called in.</p> <p>H. Notify the patient that the prescription has been called in.</p>	<p>A. Lecture/Discussion</p> <p>B. Assigned Readings</p> <p>C. Have students pair up and role play calling in a refill prescription.</p>