



El Camino College
COURSE OUTLINE OF RECORD – Official

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| Subject: | NURS |
| Course Number: | 144 |
| Descriptive Title: | Dosage Calculations |
| Division: | Health Sciences and Athletics |
| Department: | Nursing |
| Course Disciplines: | Nursing |
| Catalog Description: | This course is designed to help students develop the necessary skills to calculate accurate and safe medication dosages. Advanced problem solving, application of algebraic concepts, formulas, proportional relationships, system of measurement, and measurement system conversions will be incorporated. Designated lab time will include clinical scenarios involving correct medication formulas and calculations, the selection of correct medical equipment to prepare and administer various types of medication, careful reading and interpretation of sample medication orders, and evaluation of medication labels for safe administration. |
| Prerequisite: | Mathematics 150 or 150H AND Nursing 143 or concurrent enrollment with a minimum grade of C in all prerequisites |
| Co-requisite: | |
| Recommended Preparation: | |
| Enrollment Limitation: | |
| Hours Lecture (per week): | 1.5 |
| Hours Laboratory (per week): | 1.5 |
| Outside Study Hours: | 3 |
| Total Hours: | 54 |
| Course Units: | 2 |
| Grading Method: | Letter Grade only |
| Credit Status: | Credit, degree applicable |
| Transfer CSU: | Yes |
| Effective Date: | |
| Transfer UC: | Yes |
| Effective Date: | |
| General Education: | ECC |
| Term: | |
| Other: | |

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| CSU GE: | |
| Term: | |
| Other: | |
| IGETC: | |
| Term: | |
| Other: | |
| Student Learning Outcomes: | <p>SLO #1 Safe Dosages</p> <p>The student will calculate and demonstrate the safe medication dosages across the lifespan</p> <p>SLO # 2 Medication Administration</p> <p>The student will state the six rights of medication administration</p> <p>SLO #3 Flow Rates</p> <p>The student will calculate and demonstrate the intravenous flow rates, infusion times and volumes across the life span.</p> |
| Course Objectives: | <ol style="list-style-type: none"> 1. <ol style="list-style-type: none"> 1. Demonstrate the application of mathematical concepts when calculating oral and parenteral drug dosages for adults. 2. Convert metric, apothecary, and household measurements from one system to another. 3. Carefully interpret medication labels and medication administration records to safely administer drug dosages utilizing the six rights of medication administration. 4. Calculate reconstitution of injectable and non-injectable drugs and select the correct syringe and calibrated medical equipment necessary to safely administer these medications. 5. Identify medication errors that can occur from hospital abbreviations, drug names, written metric dosages, and the actions necessary to prevent them. 6. Demonstrate the ability to calculate safe oral and parenteral drug dosages for pediatric patients. 7. Determine intravenous (IV) flow rates, infusion times, and volumes using a variety of IV tubing's drop factors, and infusion pumps. 8. Calculate advanced IV drug dosages and rates including milliliters per minute (mL/min), and micrograms per kilogram per minute (mcg/kg/min). 9. Demonstrate the ability to safely prepare and administer accurately calculated medication dosages in a simulated clinical environment. |
| Major Topics | <p>I. Systems of Measurement (1.5 hours, lecture)</p> <p>A. Metric, apothecary, household</p> |

B. Conversions and approximate equivalents

II. Equipment Used in Dosage Measurements (1.5 hours, lecture)

A. Medicine cups with approximate equivalent measure

B. Calibrated droppers

C. Needles and syringes

III. Clinical Application of Time and Temperature (1.5 lecture)

A. Traditional and international time

B. Celsius and Fahrenheit temperatures

C. Conversion formulas

IV. Demonstrate the application of various systems of measurements, equipment used in dosage measurements, and time and temperature using selected clinical scenarios (1.5 hours, lecture)

V. Medication Administration (1.5 lecture)

A. Interpreting drug order

B. Understanding drug labels

C. Preventing medication errors

VI. Demonstrate safe medication administration techniques using selected clinical scenarios (3 hours, lab)

VII. Oral Drug Dosages (1.5 lecture)

A. Calculation formulas

B. Tablets and capsules

C. Oral liquids

VIII. Parenteral Drug Dosages (1.5 lecture)

A. Calculation formulas

B. Parenteral solutions

C. Insulin

IX. Reconstitution of Injectable Solutions (1.5 hours, lecture)

A. Reconstitution formulas

B. Single-strength solutions

C. Multiple-dose vials

X. Reconstitution of Non-Injectable Solutions (1.5 hours, lecture)

A. Solution concentrations and calculations

B. Irrigants

C. External feedings

XI. Demonstrate safe application of oral and parenteral drug dosages, reconstitution of injectable and non-injectable solutions using selected clinical scenarios. (8 hours, lab)

XII. Dosage Calculations Based on Body Weight (1.5 hours, lecture)

A. Adult and pediatric calculations (including body surface areas)

B. Total dosage range per kilogram with maximum daily allowances

C. Under-dosage

XIII. Demonstrate safe dosage calculations based on body weight using selected clinical scenarios (2 hours, lab)

XIV. Alternative Dosage Calculations (1.5 hours, lecture)

A. Ratio-proportion

B. Dimensional analysis

XV. Demonstrate alternative dosage calculations using selected clinical scenarios (2 hours, lab)

XVI. Intravenous (IV) (1.5 hours, lecture)

A. IV solutions

B. IV equipment

C. IV calculations

1. Electronic flow rates

2. Manually regulated flow rates

3. Calculating IV infusion times

- 4. Calculating IV infusion volumes
- 5. Adjusting IV rates based on time and volume

XVII. Intermittent IV Medications (1.5 hours, lecture)

- A. IV Piggybacks
- B. IV push medications
- C. Saline and heparin locks

XVIII. Advanced Pediatric Calculations (3.0 hours, lecture)

- A. Pediatric volume control sets
- B. Minimal dilutions for IV medications
- C. Calculations for daily volume of maintenance fluids

XIX. Advanced IV Calculations (1.5 hours, lecture)

- A. IV medication ordered per kilogram per minute
- B. Titration formulas
- C. Blood administration

XX. Heparin Protocols (1.5 hours, lecture)

- A. Heparin calculations
- B. Heparin titration
- C. Drug alerts

XXI. Critical Care IV Calculations (1.5 hours, lecture)

- A. IV medications ordered as milligrams per minute
- B. IV medications ordered as micrograms per kilogram

XXII. Demonstrate the safe application of IV solutions, equipment, calculations including pediatric and critical care calculations, rates, intermittent medications, pediatric calculations, advanced medications, safe titration, blood administration, and heperan protocols using selected clinical scenarios. (12 hours, lab)

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| Total Lecture Hours: | 27 |
| Total Laboratory Hours: | 27 |
| Total Hours: | 54 |

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| Primary Method of Evaluation | 3) Skills demonstration |
| Typical Assignment Using Primary Method of Evaluation: | From the following Intravenous (IV) labels, list the solute(s) of each solution, identify the strength of each solute in g/mL, identify the osmolarity of each solution in mOsm/L, identify the tonicity (isotonic, hypotonic, or hypertonic) of each solution, and the physiologic effects of each solution. Submit your lab report to your instructor for evaluation. |
| Critical Thinking Assignment 1: | A child who is 28 inches tall and weighs 25 pounds will receive one dose of IV cisplatin. The recommended dosage is 37 to 75 mg/m ² once every two to three weeks. The order reads cisplatin 18.5 mg IV at 1 mg/min today at 1500 hours. You have available a 50 mg vial of cisplatin. Reconstitution directions state to add 50 mL of sterile water to yield 1 mg/mL. Minimal dilution instructions require 2 mL of IV solution for every 1 mg of cisplatin. Given the ordered IV rate of 1 mg/mL, at what rate will you infuse this medication in mL/hr on the infusion pump? How long will it take for this medication to infuse? Submit your lab report to the instructor for evaluation. |
| Critical Thinking Assignment 2: | A nurse is caring for a 167 pound client who becomes hypotensive secondary to cardiogenic shock. The physician orders dopamine 5mcg/kg/min IV stat. The concentration of dopamine provided is 400mg/250 ml in Dextrose 5% Water. The infusion pump rate has been set at 18 mL/hr. Is this calculated IV rate correct to achieve a dopaminergic response? If not, what is the actual dose of dopamine infusing at this rate? What physiologic response will occur with the currently infusing dose? Submit your lab report to the instructor for evaluation. |
| Other Evaluation Methods: | Class Performance, Objective Exam, Performance Exams, Quizzes, Written Homework |
| Instructional Methods: | Demonstration, Discussion, Lab, Lecture |
| If other: | |
| Work Outside of Class: | Answer questions, Problem solving activity, Required reading, Skill practice, Study |
| If Other: | |
| Up-To-Date Representative Textbooks: | Gloria Pickar and Amy P. Abernathy. <u>Dosage Calculations</u> . 9th ed. Del Mar publishing, 2011. Discipline Standard |
| Alternative Textbooks: | |
| Required Supplementary Readings: | |
| Other Required Materials: | |
| Requisite: | Prerequisites |
| Category: | computational and sequential |
| Requisite course(s): List both prerequisites and corequisites in this box. | Mathematics-150/150H AND Nursing-143 |
| Requisite and Matching skill(s): Bold the requisite skill. List the corresponding | Interpret medication labels and medication administration records to safely administer drug dosages. |

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| <p>course objective under each skill(s).</p> | <p>MATH 150/150H - Identify, compare and contrast various types of data and sampling techniques.</p> <p>Review data and graphs, and interpret findings. MATH 150/150H - Create appropriate displays of data, including histograms, frequency distributions, stem and leaf plots, box plots, bar graphs and pie charts. Use the displays to interpret and answer questions in the context of the data.</p> <p>Review data to determine how the probability of a given event was calculated based on various variables. MATH 150/150H - Calculate the probability of a given event using elementary probability techniques.</p> <p>Students must be able to demonstrate application of critical thinking in relation to computing drug dosages.</p> <p>NURS 143 -Demonstrate critical thinking with the application of initial conversion and mathematical skills in computing drug dosages.</p> <p>NURS 143 -Evaluate how the evidence-based practice impacts biophysical outcomes</p> |
| <p>Requisite:</p> | |
| <p>Requisite and Matching Skill(s): Bold the requisite skill(s). If applicable</p> | |
| <p>Requisite course:</p> | |
| <p>Requisite and Matching skill(s):Bold the requisite skill. List the corresponding course objective under each skill(s).</p> | |
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| <p>Enrollment Limitations and Category:</p> | |
| <p>Enrollment Limitations Impact:</p> | |
| <p>Course Created by:</p> | <p>No name was listed.</p> |
| <p>Date:</p> | <p>03/14/2018</p> |

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| Last Reviewed and/or Revised by: | Michelle Guta |
| Date: | 10/26/2021 |
| Last Board Approval Date: | 1/18/2022 |