Dosage Calculation and Safe Medication Administration 2.0
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Educator Implementation Guide
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Description

**Dosage Calculation and Safe Medication Administration 2.0** is an interactive, media-rich, online tutorial that is designed to provide curricular support for faculty and help students learn the basics of safe medication administration.

The Dosage Calculation series improves comprehension and critical-thinking skills in relation to safely calculating medication dosages. Students get the chance to practice clinical reasoning and problem-solving skills while working through in-depth tutorials and real-life case scenarios at their own pace.

Features

- User-friendly navigation.
- Rich media used to illustrate calculations to enhance learning.
- Audio narration guides students through each module.
- 11 modules providing for approximately 6 hours of interactive instruction.
- Score Reports identify students’ strengths and weaknesses based on their correct and incorrect answers.
- Step-by-step process videos for performing calculations provided in modules.
- Module tests include detailed rationales for each question.
- Interactive functionality allows students to simulate drug administration (drop pills into medication cup).
- Example videos and animations throughout the tutorial to enhance learning.

**Modules**

- Safe Dosage
- Medication Administration
- Oral Medications
- Injectable Medications
- Powdered Medications
- Parenteral (IV) Medications
- Dosage by Weight
- Pediatric Medications
- Critical Care Medications
- Case Studies and Finals

- Special attention is paid to administering pediatric and critical care medications.

- **Case studies** incorporate the clinical application of drug information and provide for formative learning with:
  - Medical administration record
  - Flow sheet
  - Drill questions

- **Finals** incorporate information from all 9 modules into scored tests.

- **Glossary** feature allows students to review definitions of select nursing terms and hear how they are pronounced.

- Real-time **Timer** allows students to monitor time spent on individual modules.

- Pop-up Calculator allows students to work through the problems without the need for a personal calculator.

- **Show Me** feature and **Step Outline View** enable a pop-up window, which walks students through each step for a particular problem.

- **Drill Sets** interspersed throughout each module provide practice problems for students.

- **Flag for Review** feature on tutorial tests allows students to skip a question and go back to it later with no penalty.
• **Resources** include the following features:
  - Military time conversions
  - Three basic metric units
  - Common metric abbreviations
  - Metric equivalents
  - Basic apothecary units
  - Apothecary to metric equivalents
  - Basic household units
  - Equivalents across the three systems
  - Common prescription abbreviations
  - Common IV fluid components
  - Commonly ordered IV solutions
  - Osmolarity and IV solution
  - Drop factor constants
  - Constants for infusions over partial hours
  - The Joint Commission’s official “Do Not Use” list
  - Institute for Safe Medication Practices’ List of Error-Prone Abbreviations, Symbols and Dose Designations
  - Federal Drug Administration and ISMP lists of look-alike drug names and recommended “tall man” letters

• **NCLEX-style questions** on every post-test at the conclusion of each module.

• **Individual** and **Group Reports** can be generated.
  - Time spent on module tests/percent correct on most recent attempt
  - *Time spent in each module* – dates/times
Benefits

- Promotes student success in nursing education.
  - Facilitates content mastery
  - Improves student confidence
  - Supports student understanding and practice
  - Teaches essential dosage calculation skills
  - Advocates student self-learning
  - Provides standard for safe administration of medications
  - Minimizes the risk for medication errors
  - Provides practice with examples and real-life scenarios
  - Strengthens critical thinking with detailed rationales and test-taking tips
  - Guided narration teaches students how to interpret manufacturers’ labels
  - Builds test-taking skills and confidence by practicing in a simulated exam environment

- All students learn to:
  - Identify the nurse’s legal responsibilities of medication administration
  - Identify the rights of safe medication administration
  - Use the nursing process to administer medication safely to clients of all ages
  - Identify components of a medication prescription
  - Describe strategies to minimize medication errors
  - Identify strategies to minimize harmful care to pediatric clients
  - Recognize risks for adverse medication reactions
• Promotes student success on the NCLEX.
  ○ Tutorial may be viewed again prior to taking NCLEX
  ○ Case studies, drills, and tests provide opportunities for practice
  ○ Rationales walk students through the steps needed to correctly calculate the answer

• Promotes success in nursing practice.
  ○ Provides first-rate drug calculation resource for practicing nurses and students in graduate nurse programs
  ○ Real-world scenarios provide typical examples of calculations used in clinical practice
  ○ Critical Care and Pediatric modules support specialty practice

• Supports faculty teaching practices.
  ○ Learning objectives provided for each module
  ○ Faculty select the dosage calculation method they would like their students to learn and use
  ○ Easy-to-understand calculations
  ○ Attention-catching format with audiovisual, interactive media
  ○ Provides initial learning, in-time learning, and content review
  ○ May be used as an independent study or adjunct to on-ground/online drug calculation course
  ○ Assign selected modules as an adjunct to lecture in any course
  ○ Assess and reinforce the effectiveness of in-class presentations on drug calculation
Recommended Use

- Lecture aid
- Classroom discussion
- Independent study
- Preparation for faculty-prepared dosage calculation exams
- Preparation for standardized exams
- Preparation for clinical
- Clinical postconference
- Remediation activity
- Preparation for NCLEX
- Preparation for initial position postgraduation
- Quick review of drug administration for students outside of their pharmacology course

Implementation Strategies

- Review Dosage Calculation modules at the beginning of a pharmacology course.
- Use select modules during pharmacology course to support didactic content.
- Assign students modules to review prior to pharmacology class.
- Provide students with drug dosage questions, and have them calculate the correct dose.
- Have small groups of students practice drawing up two medications in one syringe and check each other.
- Using the Internet, have students locate and print articles about medication errors in the news.
- Have one student “instruct” another student during a hands-on demonstration of medication preparation (insulin, liquid, pediatric syringe).
- Foster rich in-class discussion by reviewing case studies in class with students.
- Require completion of modules as a content review prior to in-class examinations.
- Assign module tests as practice or graded exams.
- Use as a remediation tool for at-risk students in a fundamentals or pharmacology course.
- Employ as a skill-building tool in preparation for drug calculation proficiency exams.
- Practice preparing medications while responding to prompts in the case study modules.
- Calculate the drip rate for IV tubing with varying drip factors.
- Simulate commonly encountered medication errors from the hospital setting by setting up empty medication bottles, various syringe sizes, manufacturers’ labels, and packages.
  - Ask students open-ended questions such as:
    - How do you know you prepared the correct dosage?
    - What action(s) should you take if you discover a discrepancy?
    - What criteria did you use to choose the syringe and needle size for this medication?
- Print sample medication administration records, and assign students to administer medications to mannequins.
- Bring in labels from hospitals with nonidentifiers, and require students to identify potential sources of errors.
- Outfit a medication cart with various syringe and needle sizes, provide students with notecards describing various client situations, and ask which syringe and needle should be used.
- Require students to complete specific modules prior to medication labs.
- Mandate that struggling students complete assigned modules postlab.
- Debrief students after medication lab by asking them what they think they did well and what they might do differently the next time.
Examples of Student Learning Activities

- Review administration of medications prescribed to assigned patients prior to giving drugs during patient care.

- Assign modules to independently complete as a part of a fundamentals, pharmacology, pediatric, or critical care course.

- Print any or all of the 17 charts and tables as quick reference guides.

- Remediate drug administration following unsuccessful lab demonstration or difficult clinical medication pass.

- Repeat Dosage Calculation prior to taking ATI Pharmacology and Comprehensive Predictor assessments.

- Work through modules, and complete module tests prior to taking the NCLEX.

Recommended Time Spent

- Refer to the Dosage Calculation and Safe Medication Administration Comparisons Chart to determine the recommended amount of time for a student to spend on each module.

- Completing case studies and assessments will require 2.5 minutes per item.

Product Support

- At ATI, we pride ourselves on timely and effective support to meet your needs.

- Please contact us at 800-667-7531 if you need assistance with this product.

Technical Requirements

- For optimal testing experience, we recommend a wired network connection.

- Direct links to downloads for starred (*) programs are provided in the bottom right-hand corner of the ATI Student/Faculty Home Page under “Technical Requirements.”

- Silverlight 4 or higher*

- Adobe Acrobat Reader X or higher*
- Adobe Flash Player 11 or higher*
- Windows XP, Vista, or 7
  - Internet Explorer 8 or higher; 9.0 recommended*
  - Mozilla Firefox 14 or higher*
- Mac OS X 10.5 (Leopard) or higher
  - Mozilla Firefox 14 or higher*
  - Safari 5 or higher*
- Session time-out counter
  - Your browser must allow status bar updates via script for a session time-out counter to be visible.
Dosage Calculation and Safe Medication Administration Comparison Chart

*Students should be given 2.5 minutes to answer each item.*

<table>
<thead>
<tr>
<th>New Dosage Calculation</th>
<th>Original Dosage Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modules</td>
<td>Drills and Tests</td>
</tr>
<tr>
<td>Safe Dosage (1 hr)</td>
<td>10 drill items, 20 test items</td>
</tr>
<tr>
<td>Medication Administration (15 min)</td>
<td>40 drill items, 20 test items</td>
</tr>
<tr>
<td>Oral Medications (15 min)</td>
<td>25 drill items, 20 test items</td>
</tr>
<tr>
<td>Injectable Medications (25 min)</td>
<td>23 drill items, 20 test items</td>
</tr>
<tr>
<td>Powdered Medications (10 min)</td>
<td>15 drill items, 20 test items</td>
</tr>
<tr>
<td>Parenteral (IV) Medications (30 min)</td>
<td>40 drill items, 20 test items</td>
</tr>
<tr>
<td>Dosage by Weight (25 min)</td>
<td>30 drill items, 20 test items</td>
</tr>
<tr>
<td>Pediatric Medications (25 min)</td>
<td>20 drill items, 20 test items</td>
</tr>
<tr>
<td>Critical Care Medications (20 min)</td>
<td>15 drill items, 20 test items</td>
</tr>
<tr>
<td>Case study Pediatric Asthma: Dosage by Weight</td>
<td>9 drill items</td>
</tr>
<tr>
<td>Case study Leukopenia: Parenteral (IV) Calculations</td>
<td>9 drill items</td>
</tr>
<tr>
<td>Case study Diabetes: Oral Medications</td>
<td>6 drill items</td>
</tr>
<tr>
<td>Six additional case studies will be added by January 2013 at no additional cost.</td>
<td></td>
</tr>
<tr>
<td>New Dosage Calculation</td>
<td>Original Dosage Calculation</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td><strong>Finals</strong></td>
<td><strong>Tests</strong></td>
</tr>
<tr>
<td>Final 1</td>
<td>25 test items</td>
</tr>
<tr>
<td>Final 2</td>
<td>25 test items</td>
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<tr>
<td>Final 3</td>
<td>25 test items</td>
</tr>
<tr>
<td>Final 4</td>
<td>25 test items</td>
</tr>
</tbody>
</table>
Dosage Calculation and Safe Medication Administration Content Outline

Note: Evidence-based practice is incorporated within each module.

<table>
<thead>
<tr>
<th>Safe Dosage</th>
<th>Medication Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Introduction</td>
<td>• Other Systems</td>
</tr>
<tr>
<td>• Administration Basics</td>
<td>• Common Abbreviations</td>
</tr>
<tr>
<td>• Common Medication Errors</td>
<td>• Equivalent Dosages</td>
</tr>
<tr>
<td>• Tools for Safe Medication Practice</td>
<td>• Rounding Rules</td>
</tr>
<tr>
<td></td>
<td>• Summary</td>
</tr>
<tr>
<td></td>
<td>• Assessment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oral Medications</th>
<th>Injectable Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Introduction</td>
<td>• Working with Insulin</td>
</tr>
<tr>
<td>• Medication Dispensing</td>
<td>• Insulin Syringes</td>
</tr>
<tr>
<td>• Medication Administration Record</td>
<td>• Summary</td>
</tr>
<tr>
<td>• Automated Dispensing Devices</td>
<td>• Assessment</td>
</tr>
<tr>
<td>• Solid Medications</td>
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</table>

<table>
<thead>
<tr>
<th>Powdered Medications</th>
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</tr>
</thead>
<tbody>
<tr>
<td>• Introduction</td>
<td>• Summary</td>
</tr>
<tr>
<td>• Administration</td>
<td>• Assessment</td>
</tr>
<tr>
<td>• Powdered Dosages</td>
<td></td>
</tr>
</tbody>
</table>
Parenteral (IV) Medications

- Introduction
- Introduction to IV Therapy
- Introduction to IV Medications
- Types of IV Fluids
- Osmolarity
- IV Equipment and Medication Administration
- IV Solutions
- Flow Rate
- Electronic IV Pumps
- Manual IVs (gtt/min)
- Summary
- Assessment

Dosage by Weight

- Introduction
- Finding Weight in Kilograms
- “mg/kg/day” Dosages
- Recommended Dosages
- Safe Dosages
- Summary
- Assessment

Pediatric Medications

- Introduction
- Special Considerations
- Fluid Balance
- Medication Dosing for Children
- Summary
- Assessment

Critical Care Medications

- Introduction
- Intravenous Fluid Infusions
- Calculating Flow Rates
- Continuous IV Medication Infusions
- Titrating Continuous IV Medication Infusions
- IV Bolus Medications
- Bolus Mini-Injection System
- Summary
- Assessment

Case Studies and Finals

- Pediatric asthma: Dosage by weight
- Leukopenia: Parenteral (IV) calculations
- Diabetes: Oral medications
- 6 additional case studies by January 2013
- Final 1
- Final 2
- Final 3
- Final 4

References


