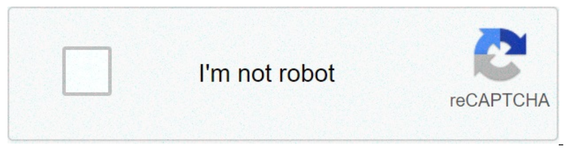

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How to do drug calculations for nurses

This website uses cookies. By continuing to use this website you are giving consent to cookies being used. For information on cookies and how you can disable them visit our Privacy and Cookie Policy. Got it, thanks! Welcome to your NCLEX reviewer for nursing drug calculations! In this nursing test bank, practice dosage calculation problems to measure your competence in nursing math. As a nurse, you must be able to accurately and precisely calculate medication dosages to provide safe and effective nursing care. The goal of this quiz is to help students and registered nurses alike grasp and master the concepts of medication calculation. Drug Dosage Calculation Practice Quiz In this section are the practice problems and questions for nursing dosage calculations. This nursing test bank set includes 100+ questions broken down into four parts. Included topics are dosage calculation, metric conversions, unit conversions, parenteral medications, and fluid input and output. As you can tell, this NCLEX practice exam requires tons of calculations, so get your calculators ready! Remember to answer these questions at your own pace and don't forget to read the rationales! Don't be discouraged if you have incorrect answers, you are here to learn! Make sense of the rationales and review the drug dosage calculations study guide below. Quizzes included in this guide are: Guidelines Read and understand each question before choosing the best answer. Since this is a review, answers and rationales are shown after you click on the "Check" button. There is no time limit, answer the questions at your own pace. Once all questions are answered, you'll be prompted to click the "Quiz Summary" button where you'll be shown the questions you've answered or placed under "Review". Click on the "Finish Quiz" button to show your rating. After the quiz, please make sure to read the questions and rationales again by click on the "View Questions" button. Comment us your thoughts, scores, ratings, and questions about the quiz in the comments section below! Welcome to the first part of your drug dosage calculation practice! Included topics in this section are practice for unit conversions and medication dosage calculations. Get your calculators ready! You have already completed the quiz before. Hence you can not start it again. You must sign in or sign up to start the quiz. You must first complete the following: Quiz complete. Results are being recorded. 0 of 20 Questions answered correctly Your time: Time has elapsed You have reached 0 of 0 point(s), (0) Earned Point(s): 0 of 0, (0) 0 Essay(s) Pending (Possible Point(s): 0) Congratulations, you have completed this quiz! Looking for the rationales? Please click on the "View Questions" button below to review your answers and read through the rationales for each question. Drug Calculations Reviewer for Nurses This is your study guide to help you refresh or review what you know about drug dosage calculations including tips on how to answer them. NCLEX Tips for Dosage Calculation Questions The fill-in-the-blank question format is usually used for medication calculation, IV flow rate calculation, or determining the intake-output of a client. In this question format, you'll be asked to perform a calculation and type in your answer in the blank space provided. Always follow the specific directions as noted on the screen. The unit of measure you need for your final answer is always given. There will be an on-screen calculator on the computer for you to use. Do not put any words, units of measurements, commas, or spaces with your answer, type only the number. Only the number goes into the box. Rounding an answer should be done at the end of the calculation or as what the question specified, and if necessary, type in the decimal point. Nursing Responsibilities for Medication Administration 10 Rights of Medication Administration. Understanding the 10 Rights of Drug Administration can help prevent many medication errors. Nurses, who are primarily involved in the administration of medications, benefit from this simplified memory aid to help guide them to administer medications safely.Right Drug. The first right of drug administration is to check and verify if it's the right name and form. Beware of look-alike and sound-alike medication names. Misreading medication names that look similar is a common mistake. These look-alike medication names may also sound alike and can lead to errors associated with verbal prescriptions. Check out The Joint Commission's list of look-alike/sound-alike drugs.Right Patient. Ask the name of the client and check his/her ID band before giving the medication. Even if you know that patient's name, you still need to ask just to verify. Right Dose. Check the medication sheet and the doctor's order before medicating. Be aware of the difference between an adult and a pediatric dose. Right Route. Check and verify the order (i.e., per orem, IV, SQ, IM)Right Time and Frequency. Check the order for when it would be given and when was the last time it was given. Right Documentation. Make sure to write the time and any remarks on the chart correctly. Right History and Assessment. Secure a copy of the client's history to drug interactions and allergies. Right Drug Approach and Right to Refuse. Give the client enough autonomy to refuse the medication after thoroughly explaining the effects. Right Drug-Drug Interaction and Evaluation. Review any medications previously given or the diet of the patient that can yield a bad interaction to the drug to be given. Check also the expiry date of the medication being given. Right Education and Information. Provide enough knowledge to the patient of what drug he/she would be taking and what are the expected therapeutic and side effects. Systems of Measurement There are three systems of measurement used in nursing: the metric system, the apothecaries' system, and household system. Metric SystemThe most widely used international system of measurement.The basic units of metric measures are the gram (weight), meter (length or distance), and liter (volume).It is a decimal-based system that is logically organized into units of 10. Basic units are multiplied or divided by 10 to form secondary units. Apothecaries' SystemThe apothecaries' system is one of the oldest systems of measurement, older than the metric system and is considered to be out of date. The basic units used in this system are the grain (gr) for weight, minim for volume, ounce, and pound. All of which are seldomly used in the clinical setting. Quantities in the apothecaries' system are often expressed by lowercase Roman numerals when the unit of measure is abbreviated. And the unit of measure precedes the quantity. Quantities less than 1 are expressed as fractions. Examples: "gr ii", "gr ¼ "And yes, it can be confusing therefore use the metric system instead to avoid medication errors.Household SystemHousehold system measures may be used when more accurate systems of measure are not required. Included units are drops, teaspoons, tablespoons, cups, pint, and glasses.Other Systems of MeasurementMilliequivalent (mEq)The milliequivalent is an expression of the number of grams of a medication contained in 1 milligram of a solution.Examples: the measure of serum sodium, serum potassium, and sodium bicarbonate is given in milliequivalents.Unit (U)Unit measures a medication in terms of its action, not its physical weight. When documenting, do not write "U" for unit, rather spell it as "unit" as it is often mistaken as "0". Examples: Insulin, penicillin, and heparin sodium are measured in units. Converting Units of Weight and Measure Converting values between metric systemFor drug dosages, the metric units used are the gram (g), milligram (mg), and microgram (mcg). For volume units milliliters (mL) and liters (L). It is simple to compute for equivalents using the metric system. It can be done by dividing or multiplying; or by moving the decimal point three places to the left or right. Do not use a "trailing zero" after the decimal point when the dosage is expressed as a whole number. For example, if the dosage is 2m mg, do not insert a decimal point or the trailing zero as this could be mistaken for "20" if the decimal point is not seen. On the other hand, do not leave a "naked" decimal point. If a number begins with a decimal, it should be written with a zero and a decimal point before it. For example, if the dosage is 2/10 of a milligram, it should be written as 0.2 mg. It could be mistaken for 2 instead of 0.2. UnitEquivalentsMetric systemEquivalents1 microgram (mcg)0.000001 g1 milligram (mg)0.0001 g or 1000 mcg1 gram (g)1000 mg1 kilogram (kg)1000 g1 kilogram (kg)2.2 lbs1 milliliter (mL)0.001 LApothecary system (weight)Equivalents1 grain (gr)60 or 65 mg5 grain (gr)300 or 325 mg15 grain (gr)1000 mg or 1g1/150 grain (gr)0.4 mgHousehold system (volume)Equivalents1 teaspoon (tsp)5 ml or 16 drops1 tablespoon (T)3 teaspoons or 15 mL1 fluid ounce (fl oz)2 tablespoons or 30 mL1 cup (C)8 fluid oz or 240 mL1 pint (pt) 16 fluid oz or 480 mL1 quart (qt)2 pints or 946 mL or 32 fl ozHousehold system (weight)Equivalents1 pound (lb)16 ounce2.2 pounds (lbs)1 kilogram Converting Units Between SystemsHousehold and metric measures are equivalent and not equal measures.Conversions to equivalent measures between systems is necessary when a medication prescription is written in one system but the medication label is stated in another.Medications are not always prescribed and prepared in the same system of measurement; therefore conversion of units from one system to another is necessary.Common conversions in the healthcare setting include pound to kilograms, milligrams to grains, minims to drops. Methods for Drug Dosage Calculations Standard MethodThe commonly used formula for calculating drug dosages. Where in: D = Desired dose or dose ordered by the primary care provider. H = dose on hand or dose on the label of bottle, vial, ampule.V = vehicle or the form in which the drug comes (i.e., tablet or liquid). STANDARD FORMULA Example: Order: Acetaminophen 500 mgOn hand: Acetaminophen 250 mg in 5 mLDesired (D) = 500 mg On hand (H) = 250 mgVehicle (V) = 5 mLComputation: Answer: 10 mL Ratio and Proportion MethodConsidered as the oldest method used for drug calcluation problems. For the equation, the known quantities are on the left side, while the desired dose and the unknown amount to administer are on the right side. Where in: D = Desired dose or dose ordered by the primary care provider. H = dose on hand or dose on the label of bottle, vial, ampule.V = vehicle or the form in which the drug comes (i.e., tablet or liquid). X = amount to administerOnce the equation is set up, multiply the extremes (H and x) and the means (V and D). Then solve for x. RATIO AND PROPORTION METHODH : V = D : x Example: Order: Erythromycin 750 mgOn hand: Erythromycin 250 mg capsulesDesired (D) = 750 mg On hand (H) = 250 mgVehicle (V) = 1 capsuleComputation: 250 (H) : 1 (V) = 750 (D) : xMultiply the extremes and the means: 250x = 750 x=3 capsulesAnswer: 3 capsules Fractional Equation MethodA method similar to ratio and proportion but expressed as fractions. Where in: D = Desired dose or dose ordered by the primary care provider. H = dose on hand or dose on the label of bottle, vial, ampule.V = vehicle or the form in which the drug comes (i.e., tablet or liquid). FRACTIONAL EQUATION METHOD Example: Order: Digoxin 0.25 mgOn hand: Digoxin 0.125 mg tabletsDesired (D) = 0.25 mgOn hand (H) = 0.125 mgVehicle (V) = 1 tabletsComputation: Answer: 2 tablets Fluid Intake and Output CalculationIntake and output (I&O) measurement and recording is usually done to monitor a client's fluid and electrolyte balance during a 24-hour period. Intake and output is done for patients with increased risk for fluid and electrolyte imbalance (e.g., heart failure, kidney failure). Unit used in measurement of I&O is milliliter (mL). Measuring fluid intake entails recording each item of fluid consumed or administered, all of the following fluids are recorded: Oral fluids (e.g., water, juice, milk, soup, water taken with medication). Liquid foods at room temperature (e.g., ice cream, gelatin, custard). Tube feedings including the water used for flushes. Parenteral fluidsBlood productsIV medicationsMeasurement of fluid output includes: Urinary outputVomitusLiquid fecesTube drainageWound and fistula drainageMeasurement of fluid input and output are totaled at the end of the shift and documented in the patient's chart. Determine if fluid intake and fluid output are proportional. When there is a significant discrepancy between intake and output, report to the primary care provider. If you need more information or practice quizzes, please do visit the following links: Nursing Test Bank: Free Practice Questions UPDATED! Are you ready to learn? Check out our updated nursing test bank that includes over 3,500 practice questions covering a wide range of nursing topics that are absolutely free! NCLEX Questions Nursing Test Bank and Review UPDATED! For this nursing test bank, we've included more than 1,000+ NCLEX practice questions covering different nursing topics! We've made a significant effort to provide you with the most challenging questions along with insightful rationales for each question to reinforce learning. What is Dosage Calculation for Nurses? Medication administration is one of the many duties nurses do each day. Using a medication order or prescription, a nurse must calculate the appropriate dosage given the medication they have on hand. Download Dosage Calculation Practice Questions Download the questions and work along with Cathy as she goes through a number of Nursing Dosage Calculations problems. You can also download the answer key! There are 3 primary methods for calculating medication dosages; Dimensional Analysis, Ratio Proportion, and Formula or Desired Over Have Method. We will explore the Desired Over Have or Formula Method, one of these 3 methods, in more detail.Desired Over Have or Formula Method uses a formula or equation to solve for an unknown quantity (x), much like ratio proportion.Drug calculations require using conversion factors, for example, when converting from pounds to kilograms or liters to milliliters. Simplistic in design, this method allows clinicians to work with various units of measurement, converting factors to find the answer. These methods are useful in checking the accuracy of the other methods of calculation, thus acting as a double or triple check. When clinicians are prepared and know the key conversion factors, they will be less anxious about the calculation involved. This is vital to accuracy, regardless of which formula or method is employed.Conversion Factors1 kg = 2.2 lb1 gallon = 4 quart1 tsp = 5 mL1 inch = 2.54 cm1 L = 1,000 mL1 kg = 1,000 g1 oz = 30 mL = 2 tbsp1 g = 1,000 mg1 mg = 1,000 mcg1 cm = 10 mm1 tbsp = 15 mL1 cup = 8 fl oz1 pint = 2 cups12 inches = 1 foot1 L = 1.057 qt1 lb = 16 oz1 tbsp = 3 tsp60 minute = 1 hour1 cc = 1 mL2 pints = 1 qt8 oz = 240 mL = 1 glass1 tsp = 60 gtt1 pt = 500 mL = 16 oz1 oz = 30 mL4 oz = 120 mL (Casey, 2018)There are 3 primary methods for the calculation of medication dosages, as referenced above. These include Desired Over Have Method or Formula, Dimensional Analysis, and Ratio and Proportion (as cited in Boyer, 2002)[Lindow, 2004]. Desired Over Have or Formula MethodDesired over Have or Formula Method is a formula or equation to solve for an unknown quantity (x), much like ratio proportion. Drug calculations require the use of conversion factors, such as when converting from pounds to kilograms or liters to milliliters. Simplistic in design, this method allows us to work with various units of measurement, converting factors to find our answer. It is useful in checking the accuracy of the other calculation methods as mentioned above, thus acting as a double or triple check. A basic formula, solving for x, guides us in the setting up of an equation:D/H x Q = x, or Desired dose (amount) = ordered Dose amount/amount on Hand x Quantity. For example, a provider requests lorazepam 4 Mg IV Push for a patient in severe alcohol withdrawal. The clinician has 2 mg/mL vials on hand. How many milliliters should he or she draw up in a syringe to deliver the desired dose?Dose ordered (4 mg) x Quantity (1 mL)/Have (2 mg) = Amount wanted to give (2 mL)Units of measurement must match, for example, milliliters and milliliters, or one needs to convert to like units of measurement. In the example above, the ordered dose was in milligrams, and the have dose was in milligrams, both of which cancel out, leaving milliliters (answer called for milliliters), so no further conversion is required.Dimensional Analysis MethodAn order placed by a provider for lorazepam 4 mg IV PUSH for CIWA score of 25 or higher, follow CAGE Protocol for subsequent dosages based on CIWA scoring.The clinician has 2 mg/mL vials in the automated dispensing unit.How many milliliters are needed to arrive at an ordered dose?The desired dose os placed over 1 remember, (x mL) = 4 mg/1 x 1 mL/2 mg x (4) (1)/2 x 4/2 x 2/1 = 2 mL, keep multiplying/dividing until the desired amount is reached, 2 mL in this example.Notice, the fraction was set up with milligrams and milligrams strategically placed, so units could cancel each other out, making the equation easier to solve for the unit desired or milliliters. The answer makes sense, so work is done.Zeros can be canceled out in the same way as like units. For example:1000/500 x 10/5 = 2, the 2 zeros in 1000 and 2 zeros in 500 can be crossed out since like units in numerator and denominator, leaving 10/5, a much easier fraction to solve, and the answer makes sense. We have addressed zeros, and now let us look at 1.If one multiplies a number by a 1, then the number is unchanged.In contrast, if you multiply a number by zero, the number becomes zero.Examples listed below are as follows: 18 x 0 = 0 or 20 x 1 = 20.Ratio and Proportion MethodThe Ratio and Proportion Method has been around for years and is one of the oldest methods utilized in drug calculations (as cited in Boyer, 2002)[Lindow, 2004]. Addition principals is a problem-solving technique that has no bearing on this relationship. Only multiplication and division are used to navigate through a ratio and proportion problem, not adding. An example listed below will provide a better explanation using a fraction or a colon format:A provider orders lorazepam 4 mg IV Push now for a CIWA score of 25. There are 2 mg/mL vials on hand. How many milliliters are required to carry out the ordered dose?Have on hand / Quantity you have = Desired Amount / x2 mg/1 mL = 4 mg/x2x/2 = 4/2x = 2 mL One would use H:V::D:X and multiply means DV and Extremes HX in colon format.Hx = DV, x = DV/H, 2:1::4:x, 2x = (4)(1), x = 4/2, x = 2 mLA 2016 study evaluated the role confidence plays in overall arithmetic in drug calculation skills. Study participants attended remedial math classes from a wide range of educational backgrounds and age dynamics seeking a first degree in nursing, a foundation degree, or post-registration courses (Shelton, 2016). The study revealed one-third of students feel a lack of confidence, which originated in an earlier stage of education, dating back to a primary school environment (Shelton, 2016). The study concluded that confidence plays a role in dosage calculations and the overall performance of mathematical calculations and can be improved in an environment that fosters a deep-learning approach (Shelton, 2016).Medication errors can be detrimental and costly to patients.[1] Drug calculation and basic mathematical skills play a role in the safe administration of medications.According to a 2016 study of intensive care (ICU) nurses, 80% of nurses considered knowledge of drug dosage calculation essential to decrease medication errors during the preparation of intravenous drugs.[2]High-risk medications such as heparin and insulin often require a second check on dosage amounts by more than one provider before administering the drug. Follow institutional policies and recommendations on the double-checking of dose calculations by another licensed provider.Published in 2018, one study by a group of oncology nurses in 3 Swiss hospitals discusses the process of double-checking and its limitations in the current healthcare environment and increased nurse workload and time constraints, distracting environments, and lack of resources. The study concluded that oncology nurses strongly believed in the effectiveness of double-checking medication despite reporting limitations of the procedure in clinical practice.[3] All members of the interprofessional team are responsible for dose calculations. Physicians, nurses, and pharmacists all must be knowledgeable regarding the desired formulas. This technique is invaluable in properly treating patients.Continuing Education / Review Questions1.Chen CC, Hsiao FY, Shen LJ, Wu CC. The cost-saving effect and prevention of medication errors by clinical pharmacist intervention in a nephrology unit. Medicine (Baltimore). 2017 Aug;96(34):e7883. [PMC free article: PMC5572025] [PubMed: 28834903]2.Di Muzio M, Tartaglini D, De Vito C, La Torre G. Validation of a questionnaire for ICU nurses to assess knowledge, attitudes and behaviours towards medication errors. Ann Ig. 2016 Mar-Apr;28(2):113-21. [PubMed: 27071322]3.Schwappach DLB, Taxis K, Pfeiffer Y. Oncology nurses' beliefs and attitudes towards the double-check of chemotherapy medications: a cross-sectional survey study. BMC Health Serv Res. 2018 Feb 17;18(1):123. [PMC free article: PMC5816392] [PubMed: 29454347]

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