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MATHEMATICS IN NURSING / BILINGUAL NURSING FELLOWSHIP PROGRAM

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Mathematics in Nursing / Bilingual Nursing Fellowship Program

Abstract

The focus of this research study is to enhance the Bilingual Nursing Fellowship Program (BNFP) in South Mountain Community College graduation rate and transfer program to PC (Phoenix College) or GateWay College) and then MAPP (Maricopa ASU Pathways Program) to Arizona State University Nursing; or at least to CNA degree. MAT 141/142, College Mathematics, is therefore the required mathematics course for this degree. The one-hour workshop Prevention and Remediation on HESI A2 was offered every Friday and then comparing pre- and post-test results.

Introduction

Mathematics as a subject always deals with knowledge and critical thinking, proportional- reasoning, and correctness of such calculation in dimensional analysis. Nursing degree needs as much as mathematics in their field to be able to excel in their career toward Registered Nurse (RN), or Nurse Practitioner.

Unlike many nursing programs, entrance requirements for this bilingual program did not include a minimal grade point average (GPA) or previous course completions. (Bosch, Dossier, and Gess-Newsome 2012). Starting 2016, BNFP has been requiring a GPA to be 3.0. In a sense, it offers an opportunity to focus attention on the ways in which professional discourse shape mathematical meanings and, reciprocally, on how the use of mathematics. However, it defined structures the discourse of work. One might hope that such insight will afford leverage on didactical strategies within and beyond work-based settings (Hoyles, Noss, and Pozzi 2001).

A short history of the Bilingual Nursing Fellowship Program, it started in spring 2003 the demographic needs of nurses who speak fluent Spanish and English in the demanded Latino community and the representation of minorities in workforce. Congressman Ed Pastor was instrumental in securing federal funding to help support the program. In 2008 the Bilingual Nursing Fellowship Program (BNFP) of South Mountain in collaboration with Phoenix College and GateWay Community Colleges has been

selected "Example of Excellence" by Excelencia in Education.

In 2016, BNFP received the Bright Spot in Hispanic Education from the White House Initiative for Educational Excellence for Hispanics. The award is in the group's associate-level category. The first cohort of 25 students in 2003 and by 2008, 86 students in the program have earned their Registered Nurse (RN) degrees; 133 have completed the Licensed Practical Nurses (LPN) requirements; and 155 have completed their Certified Nursing Assistant program (CNA).

In summer 2014 through Maricopa Summer Institute I began to research the Mathematical proportional-reasoning for these students for HESI A2 exams preparation. With my reading colleague, we offered every Friday a workshop that focus on test taking strategy and how to access and excel the HESI A2 exam to those who have not taken the HESI A2 exam yet. Data was collected, and it showed significant improvement between Pre- and Post-Test for those students attending the workshop and passing their HESI A2 exam.

The Role of Mathematics Behind It

Proportional-reasoning is a way of thinking a unit rate that applies to our daily life. In Nursing, proportional-reasoning becomes as crucial as critical thinking when it requires converting from one dimension to another. Nurses' jobs are not just giving medicines to a patient, but also must know the conversion and the proper dosage of medication based on a patient weight and the amount of drug available at hand.

Example 1:

The prescribed dosage of a drug is 10 mg/kg daily, meaning that 10 milligrams of the drug should be administered daily for each kilogram of a patient's weight. How many 400-milligram tablets should be given each day to a patient who weighs 178 pounds? (1 pound \approx 0.45 kg)

Solution steps by step.

Step 1: Conversion from pounds to kilogram.

$$178 \text{ pounds} \times \left(\frac{0.45 \text{ kg}}{1 \text{ pound}} \right) = 80.1 \text{ kg}$$

Step 2: How much dosage needed = $80.1 \text{ kg} \times \left(\frac{10 \text{ mg}}{1 \text{ kg}} \right) = 801 \text{ mg}$

Step 3: How many tablets needed as the availability of the meds

$$801 \text{ mg} \times \left(\frac{1 \text{ tablet}}{400 \text{ mg}} \right) = 2.00025; \text{ this can be round down to 2 tablets is sufficient.}$$

A unit rate is part of the dimension analysis that apply in real life situation. In algebra, a unit rate is a rate of change, which is also called “slope”

Example 2:

An IV medication of 235mL is to infuse at the rate of 60mL/hr. What is the total infusion time? (how long will it take)?

Total infusion time =?

Solution

Step 1: Unit rate to infuse: 60mL / 1 hour = 60 ml / 60 minutes = 1ml/minute

$$\text{Step 2: } 235 \text{ ml} \times \left(\frac{1 \text{ min}}{1 \text{ ml}} \right) = 235 \text{ minutes}$$

$$\text{Step 3: Convert to hours } 235 \text{ minutes} \times \left(\frac{1 \text{ hour}}{60 \text{ min}} \right) = 3 \text{ hours and } 55 \text{ minutes.}$$

Example 3:

The patient is receiving an antibiotic IV at the rate of 50 mL/hr. The IV solution contains 1.5 gram of the antibiotic in 1000 mL. Calculate the mg/hour given.

Solution:

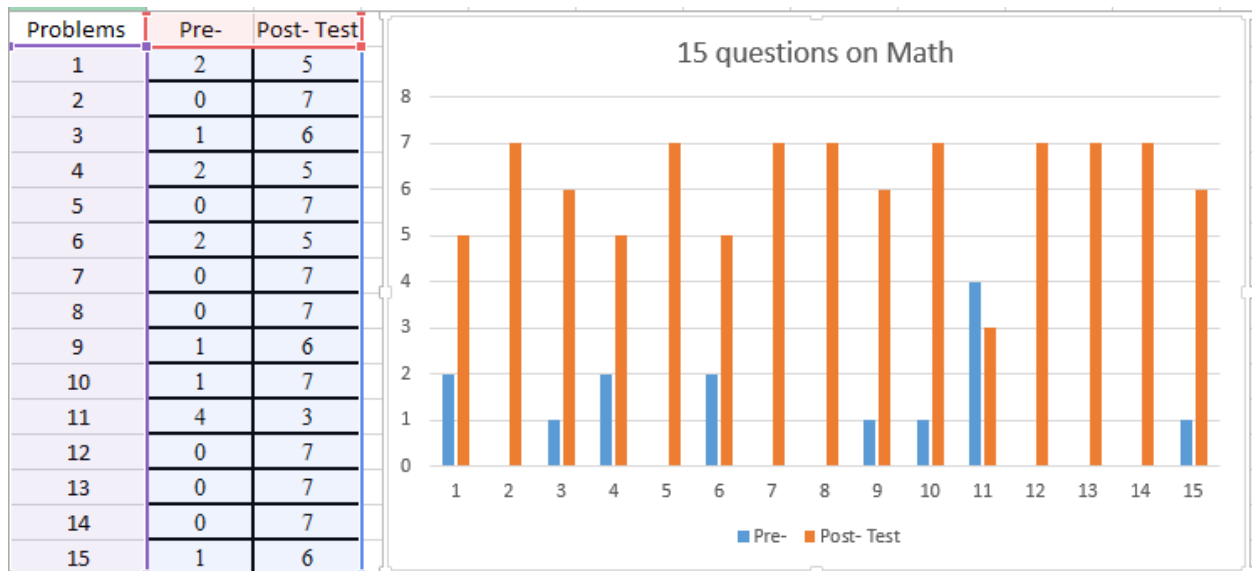
Step 1: Solution contains 1.5 gram of the antibiotic in 1000mL

To convert 1.5 gram to gram. $1.5\text{g} \left(\frac{1000 \text{ mg}}{1\text{g}} \right) = 1500 \text{ mg in } 1000\text{mL}$

Step 2: receiving an antibiotic IV at the rate of 50 mL/hr

$$\frac{50 \text{ mL/hour}}{1000 \text{ mL}} = \frac{1}{20} / \text{hour} \quad \text{Then, MULTIPLY } \frac{1}{20} / \text{hour} (1500\text{mg}) = 75 \text{ mg/hour.}$$

Results from the “**Prevention & Remediation workshop Math**” every other week on Friday in **2014-2015**.



Post-test results showed improvement as compared to the Pre-test.

Note: See separate 15-problem assessments.

These are the recent cohorts Mathematics level students had taken.

BNFP Cohort 18 , 19, 20 , and 21		
	Passed MAT141/142 with A	Passed MAT151/Above with A
Cohort 18 - Fall 2016	16	5
Cohort 19 - Spring 2017	10	0
Cohort 20 - Fall 2017	7	1
Cohort 21 - Spring 2018	9	3
Total	42	9
	Passed MAT141/142 with B	Passed MAT151/Above with B
Cohort 18 - Fall 2016	5	2
Cohort 19 - Spring 2017	8	3
Cohort 20 - Fall 2017	4	0
Cohort 21 - Spring 2018	7	1
Total	24	6
	Passed MAT141/142 with C	Passed MAT151/Above with C
Cohort 18 - Fall 2016	3	1
Cohort 19 - Spring 2017	0	2
Cohort 20 - Fall 2017	1	1
Cohort 21 - Spring 2018	3	0
Total	7	4

Note: Some students already had a higher math courses MAT151 College Algebra or above.

Images:



South Mountain Community College instructor Jean Revie, second from left, teaches students in a bilingual advanced anatomy class.

Spring 2003 – Advanced anatomy class

Spring 2017 – Microbiology Lab





Bilingual Nursing Fellowship Program (BNFP)



2016-2017

References:

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 - <https://southmountaincc.edu>

Prevention & Remediation HESI A2 for BNP



NAME: _____

SCORE: _____ /15 _____ %

Read the questions carefully, and then show your work in the space provided.

You may use a calculator. Write your answer on the right side.

1. A hospital worker is filling out his timesheet. He worked 8 hours on Monday, 7 hours and 30 minutes on Tuesday, $8\frac{3}{4}$ hours on Wednesday, 4 hours on Thursday, and $8\frac{1}{4}$ hours on Friday. If he earns \$14.35 per hour, what will be his gross pay for this week? (Round your answer to the nearest cents.)

Answer: _____

2. How many milliliters are in 2 Liter bottles saline solution?

Answer: _____

3. A newborn weighs 8 pound 5 ounces. There are 453.59 grams per pound. What is the infant's weight in grams?

Answer: _____

4. Over the past week, 38 baby girls were born at the hospital. This was 55% of all babies born. How many boys were born over the past week?

Answer: _____

5. The doctor tells the patient to cut back on coffee. The patient usually has four 8-oz cups of coffee per day. If the doctor told the patient to cut back by 25%, how many ounces of coffee can the patient have each day?

Answer: _____

6. The patient should receive 30 mg of sodium in every 100mL of IV saline. What would the percentage of sodium be in this IV solution?

Answer: _____

7. The order is one 125 mg tablet per 25 kg patient weight bid. Your patient weighs 165 lbs. (1kg \approx 2.2 lbs.) How many tablets will you administer per dose?

Answer: _____

8. You are to set the IV pump to deliver 300cc over 6.5 hours.
What is the rate cc/hour would you set?

Answer: _____

9. A box in a college bookstore contains books, and each book in the box is a Math book, an English book or a Science book. If one-third of these books are Math books and one-sixth are English books, what fraction of the books are science books?

Answer: _____

10. The patient is receiving an antibiotic IV at the rate of 50 mL/hr. The IV solution contains 1.5 gram of the antibiotic in 1000 mL. Calculate the mg/hour given

Answer: _____

11. The dietician allows a patient to consume 2 quarts of juice, how many ounces is that?

Answer: _____

12. To convert pounds to kilograms, what factor is used?

- A. 0.454
- B. 0.334
- C. 10
- D. 2.2

Answer: _____

13. A bicycle trip of 680 meters takes 12.6 seconds. What is the average speed of the bicycle?

Answer: _____

14. Which of the following must be known to calculate average speed?

- A. Distance and direction only
- B. Direction and velocity
- C. Velocity and time
- D. Distance and time

Answer: _____

15. An IV medication of 235 mL is to infuse at the rate of 60mL/hr. What is the total infusion time (how long will it take)?

Answer: _____