The Sredl Triangle Technique Theory For Oral And Intra-Muscular (IM) Medication Calculations Enhanced For Pediatric Intra-Venous (IV) Calculations

Author

Darlene Sredl, Ph.D., R.N.(university of Missouri @ St. Louis) author of the nursing theory , The Sredl Triangle Technique (Sredl, 2006) with IV calculations postulated by Professor Phillip Budgeon (Southern Cross University, Australia).

ABSTRACT

Introduction: The Sredl Triangle Technique (STT) is a mid-range nursing theory originally postulated to provide ease and accuracy of oral and intra-muscular (IM) medication calculation for pediatric patients. This article expands STT to include principles guiding intra-venous (IV) medication calculation for pediatric patients.

Method: A pilot study utilizing pre and post-test methodology was done among diploma level nursing students in an urban Midwestern school of nursing. No clinical research has been done (to this author's knowledge) studying the accuracy of the theory inclusions concerning IV medication administration.

Results: Statically significant results obtained by Pearson's Product Moment Correlation indicated that students participating in learning the Sredl Triangle Technique theory were better able, as indicated by higher scores on the post test to calculate accurate therapeutic pediatric oral and IM dosage ranges of medications prescribed in mg/kg for pediatric patients.

Discussion: The adaptation of the principles of medication calculation as posited in the original Sredl Triangle Technique to include IV calculation and administration is the focus of this article.

Future Implications: As stated above, "No clinical research has been done (to this author's knowledge) studying the accuracy of the Sredl Triangle Technique theory's adaptation including the principles of IV medication administration". For this reason, neither the authors nor the publisher of this article accept any responsibility for the accuracy of the tenets postulated within the modifications to this theory.

INTRODUCTION TO ORIGINAL THEORY

The Sredl Triangle Technique (STT) is a mid-range theory developed into an educational instrument to assist nurses and student nurses with oral pediatric medications. STT incorporates contemporary evidence-based concepts of medication calculation within an easily understood triangle graphic model offering visual, auditory, and kinesthetic learning style accessibility. The need that led to the development of this theory was based on nursing students' verbalizations of their experience with math anxiety and the subsequent development of an aversion to performing an essential skill that nurses MUST become comfortable with for the safety of their patients. Since nurses confront mathematical problems as part of determining dosage calculations every shift, they must learn to feel comfortable with their ability to perform these calculations accurately throughout the course of their profession (Sredl, 2014).

METHODOLOGY

A pilot study utilizing a pre and post-test methodology was done among diploma-level nursing students in order to determine ease of concept grasp using STT (Sredl, 2006). Statistically significant results obtained by Pearson's Product Moment Correlation indicated that students participating in learning the Sredl Triangle Technique theory were better able, as indicated by higher scores on the post-test, to calculate accurate therapeutic pediatric oral dosage ranges of medications prescribed in mg/kg (Sredl, 2013, & 14)).

GRAPHIC BASE

An isosceles triangle is used as the graphic base for STT. The patient's weight in kg is entered at the top of the triangle. The normal therapeutic range of the medication is entered at the base: low to the left & high to the right. The patient's weight is multiplied by the low end of the range on the left side and by the high end of the range on the right side.

If the numbers fall BELOW the low end of the therapeutic range, the dose is considered SUB-THERAPEUTIC. If the numbers fall ABOVE the high end of the therapeutic range, the dose is considered TOXIC. Either of the above 2 occurrences require that the physician be notified of the finding. The area between these two extremes is considered 'within normal limits' and may be given safely.

IV ADAPTATION

Adapting the Sredl Triangle Technique (STT) to IV calculations involves utilizing the same isosceles triangle graphic base.

Dosage rate computations are given in *mg/hr* IV infusion rate is figured in *ml/hr*

To begin this computation the medication concentration in ***mg/ml*** is placed at the top of the triangle. As Professor Budgeon explains: "the concentration 'connects' the two quantities together. The concentration of the IV medication is <u>always known</u> so, if the IV infusion rate is known, then the dosage can be calculated and vice versa". (Personal communication, 2017, Budgeon, P.), (Sredl, D.,2014).

To calculate the dosage rate when concentration and IV infusion rate are known, use this formula:

Dosage rate (units/hr) = concentration (units per ml) *multiplied by* IV rate (ml/hr)

To calculate IV infusion rate when dosage rate and concentration are known, use this formula

IV rate (ml/hr) = dosage rate (units per hr) *divided into* concentration (units /ml)

If pharmacy sent a medication concentration of 50 mg/ml, and you wanted to give 25 mg/Hr, divide 25 into 50 and the infusion rate is 2 ml/Hr.

CONCLUSION

Utilizing the graphic base of the isosceles triangle, as first postulated in the Sredl Triangle Technique, the same logical reasoning can be used when substituting IV infusion rate, dosage rate and medication concentration for the original triangle components..

REFERENCES

1. Sredl, D. (2014). Temptations that come with a medication error. *Journal of Christian Nursing, 4th quarter*
2. Sredl, D., (Ed) (Ed.). (2012). *Evidence-Based Leadership Success Strategies for Nurse Administrators, Advance Practice Nurses (APN), and Doctors of Nursing Practice (DNP)*. New York: Nova Science Publishers, Inc.
3. Sredl, D. (2013). Pharmacologic Implications of Utilizing Amalgamethodology as an Adaptive Research Methodology for Clinical Trials. *Journal of Pharmacologic and Biomedical Scinces, www.jpbms.info/index.php?option=com.docman&task*.
4. Sredl, D. (2006). The Triangle Technique: A New Evidence-Based Educational Tool for Pediatric Medication Calculations. *NLN Nursing Educational Perspectives, 27*(2), 84-88
5. Sredl, D. (2013). Amalgamethodology: A research methodology unique to nursing fostering critical thinking implications for education and practice. *Journal of Applied Medical Sciences*, *2*(1), 61-73.
6. Sredl, D. (2013). Pharmacologic Implications of Utilizing Amalgamethodology as an Adaptive Research Methodology for Clinical Trials. *Journal of Pharmacologic and Biomedical Scinces* , *www.jpbms.info/index.php?option=com.docman&task*.
7. (Budgeon, P.(2017). Personal communication,)