Evaluating an AI-Powered Tool to Improve Pediatric Dosage Calculation Skills

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Introduction

Pediatric medication administration requires precise dosage calculations due to children's varying weights and developmental considerations. Despite repeated instruction, undergraduate nursing students frequently report anxiety and difficulty mastering dosage math, particularly in pediatrics where the margin for error is narrow (Cartwright et al., 2021; Fleming et al., 2020).

Emerging technologies, such as AI-powered educational tools, offer new possibilities to enhance learning and reinforce clinical reasoning (Topaz & Pruinelli, 2017). Conversational agents like chatbots have shown promise in health education, providing scalable, interactive learning experiences (Kulikovskaya & Stoyanov, 2022).

However, the integration of artificial intelligence into undergraduate nursing curricula remains limited and under-researched (Schuessler et al., 2023).

Description

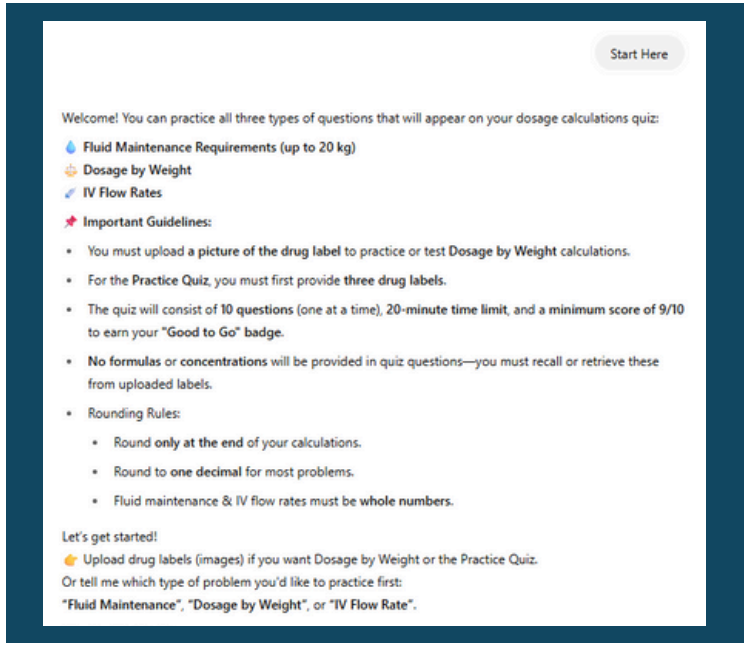
To address persistent gaps in medication math competency, we piloted the **Medimath Bot**, a conversational AI tool, in a pediatric nursing course.

The bot was designed to simulate real-time problem-solving, offer unlimited practice opportunities, and promote student confidence.

Aims

1. Evaluate the impact of the Medimath Bot on student performance and failure rates in pediatric dosage calculations by comparing exam outcomes across semesters.
2. Explore student perceptions of the Medimath Bot's usability, ease of use, and overall learning experience.

MediMath Bot Opening Prompt



Evaluation

We compared dosage calculation exam results from three semesters prior to the bot's introduction with results from Spring 2025, when students used the Medimath Bot. The exam was standardized across all terms, with a passing score set at 9 out of 10.

Spring 2025 students also completed a brief evaluation rating the bot's helpfulness and ease of use, and provided open-ended feedback. We analyzed exam performance descriptively and reviewed qualitative responses for common themes

Results

Metric	Pre-Bot (3 Terms)	Spring 2025 (Bot Used)
Total Students	109	37
Average Score	9.44	9.57
Perfect Scores (%)	66 (60.6%)	28 (75.7%)
Failed (≤8) (%)	10 (9.2%)	4 (10.8%)

Students who used the Medimath Bot in Spring 2025 had a slightly higher average score (9.57) compared to students from the three previous terms combined (9.44), along with a greater proportion achieving perfect scores (75.7% vs. 60.6%). However, the failure rate also increased slightly in the post-bot group (10.8% vs. 9.2%).

Helpfulness (1-5)	**3.87**
Ease of use (1-5)	3.6
Should MediMath Bot be used again?	Yes: 21 (70.0%) Unsure: 6 (20.0%) No: 3 (10.0%)
What Students Liked	• Easy to use and navigate • Wide range of practice questions • Unlimited practice with some timed options
Suggestions for Improvement	• Improve accuracy of rounding in answers • Prevent student lockouts • Increase question complexity to better reflect test difficulty

Students rated the Medimath Bot as moderately helpful (3.87/5) and easy to use (3.6/5), with 70% recommending it for future courses. They appreciated its ease of use, variety of practice questions, and unlimited access, while suggesting improvements to rounding accuracy, lockout prevention, and question difficulty.

Implications

The Medimath Bot shows potential as a scalable tool to support medication math competency in nursing education. Its integration may enhance student confidence and performance, though refinements are needed to optimize functionality and alignment with clinical expectations.

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Biography

Sharrica Miller, PhD, RN, is a doctorally prepared, board certified pediatric nurse practitioner with over 17 years of experience in nursing and nursing education. After spending 12 years of her childhood in foster care, Dr. Miller went on to obtain her BSN from Howard University and worked a multitude of nursing specialties including pediatrics, palliative care, and critical care, before going back to school to become a nurse practitioner. She earned her PhD from UCLA in 2017 and was named one of five Johnson and Johnson Minority Nurse Faculty Scholars two years in a row.

Dr. Miller currently serves as Assistant Professor and chair of Diversity, Equity, Inclusion (DEI), and Student Engagement at Cal State Fullerton. She is currently the co-investigator of a $2.2 million HRSA workforce diversity grant where she leads a multidisciplinary team to create initiatives focused on recruitment and retention of Black and Hispanic nursing students. She is a nationally sought-after speaker and consultant who has delivered over 50 keynote presentations for various entities including universities, hospitals, and child welfare departments.

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