Title: Addressing Numeracy Challenges in Nursing Education (Comment Article)

Author: Fiona Clarke, Lecturer in Adult Nursing, Buckinghamshire New University
fiona.clarke@bucks.ac.uk

Addressing Numeracy Challenges in Nursing Education

Healthcare numeracy plays an essential role in nursing practice, underpinning vital tasks such as drug calculations, fluid balance management, and patient monitoring. However, many nursing students struggle with the mathematical skills required to succeed in these areas, particularly when faced with the pressure of formal assessments. This is a significant issue, given that the Nursing and Midwifery Council (NMC) mandates a 100% pass rate for drug calculation assessments by the end of a nursing programme to ensure patient safety (Nursing and Midwifery Council [NMC], 2018).

This article explores an innovative approach to healthcare numeracy education designed to improve student outcomes and confidence. By aligning teaching with real-world nursing practice, simplifying complex exam questions, and incorporating more engaging, practical assessments, this model has achieved considerable success in helping students overcome the barriers they face with numeracy.

The Impact of Numeracy Anxiety on Nursing Students

For many students, numeracy is a source of anxiety. The concept of maths anxiety, a form of performance anxiety linked to negative emotional responses to mathematical tasks, has been widely documented in education research (Dowker, Sarkar, & Looi, 2016). Nursing students, in particular, may experience high levels of stress when required to solve mathematical problems in timed, high-stakes exam settings. This anxiety can lead to poor performance in drug calculations and other numeracy-related tasks, which can be problematic given the importance of accuracy in healthcare. Incorrect calculations of medication dosages or fluid balances can have serious, even life-threatening, consequences.

A lack of confidence in numeracy also exacerbates this problem. Many nursing students have not encountered mathematics in an educational setting for years, often arriving at university with significant gaps in their knowledge. Furthermore, students with English as an Additional Language (EAL) or specific learning difficulties (SpLD) may face additional challenges,

particularly when trying to understand complex, wordy exam questions (Stanton, 2018). These students require tailored support and alternative teaching methods that address their specific needs, but traditional numeracy education often fails to provide this.

Innovative Approaches to Teaching Healthcare Numeracy

Recognising these challenges, an innovative numeracy module was developed for Student Nursing Associates (SNAs) with the goal of making healthcare numeracy more accessible and relevant. This approach moved away from abstract mathematical problems and focused on real-world scenarios that nurses encounter in everyday practice, such as calculating fluid balance, body mass index (BMI), and drug dosages.

One of the key elements of this module was the simplification of exam questions. Traditionally, many numeracy questions are overly complex and contain extraneous information that can confuse students. For example, a typical drug calculation question might ask how many millilitres of a liquid medication should be administered, but also include irrelevant details about how many times the medication is given each day. By simplifying the language and removing unnecessary information, the module allowed students to focus on the core mathematical task. This approach aligns with the principles of universal design for learning (UDL), which advocates for reducing barriers in education by designing learning experiences that accommodate diverse learners (Meyer, Rose, & Gordon, 2016).

In addition to simplifying questions, the module expanded the scope of numeracy teaching to include tasks that nurses perform regularly but which are often overlooked in traditional assessments. For example, students were required to calculate fluid balance by adding together the total input and output from a patient's chart and determine whether the balance was positive or negative. They were also asked to calculate BMI after converting a patient's weight and height into metric units, a task that nurses routinely perform when assessing patients' health status (Nuttall & Nuttall, 2019). These tasks not only helped students see the relevance of numeracy to their future careers but also provided a more comprehensive understanding of how numbers are used in healthcare settings.

Engaging Assessments to Improve Confidence

To further enhance engagement and reduce numeracy anxiety, the module adopted a station-based assessment format. This type of assessment, similar to the Objective Structured Clinical Examination (OSCE) used in clinical skills testing, involves students rotating through different

stations where they are required to complete practical tasks related to numeracy. For instance, at one station, students might be asked to calculate fluid balance using props such as intravenous fluid bags, while at another station they might be required to interpret a BMI chart.

This hands-on, practical approach helped to reduce anxiety by allowing students to interact with the types of materials they would use in practice, rather than relying solely on abstract paper-based questions. The station-based format also allowed students to work in shorter bursts, which helped to alleviate the pressure of a long, continuous exam. Importantly, students were allowed to use calculators during the assessment, acknowledging that most nurses use calculators for drug calculations in practice (Dyson et al., 2019). This realistic approach helped to build students' confidence and demonstrated that they could rely on tools to assist them, rather than having to perform all calculations mentally.

Outcomes and Reflections

The redesigned healthcare numeracy module has been delivered twice, with a total of 66 students participating. The results were overwhelmingly positive, with all students passing the assessment, and 13 students achieving a perfect score of 100%. The lowest score recorded was 60%, indicating that even students who had previously struggled with numeracy were able to achieve a passing grade.

While the high pass rate was encouraging, it also raised questions about whether the assessments were challenging enough to stretch more advanced students. To address this, the module included a mix of basic and more complex questions. For example, while some questions focused on foundational skills like unit conversions, others required students to calculate percentages or interpret complex clinical data. This balance ensured that the assessments were rigorous while still being accessible to all students.

There were also discussions about the ethical considerations of giving partial credit. In many cases, students who made an initial error in their calculations were still able to correctly apply the subsequent steps of a formula. For example, if a student miscalculated a patient's fluid input but used the correct process to calculate the overall balance, they were awarded partial credit. This approach recognises that in nursing, the method is often as important as the final answer. However, there is ongoing debate about whether this leniency undermines the importance of precision in patient care.

Conclusion

Numeracy is a critical skill in nursing, where accuracy can be the difference between safe and unsafe patient care. However, many nursing students struggle with numeracy due to anxiety, gaps in knowledge, and poorly designed assessments. The innovative approach to healthcare numeracy education outlined in this article has demonstrated that by simplifying complex questions, using real-world scenarios, and incorporating more engaging assessment formats, it is possible to improve student outcomes and build confidence.

This educational model, which focuses on practical numeracy tasks and aligns with the day-to-day realities of nursing, provides a valuable blueprint for future healthcare numeracy education. While challenges remain, particularly in ensuring that assessments are both supportive and rigorous, this approach represents a significant step forward in preparing nursing students for the numeracy demands of their profession.

References

Dowker, A., Sarkar, A., & Looi, C. Y. (2016). Mathematics anxiety: What have we learned in 60 years? Frontiers in Psychology, 7, 508. https://doi.org/10.3389/fpsyg.2016.00508

Dyson, S., Wright, K., & Brown, B. (2019). Numeracy and clinical calculations: A continuing challenge for student nurses. Nurse Education Today, 79, 16-22. https://doi.org/10.1016/j.nedt.2019.05.004

Meyer, A., Rose, D. H., & Gordon, D. (2016). Universal Design for Learning: Theory and Practice. CAST Professional Publishing.

Nursing and Midwifery Council (NMC). (2018). Standards for pre-registration nursing programmes. Available at: https://www.nmc.org.uk/standards

Nuttall, F. Q., & Nuttall, R. T. (2019). Body mass index: Obesity, BMI, and health. Nutrition Today, 54(3), 117-125. https://doi.org/10.1097/NT.0000000000000351

Stanton, A. (2018). Supporting students with learning difficulties in higher education: Nursing and healthcare perspectives. Nurse Education Today, 61, 127-131. https://doi.org/10.1016/j.nedt.2017.11.015