

A flipped classroom approach to teaching drug calculations

C. Guilding. Newcastle University, Newcastle Upon Tyne, UNITED KINGDOM.

Background and aims The wrong dose, strength or frequency of a medication accounts for almost a third of medication errors in the NHS (1). To strengthen teaching of pharmaceutical numeracy to medical students a range of 'drug calculation' outcomes were recently introduced to the MBBS curriculum (2). However, guiding the learning of a large class (>200) with mixed mathematical abilities is difficult, especially within a traditional didactic lecture format. The 'flipped classroom' is a pedagogical model in which students learn the core content of a topic outside of the classroom, freeing up class time for problem solving and interactive learning activities. This project aimed to develop a flipped classroom approach to teaching mathematical concepts around drug dosage calculations.

Summary of work A one hour Stage 1 MBBS 'Drug Calculations' session was flipped. A workbook was produced containing the theory, worked examples and a series of questions for students to complete before their classroom session. Workbook answers were provided in advance of this session in two formats: a fully completed workbook and vlogs of the lecturer completing the workbook while talking through how they approached the calculations (to model metacognition). In the classroom, students had to apply the knowledge learned beforehand to a series of increasingly difficult clinically based questions. This was run as an inter-seminar group quiz using interactive voting technology.

Outcomes Students responded very positively to the flipped classroom approach. 90% of students (n=167 out of 188, 88% response rate) agreed or strongly agreed with the statement 'I found the CPTP1.5 flipped classroom approach, completing the 'Drug Calculations Workbook' in advance of the session then applying the principles to examples in class, a more effective approach than learning the maths principles in a standard lecture format'.

Discussion and conclusion An increasing body of evidence indicates that the flipped classroom approach can be more effective than a traditional didactic lecture, especially when ability in core content differs (3). The flipped classroom approach enabled each student to learn how to do calculations in their own way and at their own pace freeing class time for interactive application of this knowledge. Satisfaction with this approach was high and we are currently developing more pharmacology content for delivery in this format.

References 1. Cousins *et. al.*, 2012. *Br J Clin Pharmacol*. **74**, p597-604 2. Guilding, 2016. *pA2 Online* **13**(3) 3. Abeysekera and Dawson, 2015. *Higher Education Research & Development* **34**, p1-14