A mixed methods evaluation of team-based learning for applied pathophysiology in undergraduate nursing education

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ABSTRACT

Background: It is important for nurses to have a thorough understanding of the biosciences such as pathophysiology that underpin nursing care. These courses include content that can be difficult to learn. Team-based learning is emerging as a strategy for enhancing learning in nurse education due to the promotion of individual learning as well as learning in teams.
Objectives: In this study we sought to evaluate the use of team-based learning in the teaching of applied pathophysiology to undergraduate student nurses.
Design: A mixed methods observational study.
Methods: In a year two, undergraduate nursing applied pathophysiology module circulatory shock was taught using Team-based Learning while all remaining topics were taught using traditional lectures. After the Team-based Learning intervention the students were invited to complete the Team-based Learning Student Assessment Instrument, which measures accountability, preference and satisfaction with Team-based Learning. Students were also invited to focus group discussions to gain a more thorough understanding of their experience with Team-based Learning. Exam scores for answers to questions based on Team-based Learning-taught material were compared with those from lecture-taught material.
Results: Of the 197 students enrolled on the module, 167 (85% response rate) returned the instrument, the results from which indicated a favourable experience with Team-based Learning. Most students reported higher accountability (93%) and satisfaction (92%) with Team-based Learning. Lectures that promoted active learning were viewed as an important feature of the university experience which may explain the 76% exhibiting a preference for Team-based Learning. Most students wanted to make a meaningful contribution so as not to let down their team and they saw a clear relevance between the Team-based Learning activities and their own experiences of teamwork in clinical practice. Exam scores on the question related to Team-based Learning-taught material were comparable to those related to lecture-taught material.
Conclusions: Most students had a preference for, and reported higher accountability and satisfaction with Team-based Learning. Through contextualisation and teamwork, Team-based Learning appears to be a strategy that confers strong pedagogical benefits for teaching applied pathophysiology (bioscience) to student nurses.

1. Introduction

Nurses need to have a thorough knowledge of the biosciences, including applied pathophysiology, in order to understand health and disease and therefore deliver the best care (Taylor et al., 2016). However, student nurses, and registered nurses, have admitted to difficulties understanding the bioscience underpinning nursing care (Davies, 2010; McVicar et al., 2015). Consequently, students and academics have called for a greater emphasis on bioscience in nurse education (Fell and James, 2012; Taylor et al., 2015). One approach to addressing this

might be the use of innovative teaching methods to improve student engagement and attainment in what can be a challenging subject area (Saville et al., 2012).

There is growing evidence that team-based learning (TBL), a student-centred but teacher-directed flipped classroom strategy, has increased student satisfaction and higher engagement compared to traditional teaching methods (Sisk, 2011). TBL also appears to promote team participation and improved knowledge acquisition (Haidet et al., 2014). Possibly for these reasons, TBL is increasingly being used in medical and nurse education (Haidet et al., 2014). Researchers have

examined TBL in the teaching of applied pathophysiology to student nurses. In an evaluation of the teaching of clinical oncology, excellent attendance, high student participation and positive course evaluation were provided as evidence of engagement with TBL but evaluation or academic performance data were not reported (Middleton-Green and Ashelford, 2013). A randomised controlled trial (RCT) on the teaching of nurses' management of patients with respiratory conditions found that problem-solving ability, knowledge and clinical performance were significantly higher in the TBL cohort versus control (traditional teaching) (Kim et al., 2016).

Increased student engagement has been a common finding where TBL has been evaluated across various courses in nurse education (Branson et al., 2016; Clark et al., 2008; Feingold et al., 2008; Mennenga, 2015). However, this does not necessarily translate into students' preference for TBL versus traditional lectures (Mennenga, 2013) even where academic performance appears to have improved (Della Ratta, 2015). Thorough planning and evaluation is therefore required to best inform the implementation of new approaches like TBL if wide-spread adoption by staff and students is going to be successful (Andersen et al., 2011; Smith and Coleman, 2008).

Therefore, in this study we combined the use of both the validated TBL-SAI (Student Assessment Instrument) (Mennenga, 2012) and focus-group discussions to gain a thorough understanding of students' experience with TBL of applied pathophysiology. We further aimed to explore any effect on exam performance.

2. Methods

This was a mixed methods observational study.

2.1. Participants

The TBL intervention was offered to all year 2 undergraduate student nurses (students who commenced year 2 in one of two intakes: September 2014 or February 2015) at one UK higher education institution.

2.2. Structure of the Module

One (circulatory shock) topic out of ten in an applied pathophysiology module was delivered by TBL. All other topics were delivered by traditional lectures and seminars. The pre-reading consisted of three elements that were made available to students on the institution's virtual learning environment one week prior to class: 1. a book chapter (essential): 2. an online one-hour lecture that was tailored to making the more complex aspects of the topic more accessible and to promote engagement (essential): 3. optional supplementary materials - to cater for different learning preferences (two alternative book chapters, links to an educational videos website and one podcast and two journal articles). The students were required to answer 10 four-option multiple choice questions (MCQs) first as individuals (Individual Readiness Assurance Test - IRAT) then in teams (Group Readiness Assurance Test -GRAT). Students were allocated to teams of five or six students based on their year one anatomy and physiology test scores with the aim of spreading ability across the teams. Following Collins (2006) the MCQs were aimed at the levels of testing knowledge and combined comprehension and application (Collins, 2006).

These were delivered to the entire cohort in a one-hour lecture theatre setting where students were not allowed to access educational materials. Teams received immediate feedback using scratch cards and the lecturer identified knowledge gaps and gave a mini-lecture to address these. This was followed by two-hour concurrent seminar sessions each led by a different member of faculty (with between four and five teams in each of eight seminar rooms) consisting of two patient case scenarios (application exercises). In association with each patient scenario students had to select the best answer from seven statements (Middleton-Green and Ashelford, 2013). All statements were relevant to the case, but, as in clinical practice, had to be prioritised.

All teams had the same two scenarios and answer choices, and teams simultaneously reported their answers by holding up a letter-sign that corresponded to their chosen answer after the seminar leader counted down from three. The timing for intra-team and inter-team discussions was at the discretion of the seminar leader, who acted as a facilitator inviting challenges. The best performing teams were rewarded with sweets; since this was a 'one off' within the module peer review was not considered to be an appropriate incentive.

2.3. Data Collection

Our research design was sequential, for quantitative data elicitation was followed by qualitative data collection (Padgett, 2012). Following the literature on mixed-methods research (Kroll and Neri, 2009; Nastasi et al., 2010), our methods were fully integrated during analysis and interpretation of results, when we compared and contrasted results from the quantitative and qualitative datasets. The inferences and implications made in this article are informed by this integration.

2.4. Quantitative Outcome Measures

Immediately after the intervention, students were invited to complete the TBL-SAI, which has 33 items rated on a five-point Likert scale, reported to be valid and reliable (Mennenga, 2012); it measures TBL perceptions. The TBL-SAI includes three subscales measuring accountability (student preparation for class and contribution to team), preference (for TBL versus lecture) and student satisfaction with TBL. Students' learning was assessed by a two-hour unseen examination paper consisting of 10 short-answer questions covering all topics, one of which was on circulatory shock.

2.5. Qualitative Data

A convenience sample was invited for focus group discussions (FGDs). FGDs were chosen because they elicit opinions as they are displayed in public, which complemented the individual-level responses obtained via the TBL-SAI. Consistent with relevant literature on the execution of FGD (Grossen, 2007; Kitzinger, 1994), in the group discussions we sought to foster debate, argumentation and elaboration on initial responses, as well as multi-layered meanings that contextualised the responses obtained through the TBL-SAI.

The FGD schedule mirrored the TBL-SAI subscales, seeking to obtain more information and identify conflicting views, if present, in the groups. Five FGDs, each composed of students from five out of the eight seminar groups, took place between two and six months after the TBL intervention to probe for long-term assessment of the intervention after the examination had taken place. FGD lasted 39 min on average and were audio recorded. Participants were provided with refreshments.

2.6. Data Analysis

Quantitative data were analysed in SPSS (version 21). Two research assistants performed simple verbatim transcription of FGD recordings. Transcripts were imported into the package MAXQDA, where thematic analysis was performed (Braun and Clarke, 2006). Categorisation included deductive codes derived from the TBL-SAI headings, simultaneously inducing codes from the data. Illustrative quotes were chosen on the basis of the quality and brevity with which students articulated each point, and on the representativeness of the quote in relation to the overall theme.

2.7. Ethical Approval

Institutional ethical clearance was granted for the study.