

BEME Collaboration

PROTOCOL

A Systematic Review: The effectiveness of team based learning on learning outcomes in health professions education

A Systematic Review: The effectiveness of team based learning on learning outcomes in health professions education

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Background:

Trends in health professions trainee education are shifting from passive to active learning due to the belief that active learning results in enhanced knowledge retention and skills acquisition. The inadequacies of traditional lectures to stimulate active participation have prompted the development of new interactive teaching strategies (Prince, 2004). Team based learning (TBL) is one teaching strategy that was developed to make classroom learning more active. This method also poses a potential solution to common circumstances where students are developing fatigue to their standard learning strategies. In comparison to many common learning strategies such as lectures, case based learning and problem based learning (PBL), recent studies purport that TBL is a learning alternative that is often more active and less resource intensive (Parmelee & Michaelsen, 2010).

TBL is based in social learning theory and appears to have real pedagogical value. TBL was first introduced into medical education at Baylor College of Medicine in 2001 as a learner-centered but instructor-led learning strategy (Koles et al., 2010). Until then, case based learning and PBL were considered the primary active learning methods in medical education for nearly 40 years with lectures remaining as the standard but more passive approach (Koles et al., 2010). However, TBL is gaining increased attention due in part to the role of the single instructor as both the provider of content expertise and the overseer of learning endeavours for multiple small groups simultaneously (Parmelee & Michaelsen, 2010). This is extremely attractive in settings where numbers of trained facilitators are limited.

The TBL method involves three phases: (1) advanced preparation by the students, (2) individual and group readiness assessment, and (3) application, including discussion and analysis with the entire class (Koles et al., 2010). Permanent small groups, student accountability, the appeal process, and peer evaluation are additional cornerstones of TBL.

TBL is currently being implemented at schools of medicine, nursing, dentistry, veterinary science, physicians' assistantship, residency programs, and continuing medical education programs at over 50 schools in the United States as well as in Japan, Korea, Singapore, and the Middle East (Parmelee, 2010). Our scoping search revealed that the effectiveness of TBL has been investigated in terms of performance on comprehensive course examinations; at medical schools over a span of two years; and as compared to case-based group discussion (Koles et al., 2010; Thompson et al., 2007; Koles et al., 2005).

While studies have been done on numerous aspects and impacts of TBL, and in various contexts, our scoping search revealed that no systematic review has been done to evaluate the effectiveness of TBL in health professions education. Individual studies provide some conflicting evidence regarding the effectiveness of TBL; a systematic review examining the totality of evidence will provide a more solid and informed evidence base for curriculum planners. With the recent increased interest in TBL in health professions education, a significant number of new studies have been published and it is both

possible and necessary to provide a more meaningful evaluation of the effect of TBL on learning in health professions trainees in a systematic fashion. A systematic review will allow educators to gain a better understanding of whether or not health professionals' learning improves when TBL-centred courses and curricula are introduced. This would provide an empirical basis for curriculum planners to justify the modification of current curricula or the implementation of TBL as a new curricular pedagogy.

Objective of the review:

This review aims to identify the effectiveness of TBL learning in health trainee education compared to existing teaching strategies. This review will include undergraduate students, clinical trainees and practicing professionals, and will include studies evaluating single professions and interdisciplinary subject groupings. Reported learning outcomes will be described and categorized in relation to the classic Kirkpatrick framework (Kirkpatrick & Kirkpatrick, 2006):

- Change in patients' health
- Change in behaviour
- Change in skills
- Change in knowledge
- Change in attitudes/perceptions
- Changes in learner reactions

It is our goal to synthesize existing comparative data to provide decision support and justification for curriculum planners who are considering implementing this teaching strategy.

Methods:

For the purpose of this review, TBL is defined as a learning strategy that includes the three classic phases: advanced individual preparation, readiness assurance, and group application (Parmelee, 2010). In order to minimize the heterogeneity of studies reporting use of TBL, we will use the above definition in this review. We have validated the definition with the literature (Michaelsen et al., 2008), with the founder (Larry Michaelsen) and with a second key expert in this field (Dean Parmelee). The validated definition of TBL includes the three phases above while focusing on learner-centered education, individual and group accountability, permanence of teams, immediate feedback, and a meaningful peer evaluation process (Michaelsen & Parmelee, personal communication, 2011). The nature of the group assignments must be described in detail and must aim to include full cooperation of the team. The learning environments to be examined include all teaching venues such as large group teaching, workshops, small group teaching and clinical teaching. The learners will include all health professions trainees at the undergraduate, postgraduate and continuous professional development levels. Studies of uni-professional, multi-professional and inter-professional teaching will all be included.

Our primary outcomes will be: changes in health of patients; changes in learners' behaviour, skills, and knowledge; changes in learners' attitudes/perceptions; and participant reactions.

Inclusion and exclusion criteria:

| | Inclusion Criteria | Exclusion Criteria |
|--|--|---|
| Population | Medical Students Residents Physicians Nursing Students/Nurses Pharmacy Students/Pharmacists Dental Students/Dentists Veterinary Trainees/Veterinarians Dietician Trainees/Dieticians Clinical Psychology Trainees/ Clinical Psychologists Other Allied Health Professionals Interdisciplinary health professions teams | Non-Health Professions Trainees |
| Intervention | Team based learning in conjunction with: Lectures Workshops Small group learning sessions Clinical teaching Other structured teaching sessions | Shadowing Mentoring Practice audits Feedback alone |
| Comparator | Any teaching method described under the inclusion criteria for Intervention section without TBL. Any "standard curriculum" without TBL | |
| Outcome (Categorized by the modified Kirkpatrick's 1967 model of hierarchical outcomes (Kirkpatrick & Kirkpatrick, 2006)) | Change in patients' health Change in behaviour Inclusion of skill in clinical practice Change in skills OSCE scores Observed assessment scores Change in knowledge Written exam scores Change in attitudes/perceptions Confidence self ratings | |

| | | |
|-------------------|--|---|
| | Comfort self ratings Learner Reaction Satisfaction with teaching method Satisfaction with instructor | |
| Study Type | Comparative studies which provide primary data for any of the outcomes listed above, including the following designs: Randomized controlled trials Non-randomized control trials Controlled before and after studies Interrupted time series Other robust comparative studies (e.g., cohort studies) Qualitative comparative studies English language (Morrison A et al., 2009) | Studies reporting on needs assessments for TBL Studies reporting the prevalence of TBL Opinion Papers Studies without a comparator group Articles not in the English language |

Search Sources and Strategies:

We aim to include comparative studies that evaluate the effectiveness of team based learning in health professions education.

Potential studies will be identified by two search strategies depending on whether the database in question is health related or not.

Thus, for the following health related electronic databases the search table below will be employed to retrieve relevant articles:

- Medline (1970 – present)
- EMBASE
- PubMed
- CINAHL
- Cochrane Library

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|-----------------------|
| “team based learning” |
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|---|
| “team based learn*” or (tbl and team*) |
|---|

Limits: English language, human, 1970 – present

In order not to miss relevant studies we will use the concept of TBL combined with a concept of health professions for databases that do not primarily focus on health professions content. Thus, for the following non-health related electronic databases the search table below will be employed to retrieve relevant articles:

- Physical Education Abstracts
- ERIC
- Education Research Complete
- SCOPUS
- Web of Science
- OpenSigle
- Proquest Dissertations

| Team based learning | And “Health professions” |
|---|---|
| “team based learn*” or (TBL and team*) DE "TEAM learning approach in education" | medic* or nurs* or "physical therap*" or physician* or health or dentist* or pharmac* or “occupational therap*” or doctor* or dietitian* or psychologist* or psychiatr* or clinic* or clerkship* or veterinary* |

Limits: English language, human, 1970 – present

In addition, we will hand search the reference lists of all included studies and any relevant reviews. We will also conduct a separate search in Scopus looking forward for studies that cite any of the included articles. We will contact authors of relevant studies to determine if they know of any unpublished, recently published, or ongoing studies relevant to the review. Further we will review grey literature in the field of health education to identify any relevant studies (e.g. conference proceedings, Google Scholar etc.).

Study Selection Process:

The titles and abstracts of the studies obtained following our search will be independently screened by two reviewers to exclude those that obviously do not meet the inclusion criteria or address the question under study.

The full texts of the remaining studies will be retrieved and a study inclusion form derived from the BEME coding template will be applied to them to filter for relevant studies. Two reviewers will do this independently, and any disagreements that arise will be resolved through discussion, or with the aid of the third reviewer as required.

A copy of the intended inclusion form is appended.

Data extraction and quality assessment:

The resultant eligible papers will undergo coding using a refined electronic BEME coding sheet for data extraction. The data extraction sheet will capture the following information:

- Author's objective(s)
- Structured teaching intervention
- Comparator
- Primary and secondary outcomes
- Study design
- Characteristics of the study group
- Kirkpatrick level of outcome
- Study results for outcomes specified above
- Authors' conclusions

A copy of the intended data extraction form is appended.

The methodological quality of studies will be evaluated using tools devised by The Cochrane Collaboration or The Cochrane Effective Practice and Organization of Care (EPOC) Group (<http://www.epoc.cochrane.org/en/handsearchers.html>), depending on study design.

To ensure accuracy and consistency of data extraction, a sample of 20% of the articles will be randomly selected for checking by a second reviewer. Quality assessment of all relevant studies will be performed independently by two reviewers. Any discrepancies between the two reviewers will be resolved by a third party and if there is extensive discrepancy, the data extraction and quality assessment coding processes will be re-evaluated.

Data Synthesis and Analysis:

It is anticipated, based on this review group's previous experience with systematic reviews in the medical education literature, that the data obtained may be too heterogeneous to be combined for quantitative statistical meta-analysis. We will approach our analysis in an iterative and responsive fashion as we continue through the data extraction process and evaluate relevant studies. If there are data of sufficient homogeneity to combine (e.g., similar interventions, comparisons, outcomes, and study designs), we will follow standard methods for meta-analysis (www.cochrane-handbook.org). If quantitative analysis is not appropriate we will conduct a qualitative review of the evidence, grouping and reporting studies by Kirkpatrick level of outcomes and study design. We will develop evidence tables detailing study design and study population characteristics; interventions and comparisons; and, results and conclusions for the pre-specified outcomes.

Project timeline:

| Activity | Timeline |
|---|---------------------------|
| Protocol submitted to BEME for review | Late April 2011 |
| Conduct electronic database and hand searches | Late May 2011 (2 weeks) |
| Completion of screening titles, abstracts and relevant full text articles | June 2011 (2 weeks) |
| Piloting coding sheet | Mid June 2011 |
| Coding of studies completed | Early July 2011 (2 weeks) |
| Data Analysis complete | End July 2011 (2 weeks) |
| Data Synthesis and write up of report | August 2011 (4-6 weeks) |

Conflict of interest:

Nil.

Review team expertise:

Anna E. Oswald, BMSc, MD, MMed, FRCPC

Dr. Oswald is an Assistant Professor, consultant rheumatologist, and course-coordinator for the undergraduate musculoskeletal medicine course for preclinical medical students at the University of Alberta. She has a Masters in Medical Education degree from the University of Dundee. She has co-authored a systematic review on problem-based learning has been the team leader for recent BEMEs on musculoskeletal Clinical Skills and Audience Response Systems.

Mim S. Fatmi

Miss Mim S. Fatmi is a fourth year Biological Sciences student and summer studentship recipient. She has attended the two day 2011 Putting Evidence into Practice Systematic Review Workshop by the Alberta Research Centre for Health Evidence the University of Alberta.

Sandra Campbell, BA, MLS, AALIA (CP)

Ms. Campbell is a Public Services Librarian and library liaison to the Faculty of Medicine and Dentistry. She is also an expert database searcher and information literacy instructor. She has recently co-authored and provided librarian support and consultation on recent BEMEs on musculoskeletal Clinical Skills and Audience Response Systems.

Lisa Hartling, MSc, PhD

Assistant Professor, Department of Pediatrics

Dr. Hartling is Director of the Alberta Research Centre for Health Evidence and the Director of the University of Alberta Evidence-based Practice Center. In this role she oversees approximately 25 staff in the production of systematic reviews, health technology assessments, and methodological research for evidence synthesis. She is a reviewer with The Cochrane Collaboration (Acute Respiratory Infections, Anaesthesia, Injury, Wounds, Heart, and Infectious Diseases Groups). She has co-authored more than 20 systematic reviews. She has also recently co-authored BEMEs on musculoskeletal Clinical Skills and Audience Response Systems.

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