



MONASH University

Medicine, Nursing and Health Sciences

Examining the effectiveness of blended learning for teaching evidence-based medicine

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Background

- Teaching methods in medicine have evolved
 - lectures; seminars;
 - problem/case based learning (PBL/CBL);
 - self-directed;
 - online;
 - clinically-integrated; and
 - work-based
- Which method is most effective in teaching evidence-based medicine (EBM)?

Background

- Post-graduate trainees
 - Clinically integrated teaching increases knowledge, skills, attitudes and behaviour ^[1]
- Undergraduate trainees
 - Any form of teaching increases learner competency in EBM
 - No single method better than any other ^[2]

[1] Coomarasamy A, Khan K. What is the evidence that postgraduate teaching in evidence based medicine changes anything? A systematic review BMJ 2004;329: 1017.

[2] Ilic D, Maloney S. Methods of teaching medical trainees evidence-based medicine: a systematic review. Medical Education 2014; 48:124-135

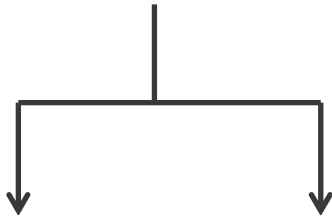
Background

- What is blended learning?
 - Attempts to create optimal learning style by ‘blending’ a variety of formats
- Non-EBM related blended learning trials report increase in student directed learning and knowledge
- Study aim
 - To examine the effectiveness of blended learning for teaching evidence-based medicine

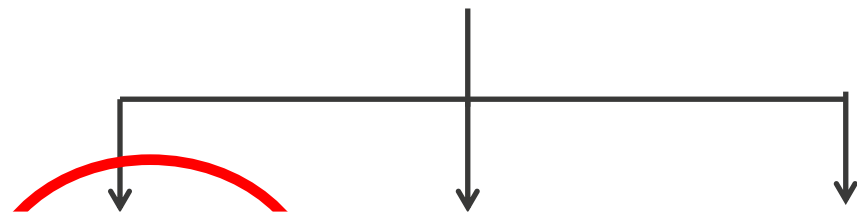
Methodology

MBBS is a 5 year undergraduate course and
4 year graduate course

Year 1-2 (A) university based



Years 3-5 (B-D) clinically based



EBM teaching begins

- Multi-campus study of 3rd year MBBS students at Monash University
- Undergraduate/graduate, Australian/Malaysian based, metropolitan/rural based students

Methodology: Randomised controlled trial

- Control (didactic)
 - 10 two-hour teaching sessions (lecture/tutorial)
- Intervention (blended learning)
 - Lectures – delivered online via clips
 - <https://www.youtube.com/user/EBMOLT>
 - Critical appraisal techniques
 - <http://guides.lib.monash.edu/c.php?g=219702&p=1452686>
 - Mobile learning
 - Application of EBM concepts on the ward
 - Tutorials
 - Class discussion of case presentations



Methodology: Randomised controlled trial

Outcomes

- Blinded assessment of EBM competency
 - Berlin questionnaire [3]
 - Assessing Competency in EBM (ACE) tool [4]
 - Self-efficacy, behaviours & attitudes on EBM [5]

[3] Fritsche L, et al. Do short courses in evidence based medicine improve knowledge and skills? Validation of Berlin questionnaire and before and after study of courses in evidence based medicine. *BMJ* 2002;325:1338-1341

[4] Ilic D, et al. Development and validation of the ACE tool: assessing medical trainees' competency in evidence based medicine. *BMC Medical Education* 2014;14:114.

[5] Upton D, Upton P. Development of an evidence-based practice questionnaire for nurses. *Journal of Advanced Nursing* 2006;53:454–8.

Methodology: qualitative component

- Focus group discussions with undergraduate and graduate-entry medical students
- Performed by same facilitator
- All focus groups digitally recorded and transcribed verbatim
- Thematic analysis performed independently by 2 researchers



Results

- Total of 497 students enrolled with 147 (30%) (45 graduate-entry and 102 undergraduate-entry students completing the outcome assessment
 - 63 students were placed at an Australia metropolitan hospital
 - 45 at an Australian rural hospital
 - 39 at a Malaysian-based hospital
- Six focus groups conducted with 29 students
 - 3 undergraduate groups
 - 1 graduate entry group
 - 2 Malaysian-based groups

Results

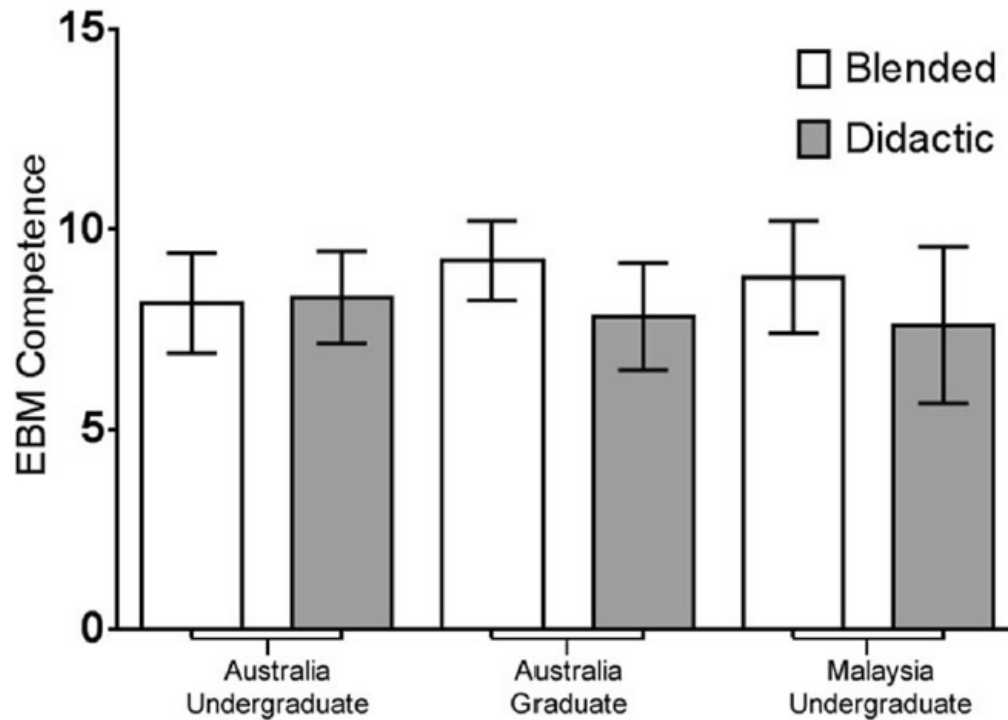


Figure 3 Comparison of EBM competency across students randomised to blended learning or didactic learning methodologies. EBM competency is assessed using the Berlin Questionnaire (mean score \pm 95% confidence interval).

Results

Blended learning associated with higher student self-efficacy, attitudes & behaviour

Question	Blended learning (Mean ± SD) n=44	Didactic learning (Mean ± SD) n=38	Mean difference (95%CI)
Practice of evidence-based practice			
1. How often have you formulated a clearly answerable question as the beginning of the process towards filling an information gap?	6.22 ± 0.16	4.21 ± 0.33	2.01 (1.29 to 2.73)*
2. How often have you tracked down the relevant evidence once you have formulated the question?	6.13 ± 0.20	5.05 ± 0.24	1.08 (0.45 to 1.7)*
3. How often have you critically appraised any literature you have discovered?	5.63 ± 0.27	4.26 ± 0.32	1.37 (0.52 to 2.2)*
4. How often have you integrated the evidence you have found with your activities?	5.72 ± 0.27	4.10 ± 0.28	1.62 (0.82 to 2.41)*
5. How often have you evaluated the outcomes of your EBCP practice?	5.50 ± 0.28	3.26 ± 0.36	2.24 (1.31 to 3.15)*
6. How often have you shared information that you've gathered with colleagues?	5.50 ± 0.34	4.78 ± 0.32	0.72 (-0.23 to 1.65)
Attitude towards evidence-based practice			
7. New evidence is so important that I make the time in my work schedule	5.09 ± 0.32	3.73 ± 0.21	1.36 (0.56 to 2.14)*
8. I welcome questions on my practice	6.09 ± 0.22	5.31 ± 0.18	0.78 (0.19 to 1.35)*
9. Evidence based practice is fundamental to professional practice	6.63 ± 0.12	6.15 ± 0.14	0.48 (0.09 to 0.85)*
10. My practice has changed because of evidence I have found	5.68 ± 0.21	5.10 ± 0.23	0.58 (-0.04 to 1.20)
Knowledge/skills associated with evidence-based practice			
11. How would you rate your research skills?	5.09 ± 0.21	3.73 ± 0.19	1.36 (0.78 to 1.92)*
12. How would you rate your IT skills?	5.68 ± 0.24	4.47 ± 0.22	1.21 (0.54 to 1.87)*
13. How would you rate your ability to monitor and review your EBCP skills?	5.22 ± 0.26	3.73 ± 0.20	1.49 (0.80 to 2.17)*
14. How would you rate your ability to convert your information needs into a clinical question?	5.95 ± 0.19	4.68 ± 0.15	1.27 (0.76 to 1.77)*
15. How would you rate your awareness of major information types and sources?	5.27 ± 0.25	5.26 ± 0.13	0.01 (-0.59 to 0.61)
16. How would you rate your ability to identify gaps in your professional practice?	4.81 ± 0.19	4.36 ± 0.20	0.45 (-0.12 to 1.02)
17. How would you rate your knowledge of how to retrieve evidence?	5.31 ± 0.24	4.94 ± 0.18	0.37 (-0.25 to 1.00)
18. How would you rate your ability to analyse critically evidence?	5.09 ± 0.20	4.15 ± 0.16	0.94 (0.40 to 1.46)*
19. How would you rate your ability to determine how valid (close to the truth) the material is?	5.00 ± 0.26	4.05 ± 0.19	0.95 (0.27 to 1.61)*
20. How would you rate your ability to determine how useful (clinically applicable) the material is?	5.68 ± 0.18	4.57 ± 0.12	1.11 (0.64 to 1.56)*
21. How would you rate your ability to apply information to individual cases?	5.40 ± 0.18	4.78 ± 0.17	0.62 (0.10 to 1.13)*
22. How would you rate your sharing of ideas and information with colleagues?	5.18 ± 0.27	4.84 ± 0.19	0.34 (-0.35 to 1.03)
23. How would you rate your dissemination of new ideas about care to colleagues?	5.31 ± 0.27	3.89 ± 0.16	1.42 (0.75 to 2.09)*
24. How would you rate your ability to review your own practice?	5.22 ± 0.24	4.15 ± 0.14	1.07 (0.47 to 1.66)*

*p-value < 0.05.

Results

- Blended learning preferred style of teaching

“It was like someone thinking out aloud, someone who knew what they were doing, so understood the thought process (...behind teaching EBM to students)”.

- Barriers to teaching EBM

“We are still learning to walk and yet they want us to run (in terms of applying EBM to the clinical context)”.

- Closing the theory to practice gap

“It’s not an abstract thing... I can see how it relates to medicine”

Discussion

- Blended learning is no more effective than didactic learning at increasing medical students' knowledge and skills in EBM
- Effective at increasing student attitudes toward EBM and self-reported use of EBM in clinical
- A multifaceted teaching approach with clinical integration is required
- Cost-effectiveness??
 - Maloney S, Nicklen P, Rivers G, Foo J, Ooi Y, Reeves S, Walsh K, Ilic D. A cost-effectiveness analysis of blended versus face-to-face delivery of evidence-based medicine to medical students. JMIR 2015;17:e182

Thank you

Thank you to co-investigators;

Ilic D, Nordin R, Glasziou P, Tilson J, Villanueva E. A randomised controlled trial of a blended learning education intervention for teaching evidence-based medicine. BMC Medical Education 2015;15:39

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