

**Background:** Manage mechanical ventilation (MV) is a complex skill that requires integration of knowledge and practical application to acutely ill patients. Limited real-life learning opportunities make teaching complex skills difficult.

**Objectives:** To evaluate effectiveness of a blended learning module in achieving medical students' knowledge and practical competence in MV operation.

**Methodology:** We performed a prospective cohort evaluation of the pedagogical effectiveness of an optional blended learning module on MV operation in two consecutive intake of final year medical students. The module consisted of e-learning - online pre-reading chapter (to introduce basic MV settings and physiology), online interactive cases and practice quizzes to be used with a MV simulator and a discussion forum on Moodle. (to facilitate scenario-based practice); as well as a one-hour face-to-face (FTF) tutorial (Figure 1-3).

Ethical approval has been obtained from the Survey and Behavioural Research Ethics Committee (SBREC) of The Chinese University of Hong Kong. Participants all provided Informed consent.

Students' MV knowledge and practical competence were evaluated. Two critical care educators, informed only of the syllabus outline, set the knowledge and skills assessments at a level expected of interns. Knowledge acquisition was evaluated by pre- and post-course multiple choice questions (MCQs) testing 10 domains of MV (Table 1). Two MCQs per domain with equal difficulty were randomized to the pre- and post-course test per student. Practical competence was evaluated by a 10-minute post-course skills test (Table 2).

Students' feedback on the usefulness of the course was surveyed.

**Results:** 179 (81%) final year medical student classes opted to participate in the final medical student classes of 2016/2017. Knowledge improved in every domain of MCQ test (McNemar's test, P-values varied from <0.001 to <0.03). Mean score (95% CI) increment 7.0 (0.8 to 13.1) improved to 32.6 (28.7 to 36.6) with FTF participation ( $p < 0.001$ ) (Table 3). Median skills test score was 8/10 (IQR 6.75 – 8.5).

Students rated course useful with median score of individual components 4-5 (IQR 4-5); 4 = agree, 5 = strongly agree (Table 4).

**Conclusion:** The blended learning approach with e-learning and one-hour FTF teaching was effective in teaching a complex skill, significantly improving students' knowledge and skills. The FTF component appeared to be crucial to performance, however we believe the preceding e-learning is also important because one-hour of FTF is insufficient to provide both the needed background as well as practical skills guidance.

Randomization of MCQs minimized differences in the difficulty of pre- and post-course tests. Assessment by blinded educators was designed to provide an impartial evaluation of the students' level of competence and therefore the modules pedagogical effectiveness.

Students showed high level of motivation to learn and the module was perceived to be useful.

This pedagogical approach may be useful for complex skills training in other topics.