Research in Education and Epidemiology

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Title: EFFECT OF EDUCATIONAL OBJECTIVES ON JUNIOR MEDICAL STUDENT LEARNING DURING TWO WEEK ANESTHESIA CLERKSHIPS.

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Introduction. Educational objectives have been used to enhance learning during short medical student anesthesia clerkships (1). Proponents claim objectives aid relevant learning, while critics say they encourage students to confine learning to specified objectives which inhibit incidental learning (2). The present study prospectively evaluated: 1) effect of enabling objectives on learning; 2) effect of objectives plus informational summary on learning.

Method. Neuromuscular blocking drugs (NBD), their pharmacology and blockade monitoring were chosen as the experimental subject areas. All students (N=38) received "traditional" instruction during the rotation consisting of: 1) clinical assignment in the operating room, rotating through different subspecialties, with multiple resident preceptors; 2) a copy of a standard anesthesia textbook (3); 3) specific reading assignments in the textbook including Neuromuscular Blocking Agents. Each group of third year medical students taking the required two week anesthesia clerkship was randomly assigned to one of three study groups: Group C (control) received no additional instruction regarding neuromuscular pharmacology or monitoring; Group O (objectives) was given enabling objectives during orientation on the first day of the rotation; Group OS (objectives plus summary) received the same objectives plus an informational summary on neuromuscular pharmacology prepared by the investigators. Enabling objectives were to: 1) develop a list of differential diagnoses when prolonged apnea complicates emergence from anesthesia; 2) understand the role of reversal agents; 3) gain familiarity with risk and side effects of neuromuscular blocking and reversal agents; 4) understand influence of concurrent medical conditions on NBD, their uptake, action, biotransformation and excretion. Two forms of a 14 item multiple choice test were created. The two forms (A and B) were interchanged as pre and posttests with the order of the forms alternated for consecutive students. Thus all students took both tests. The pretest was administered on day one of the rotation with the posttest given following clinical assignment. A comprehensive quarterly (8 to 10 weeks following the rotation) final exam with six items relating specifically to NBD and 59 items encompassing 18 additional subject areas was given to all students. T-tests for independent samples were used to evaluate equality of forms. Analysis of group differences on the posttest and comprehensive final exam was done using one factor analysis of covariance (pretest scores served as the covariate adjusting posttest scores for any pre-existing group differences). Group was used as the independent variable. Values are expressed as Mean±SEM.

Results. Scores of correctly answered items by all students for forms A and B were not statistically different (6.2±0.4 versus 6.2±0.4, respectively). Adjusted posttest scores for the Objectives only (O) and Objectives plus Summary (OS) groups were greater than the mean of the control group. Adjusted scores on the comprehensive final were not statistically different with respect to six items on NBD (Table 1). Results for all other questions were not significantly different (38.6±1.3, 39.8±1.4, 36.4±1.4 Groups C, O, OS, respectively).

Table 1. Raw Scores for Pre and Posttest and Adjusted Scores for Posttest and Comprehensive Final (Number Correct)

Group	N	Pretest (Raw)	Posttest (Raw)	Posttest (Adjusted)	Comprehensive (6 Item) Final (Adjusted)
C	13	5.3±0.4	6.6±0.3	6.4±0.4*	3.8±1.3
O	12	5.7±0.6	8.6±0.5	8.2±0.4*	4.0±1.1
OS	13	3.9±0.5	7.7±0.6	8.2±0.4	2.9±1.1

*p=0.006 O and OS versus C
C=Control, O=Objectives only, OS=Objectives plus Information Summary

Discussion. Students in groups that received enabling objectives or objectives and informational summaries learned more than the control group. By providing objectives, posttest scores and short-term learning was increased by 28 percent. Objectives and summaries enhance and stimulate the learning process. The addition of a specific information summary to objectives did enhance learning but does not appear to be superior to a well written textbook chapter. Discussion of enabling objectives in an active educational environment may stimulate short-term learning during the anesthesia rotation. Perhaps the quarterly final exam was an insensitive measure with too few questions concerning NBD or increases in knowledge were not retained during the time period following the anesthesia clerkships.

Conclusions. 1) Enabling objectives increase medical students' understanding of NBD, their pharmacology and monitoring during a two week anesthesia clerkship by 28 percent. 2) The addition of information summaries to objectives did not further increase knowledge.

References.

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