The Journal of Education in Perioperative Medicine

J Educ Perioper Med. 2000 Jan-Apr; 2(1): E013. PMCID: PMC4803379
Published online 2000 Jan 1.

Use of Key Words as an Adjunctive Learning Tool Improves Learning During a Perioperative Medicine Rotation for Anesthesiology Residents

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Presented in part at the 1999 American Society of Anesthesiologists annual meeting, October 7-13, 1999, Dallas, Texas

Abstract

Designing a successful block rotation for anesthesiology residents requires not only an appropriate curriculum but also a set of teaching tools, which promote learning. Traditional clinical rotations in Anesthesiology residencies emphasize clinical teaching, supported by interaction with staff. Since Perioperative Medicine is a non-traditional subject for anesthesia residents, we introduced a syllabus, and didactic curriculum to support clinical teaching. We hypothesized that the use of key words would enhance learning. Alternating groups of residents were assigned to receive key words, while control residents were expected to learn without key words. The key words were delivered in writing on the first day of the rotation and the syllabus was highlighted to identify the key words in the text. Pre and post-tests were administered to residents participating in the perioperative rotation. Learning was assessed by calculating the change in test scores. There was significantly more learning in the group given the key words. We conclude that key word designation improved learning in a rotation designed to teach perioperative medicine.

Keywords: Perioperative Medicine, learning, key words, teaching, Anesthesiology

INTRODUCTION

As Anesthesiology expands beyond the traditional borders of the operating room, so does the scope of teaching that must occur within Anesthesiology residencies. With increasing emphasis on care of patients before and after surgery, there has been movement toward the teaching of perioperative medicine, defined as the care of patients in the perioperative periods outside the confines of the operating room. This trend is further motivated by new curriculum requirements by the Residency Review Committee (RRC) for Anesthesiology of the American College of Graduate Medical Education (ACGME), which require the teaching of Perioperative Medicine during anesthesiology residency.

Along with the obligation to teach perioperative medicine comes the need to identify the best means to achieve such teaching. Traditionally, education in anesthesiology residencies places emphasis on case

contact combined with clinical teaching and interaction with staff. The teaching of perioperative medicine may not lend itself as readily to this approach as does operative anesthesia. The "teachable moment"(1) is a well-accepted model for adult learning, which requires the instructor to identify key events in a learning experience before the student enters this area. When the experience is encountered, learning is accentuated. This process readily applies to the traditional OR anesthetic. Looking for a way to identify these periods of optimum learning during a perioperative medicine rotation may require a different focus, designed to identify important information when maximum learning is likely(2).

We tested the hypothesis that providing a comprehensive syllabus, a didactic lecture series and identifying the most important learning points with a key word list would improve learning on a perioperative medicine rotation, compared to learning the same material without the key word list.

METHODS

A section of "Acute Perioperative Care" was created by identifying a group of faculty interested in clinical anesthesia care outside the operating room and willing to teach residents in a perioperative medicine rotation. The clinical responsibility of the section includes coverage of the pre-anesthesia consultation and evaluation clinic, the same day surgery unit, the in-house anesthesia consultation service and the post-anesthesia care unit (PACU). Anesthesia residents assigned to the section provide clinical care in these areas under the direct supervision of the Acute Perioperative Care faculty. The perioperative medicine rotation was established as a CA-1 (clinical anesthesia – year one) block rotation, assigned within the first 6 months of training. In a training program that is organized in a four-week module structure, this rotation occupies two consecutive modules.

A mandatory one hour didactic session held three days a week was set up as a formal teaching component of the rotation. The mid-morning (9:00- 10:00 AM) time was selected for this session in order to avoid conflict with the busy clinical activity of the section. The staff member assigned to medically supervise the PACU is responsible for teaching these sessions. The topics are standardized by means of a teaching schedule (table 1), which is published for each 8-week module. The content of the schedule does not change from one rotation to the next. Teaching sessions are complemented by a syllabus that contains guidelines for clinical care in each area, written material for each of the teaching sessions and an annotated bibliography.

All residents starting an 8 week module (3 residents at a time) were assigned to one of two groups, with group assignment was alternating sequentially. The control group received the written teaching materials. The study group received an additional document identifying 75 key words that were also highlighted in the syllabus. The keyword list and the highlights in the syllabus were identified to study group residents as important elements of learning for the rotation. All residents received a pre-test on the first day of the rotation, which consisted of 75 A-type (one best correct answer of five choices). All question material and answers were taken from the syllabus material. The learning objective for each question was created from material within the keyword list, and used to write a question, in a manner analogous to the method used by question writers of the Joint Council on In-Training Examinations. This same examination was administered on the last day of the rotation. Individual examination answer sheets were coded and sealed until the conclusion of the study. The residents were told that the examination was being administered for research purposes and not for formal evaluation, that their responses would be kept anonymous, and that

part of the study conditions required that they not know the details of the protocol.

When the study was completed, the examinations were scored, and the code used to identify groups and to match pre-test with post-test for each individual. The number of correct answers on the pre-test was subtracted from the number of correct answers on the post-test and the difference was assumed to represent learning. Differences between groups was measured with paired Student's t-test, and considered significant at $p<0.05$.

RESULTS

During an 18-month period, 25 residents completed the study, 13 in the control group and 12 in the study group. The average length of training at the start of the rotation (6.6 vs. 6.4 months, respectively) was not significantly different between groups, nor was the number of residents with prior training in anesthesiology prior to entering the residency (2 vs. 3, respectively). Compared with controls, the average post-test score in the study group and the average level of learning in the study group were significantly greater ($p=0.012$). The test results for each resident are contained in Table 2.

DISCUSSION

The results of this study suggest that the use of keywords as a method to maximize learning within a subspecialty curriculum for junior anesthesia residents is effective. Key words identify information for the resident, which he or she needs to target for learning. Teachers can help adult learners by establishing priorities for learning in a setting of high level stimulation, thereby allowing the learner to identify where to focus their attention in a clinical setting. This increases learning by placing emphasis on important information during times when the potential for learning is maximal(2).

Physicians recognize the overwhelming burden of information in the medical literature, and actively request delivery of focused information(3,4). Optimum learning requires that the teacher help the learner identify points of emphasis(5), which in turn, increases learning in these areas(6). Faculty generally possess sufficient experience that allows them to identify practical knowledge useful for solving clinical problems. Transmission of such knowledge to residents facilitates the latters' learning efficiency(7). Identifying key words from among a large amount of didactic material represents one way by which faculty can function in this manner.

It may be that the use of key words improves learning more in non-traditional rotations within anesthesiology than in the operative environment. Operating room teaching focuses on case management. The clinical case experience may be an excellent means to identify important areas for learning, since performance and knowledge are intimately related. Because patient volume is higher and contact with each patient less intense in perioperative medicine compared with operative anesthesia, the key learning elements may not be as obvious and learning may be improved by key words.

The use of a clinically based examination has been shown to be a valid tool for the assessment of learning, capable of distinguishing which among many elements are most contributory to learning(8). The examination used in this study appears to be a reasonable measurement tool, since the mean scores (percent correct answers) of our two groups are in the range of other clinical exam results used to evaluate physician learning(9). Test performance has been shown to be a reliable predictor of clinical performance

in anesthesiology residents(10), although scores do not reflect clinical performance in other areas of medicine(11) or medical school(12). The value of test results in predicting the clinical performance of anesthesiologists may reflect the requirement for intense preparation for each case in the operating room(10). The increased focus and intensity of learning promoted by the key words strategy could therefore have created conditions similar to a case based learning experience and resulted in greater learning efficiency.

In conclusion, we found the use of key words as a supplemental learning tool to clinical teaching, didactic teaching, and a written syllabus improved learning in junior anesthesia residents during a perioperative medicine rotation.

Acknowledgments

From the Boston Center for Medical Simulation, Boston, MA

Financial support provided by the Department of Anesthesia, Beth Israel Deaconess Hospital, Department of Anesthesia and Perioperative Medicine, Brigham and Women's Hospital, Department of Anesthesia, Children's Hospital Medical Center, Department of Anesthesia and Critical Care, Massachusetts General Hospital

Teleconferencing Equipment provided by GE Marquette Medical Electronics, Inc.

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Figures and Tables

Table 1

Perioperative Medicine Teaching Schedule

Day	Date	Teaching Session #	Topic
Tuesday		1	Basic Preoperative Assessment
Wednesday		2	Admitting a Patient to the PACU
Thursday		3	Nausea and Vomiting
Tuesday		4	Preoperative Assessment for Regional Anesthesia
Wednesday		5	Circulatory Physiology and Hemodynamic Monitoring
Thursday		6	Acute Pain in the PACU
Tuesday		7	Preoperative Assessment of Cardiac Disease
Wednesday		8	Anesthesia for Electroconvulsive Therapy
Thursday		9	Arrhythmia
Tuesday		10	Preoperative Assessment of Pulmonary Disease
Wednesday		11	Ventilation/Oxygenation/ABG interpretation
Thursday		12	Carotid Artery Disease
Tuesday		13	Preoperative Assessment of Neurological Disease
Wednesday		14	Emergency Airway Management
Thursday		15	Ethics in Anesthesiology
Tuesday		16	Asthma
Wednesday		17	Hypovolemia
Thursday		18	Rheumatoid Arthritis
Tuesday		19	Aspiration Prophylaxis
Wednesday		20	Perioperative Risks after Myocardial Infarction
Thursday		21	Pediatric PACU Care

Tuesday		22	Preoperative Assessment of Endocrine Disease
Wednesday		23	Hypothermia
Thursday		24	Anesthetic Implications of Chemotherapy

PACU = Post Anesthesia Care Unit

Table 2

Examination Results: Number of Correct Answers

	Control (n=13)			**Study (n=12)**		
	Pre-Test	*Post-Test*	*Improvement*	*Pre-Test*	*Post-Test*	*Improvement*
1	39	40	1	53	55	3
2	45	54	9	44	56	8
3	52	55	3	42	55	13
4	49	50	1	55	57	2
5	48	50	2	45	55	10
6	50	50	0	55	59	4
7	54	52	2	57	58	1
8	59	59	0	56	57	1
9	48	48	0	60	63	3
10	49	56	7	48	57	9
11	56	56	0	58	65	7
12	50	51	1	51	55	4
13	62	54	-8			
Mean (SEM)	50.8 (1.6)	51.9 (1.3)	1.3 (1.1)	52 (1.7)	57.6 (0.9)[#]	5.5 (1.2)[*]

SEM = Standard Error of the Mean

[*]P<0.001 vs. control
[#]P<0.012 vs. control

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