

การเปรียบเทียบกระบวนการสอนระหว่างวิธีการสอนโดยใช้ปัญหาเป็นฐานกับการสอนด้วยสถานการณ์จำลองในการเรียนเชิงปฏิบัติการเรื่องการบริหารจัดการภาวะทางเดินหายใจยาก

ปาริชาติ อภิเดชกุล*, พงศ์ธารา วิจิตเวชไพศาล*, ชัชวราภรณ์ จิระติวานนท์*, เบนจรรย์รัตน์ หยกอุบล*, ภาวิทย์ สุทนต์*, สุทธิพล อุดมพันธุรักษ์**

*ภาควิชาวิสัญญีวิทยา, คณะแพทยศาสตร์ศิริราชพยาบาล, มหาวิทยาลัยมหิดล, กรุงเทพฯ 10700

**สำนักงานส่งเสริมการวิจัย, คณะแพทยศาสตร์ศิริราชพยาบาล, มหาวิทยาลัยมหิดล, กรุงเทพฯ 10700

A Comparison of Learning Process between Problem-based and Simulation-based Method in Difficult Airway Management Workshop

Parichad Apidechakul*, Phongthara Vichitvejpaisal*, Tachawan Jirativanont*, Bencharatana Yokubol*, Phawan Suthon*, Suthiphol Udompandurak**

Department of Anesthesiology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700

Office of Research Promotion, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700

บทนำ: การเรียนและการสอนเกี่ยวกับการบริหารจัดการทางเดินหายใจเป็นสิ่งจำเป็นในวิสัญญีวิทยา วิธีการเรียนรู้โดยใช้ปัญหาเป็นฐานและการใช้สถานการณ์จำลองมีคุณสมบัติที่โดดเด่นในด้านกระบวนการเรียนการสอนและเนื้อหาการเรียนรู้อุณหภูมิของผู้สอนและผู้เรียนเกี่ยวกับวิธีการเรียนรู้ทั้งสองวิธีนี้จะช่วยสะท้อนอนาคตของการฝึกอบรมวิสัญญีพยาบาล

วัตถุประสงค์: เพื่อเปรียบเทียบความคิดเห็นของผู้สอนระหว่างการเรียนรู้ด้วยการใช้ปัญหาเป็นฐานและการใช้สถานการณ์จำลอง และเปรียบเทียบความคิดเห็นผู้เรียนต่อวิธีการสอนทั้งสอง

วิธีการศึกษา: การศึกษาเชิงสำรวจโดยใช้แบบสอบถามในกลุ่มวิสัญญีแพทย์ผู้สอน 10 คนและนักศึกษาวิสัญญีพยาบาล 37 คน ภายหลังจากการแบ่งชั้นและจัดหน่วยตัวอย่างเข้ากลุ่มแบบสุ่มของนักศึกษาวิสัญญีพยาบาลเพื่อเข้าร่วมกลุ่มคู่ขนานในการใช้สถานการณ์จำลองหรือการใช้ปัญหาเป็นฐานในการเรียน และ 6 สัปดาห์ต่อมาได้มีการสลับกลุ่มวิธีการเรียนการสอนในเนื้อหาเดิม ผู้เรียนและผู้สอนตอบคำถามตามมาตรวัดลิเคิร์ต 4 ระดับสำหรับวิธีการสอนทั้งสองวิธี มีการสอบถามผู้สอนในด้านเกี่ยวกับเนื้อหาของ

Introduction: Teaching and learning in airway management are essential in the anesthetic field. Problem-based and simulation-based learning manifests the superior benefit of the instructional process and learning content. The teachers' and students' viewpoints on these two learning methods would help to reflect the future setting of the anesthesia training program.

Objective: To compare the teachers' viewpoints on problem-based and simulation-based learning, and to compare students' viewpoints on these two learning techniques.

Methods: A prospective, questionnaires-based study was performed amongst 10 anesthesiologists and 37 Nurse student anesthesia. After stratified random assignment, students simultaneously attended either simulation-based learning (SBL) or problem-based learning (PBL) course one at a time. Six weeks later, a crossover technique was applied to both groups. Teachers and students responded to 4-point Likert scale for these two learning methods. Teachers' questionnaires were based on the learning contents; while, students' matters comprised learning content, process, and evaluation.

Correspondence to: Phongthara Vichitvejpaisal, M.D., Ph.D. (Educational Evaluation), E-mail: Phongthara@gmail.com

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การเรียนสอน และสอบถามผู้เรียนเกี่ยวกับเนื้อหากระบวนการและการประเมินผลการเรียนรู้

ผลการศึกษา: กระบวนการเรียนด้วยวิธีสถานการณ์จำลองมีความแตกต่างกับการใช้ปัญหาเป็นฐานอย่างมีนัยสำคัญทางสถิติ (2.7 ± 0.3 vs 2.6 ± 0.4 ; $p=0.024$) แต่ไม่พบความแตกต่างในด้านเนื้อหาและเทคนิคการประเมินผลของวิธีการเรียนการสอนทั้งสองในมุมมองของผู้เรียน ในทางกลับกัน มุมมองของผู้สอนพบความแตกต่างในการตรวจประเมินภาวะทางเดินหายใจยากอย่างมีนัยสำคัญทางสถิติ (1.5 ± 0.6 vs 2.6 ± 0.4 ; $p=0.01$) และการติดตามผู้ป่วยหลังเกิดภาวะวิกฤตด้วยวิธีการใช้ปัญหาเป็นฐาน (1.9 ± 0.7 vs 2.5 ± 0.4 ; $p=0.03$)

สรุป: ด้านเนื้อหาการเรียนรู้ กระบวนการเรียนรู้และการประเมินผล กลุ่มผู้เรียนแสดงความพึงพอใจต่อกระบวนการสอนด้วยวิธีการใช้สถานการณ์จำลอง ในขณะที่กลุ่มผู้สอนแสดงความพึงพอใจต่อการตรวจประเมินภาวะทางเดินหายใจยาก การติดตามผู้ป่วยหลังเกิดภาวะวิกฤตมากกว่า การเตรียมอุปกรณ์สำหรับการจัดการทางเดินหายใจยากและวิธีในการบริหารทางเดินหายใจยากด้วยวิธีการใช้ปัญหาเป็นฐาน

คำสำคัญ: ทัศนศึกษา, การใช้ปัญหาเป็นฐาน, การเรียนโดยใช้สถานการณ์จำลอง

Results: The learning process of SBL showed statistically significant differences as compared to PBL (2.7 ± 0.3 vs 2.6 ± 0.4 ; $p=0.024$). However, there were no significant differences in term of content and evaluation techniques of the two learning methods amongst students. On the other hand, the staff showed a statistically significant difference in the evaluation of the airway (1.5 ± 0.6 vs 2.6 ± 0.4 ; $p=0.01$) and follow up care (1.9 ± 0.7 vs 2.5 ± 0.4 ; $p=0.03$) by means of PBL.

Conclusions: Amongst Learning content, process and evaluation, students showed their favor of the Learning process under SBL. Whereas, staff revealed that the Evaluation of the airway and Follow up care other than Patient preparation and Strategic planning, had priority by means of PBL.

Keywords: Anesthesia, Problem-based learning, Simulation-based learning

Introduction

Currently, teachers have emphasized the instructional strategies and enthusiasm in critical thinking to students to understand the educational course.¹⁻⁴ As mentors, they search for innovative teaching models to reach the learning target.⁵ In anesthesia, a training program of nurse student anesthesia involves several teaching methods such as seminars, journal clubs, interesting cases as well as topic, didactic, simulation and problem-based learning.^{6,7}

Simulation-based learning in medicine utilizes aides such as manikins or actors to replicate clinical scenarios. It yields the acquisition of skills through deliberate practice rather than an apprentice style of learning,⁸ While, problem-based learning is a small group discussion where students are active, learner-centered, or self-directed learning to the topic

assignments. Teachers play a role as moderators or facilitators.⁷⁻⁹

Teaching and learning in airway management are essential in the anesthetic field. The personnel needs to be keen both basic and advanced knowledge owing to its applications to the benefits of patients' life. At present, the diversity of learning techniques such as problem-based learning (PBL) and simulation-based learning (SBL) allows sophisticated devices as an interactive learning tool to cope with all difficulties in details.

Nevertheless, neither PBL nor SBL manifests the superior benefit of instructional process and learning content. Ken Lee Chin, et al. (2014) concluded that simulation was superior to case-based learning in teaching diabetic ketoacidosis and thyroid storm to the final-year, undergraduate pharmacy students.¹⁰ Randolph H, et al. (2006) revealed that students who

learned critical assessment and management skills using full-scale, high-fidelity simulation, performed better than students who acquired similar skills in an interactive problem-based learning format.¹¹

As either PBL or SBL on difficult airway management is based upon the same table of specifications and experienced instructors. We would like to compare the teachers' viewpoints on PBL and SBL and to compare students' viewpoints on these two learning methods. All attitudes would help to reflect the future setting of instructional concerns of the anesthesia training program.

Methods

After Siriraj IRB approval COA 369/2558(EC3), this study was registered on the ClinicalTrials.gov website (NCT02993393). A prospective, questionnaires-based study was performed amongst the entire population of teachers and students in Academic Year 2015, Department of Anesthesiology, Faculty of Medicine Siriraj Hospital, Mahidol University. After signing informed consent, 37 volunteered nurse student anesthesia and 10 anesthesiologists were included to the study. The inclusion criteria for teachers were anesthesiologists involving in SBL and PBL with more than 3 years of teaching experience. Students were nurse student anesthesia who were studying in the academic years 2015. The exclusion criteria of both groups were ones who did not fit all qualifications.

The one-day workshops for difficult airway management were performed simultaneously between PBL and SBL. After stratified random assignment each ten of nurse student anesthesia attended either SBL or PBL course one at a time. Six weeks later, a crossover technique was applied to both groups. At the end of project, teachers and students responded to Likert's scale questionnaires.

The self-reported teachers' questionnaire based on the learning contents of difficult airway management workshop, consisted of 4 parts: airway evaluation (history taking and physical examination), patient preparation (equipment and experienced helpers),

strategic planning (facemask ventilation, supraglottic airway device, laryngoscopy, tracheal intubation and failed intubation) and follow up care (documentation and informative advice) for both PBL and SBL methods. On the other hand, the self-reported students' questionnaires comprised 3 parts: learning content, process and evaluation for these two learning methods. Four-point Likert scale questionnaires comprised: 4 = very suitable, 3 = suitable, 2 = unsuitable, 1 = very unsuitable.

Three board-certified anesthesiologists having at least ten-year experience in anesthesia and being not involved in the project determined the correctness and appropriateness of the questionnaires (content and face validity). The tryouts on students' and teachers' matters were performed in ten novice nurse anesthetists and five anesthesiologists respectively. In addition, the index of item-objective congruence was 0.80 and 0.82 with Cronbach's Alpha of 0.97 and 0.92 correspondingly. Data were expressed as percentage, mean and standard deviation. Investigators applied student t-Test and Cohen's d^2 effect size for data analysis at the significant level of 0.05 with 95% confident interval.

Results

The demographic characteristics revealed that most nurse student anesthesia aged between 25-30 years, whereas anesthesiologists were over 40 years old. The 92.5% of nurse student anesthesia had less than 1 year of experience in anesthesia services, while 90% of anesthesiologists had more than 10 years. More than 50% of students had ever come across the situation of difficult intubation, ventilation and airway management in less than 3 times; though doctors had more than 10 times. The 65% of students joined both learning courses less than 3 times; whereas 50% SBL and 20% PBL staff had more than 10 times (Table 1).

The nurse student anesthesia responded to the questionnaires for SBL and PBL method as follows: learning contents, 2.6 ± 0.4 and 2.6 ± 0.4 , Learning Process 2.7 ± 0.3 and 2.6 ± 0.4 , and Learning Evaluation 2.6 ± 0.4 and 2.6 ± 0.4 respectively (Table 2).

However, the instructors responded to the questionnaires for SBL and PBL method as follows: evaluation of the airway 1.5±0.6 and 2.6±0.4, basic preparation of difficult airway management 2.6±0.8 and 2.4±0.7, strategic intubation of difficult airway 2.5±0.4 and 2.4±0.6, and follow-up care 1.9±0.7 and 2.5±0.4 respectively (Table 2).

There were no statistically significant differences in term of learning content and learning evaluation of the

two methods amongst students. However, the learning process of SBL showed the significant difference as compared to PBL with the small effect size of 0.33. On the other hand, the staff showed a statistically significant difference on evaluation of airway and follow up care of PBL with the large effect size of 2.01 and 1.05 respectively.

Table 1 Participants' characteristics

Participants' characteristics	Nurse student anesthesia N=37			Anesthesiologist N=10				
	Age (yr)	25-30 (75%)	31-35 (25%)	>35 (0%)	31-35 (10%)	36-40 (40%)	>40 (50%)	
Experienced in anesthesia (yr)	<1 (92.5%)	1-5 (7.5%)	>10 (0%)	5-10 (10%)		>10 (90%)		
Difficult airway management experienced (times)	<3	3-5	5-10	>10	<3	3-5		
Difficult intubation last 1 year	50%	17.5%	5%	27.5%	10%	40%	10%	40%
Difficult ventilation last 1 year	57.5%	30%	7.5%	5.0%	40%	30%	20%	10%
Self management in difficult airway last 1 year	80%	17.5%	2.5%	0%	10%	40%	10%	40%
Teaching and learning experienced (times)	<3	3-5	>10	<3	3-5	5-10		
Simulation based learning	67.5%	30%	2.5%	10%	10%	30%		
Problem based learning	82.5%	17.5%	0%	40%	20%	20%		
American Society of Anesthesiology for practice guideline 2013	82.5%	17.5%	0%	20%	40%	40%		

Table 2 Participants' point of view for SBL and PBL methods

	Method						ES	P value
	SBL			PBL				
	Mean	SD	n	Mean	SD	n		
Nurse student anesthesia								
Learning Content	2.6	0.4	37	2.6	0.4	37	0.16	0.195
Learning Process	2.7	0.3	37	2.6	0.4	37	0.33	0.024*
Learning Evaluation	2.6	0.3	37	2.6	0.4	37	0.55	0.160
Anesthesiologists								
Evaluation of the airway	1.5	0.6	10	2.6	0.4	10	2.01	0.01*
Basic preparation	2.6	0.8	10	2.4	0.7	10	0.31	0.5
Strategy of intubation	2.5	0.4	10	2.4	0.6	10	0.33	0.5
Follow up care	1.9	0.7	10	2.5	0.4	10	1.05	0.03*

Variables of significance different (*p ≤ 0.05)

SBL= Simulation based learning, PBL=problem-based learning, ES= Cohen's *d*² effect size

Discussion

According to students' viewpoints, there were no statistically significant differences in term of content and evaluation techniques of the two methods. However, the learning process of SBL showed significant difference as compared to PBL. The SBL might yield an easy way for students to reach a psychomotor domain of core knowledge. Thus 'learning by doing' was practically to break through their ignorance. In addition, SBL yielded benefits with student satisfaction that depended on the use of high- fidelity simulation in anesthesia nursing education.¹²

These findings agreed with Steadman RH, et al. (2006) who claimed that SBL was better than PBL in critical assessment and management skills. Szogedi I. (2012) and Smithburger PL, et al. (2012) revealed that simulation served as a 'bridge' between classroom learning and the students gaining real clinical experiences in a safe environment. They could adopt the new information to their current knowledge and achieve retention freely.^{13,14} In addition, Couto TB, et al. (2015) stated that simulation was being closer to reality and remaining a non-threatening learning experience.¹⁵ It seemed that this practice-based studying followed the adult learning theory when learners related their experience to practice.

On the other hand, the staff showed statistically significant difference in the evaluation of the airway and follow up care by means of PBL. It simply implied that these two topics might not be easy to set up in a low fidelity manikin but standardized patients (SPs). Since SPs could lively response in a real-time fashion, students were able to fulfill their assignments, e.g. airway evaluation or counselling scenario.

This supported by Chen C, et al. (2007) who created PBL into the physical examination and let their students face patients in a clinical setting.¹⁶ However, McFetrich J, et al. (2006) in a structured literature review on the use of high fidelity patient simulators for teaching in emergency medicine, claimed that the simulators did not meet mental side, expression and reality in patient care.¹

Accordingly, PBL enhanced educational activity in class by improved application of theory and increased learning motivation.¹⁸ The way of learner's attitude translation should be communicated deeply in details particularly on written matters. The information was required to prove as well-documented materials.^{19,20} Consequently, this data would become the evidence-based directions to be used as an educational reference. Significantly, the situation in clinical practice should be transferred directly and sincerely to the patients.¹⁹ Koenig HM (2010) and Kadis J, et al. confirmed this topic in their studies regarding difficult airway management. They claimed that the difficult airway information should be in written notification with standardized documentation in order to minimize the uneventful situation and stress of future healthcare providers who dealt with cases.¹⁹⁻²⁰ The research method used only questionnaire-based, and it was difficult to include the participants who were med our research criteria at that moment. For these 2 reasons we decided to perform the primary investigation for two learning methods with questionnaire-based study in the entire population of teachers and students in our training center. For further study, the comparison between these two learning methods should be conducted between training center in Thailand and the qualitative study should be performed for detail oriented of the data.

Conclusions

Amongst learning content, process, and evaluation, students showed their favor of the learning process under SBL. Whereas, staff revealed that the evaluation of the airway and follow up care other than patient preparation and strategic planning, had priority by means of PBL. All attitudes helped to reflect the future setting of the anesthesia training program.

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