

ความมั่นใจและความถูกต้องของนักศึกษาแพทย์ในการใส่ท่อช่วยหายใจและการฉีดยาชาเข้าช่องน้ำไขสันหลัง

ศศิگانต์ นิมมานรัชต์

Confidence of Medical Students Performing Endotracheal Intubation and Spinal Anesthesia and Accuracy of Their Practices.

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บทคัดย่อ:

วัตถุประสงค์: การใส่ท่อช่วยหายใจและการฉีดยาชาเข้าช่องน้ำไขสันหลังเป็นหัตถการที่นักศึกษาแพทย์ต้องฝึกเพื่อให้สามารถทำได้ การศึกษานี้มีจุดประสงค์เพื่อประเมินความมั่นใจและความถูกต้องในการทำหัตถการ และเพื่อทราบจำนวนครั้งของการทำหัตถการที่นักศึกษาแพทย์ต้องการเพื่อให้เกิดความมั่นใจ

วัสดุและวิธีการ: หลังจากที่นักศึกษาแพทย์ได้ทำหัตถการภายใต้ความควบคุมดูแลของอาจารย์วิสัญญีแพทย์แล้ว นักศึกษาแพทย์จึงกรอกข้อมูลในแบบประเมินความมั่นใจในการทำหัตถการแต่ละขั้นตอน และอาจารย์วิสัญญีแพทย์ผู้ควบคุมกรอกข้อมูลในแบบประเมินความถูกต้องของแต่ละขั้นตอนในการทำหัตถการ

ผลการศึกษา: นักศึกษาแพทย์ตอบแบบประเมินความมั่นใจในการใส่ท่อช่วยหายใจจำนวน 155 ชุด และแบบประเมินความมั่นใจในการฉีดยาชาเข้าช่องน้ำไขสันหลังจำนวน 124 ชุด นักศึกษาแพทย์ส่วนใหญ่มีความมั่นใจในระดับปานกลางถึงมากในแต่ละขั้นตอนของการทำหัตถการทั้งสอง อาจารย์วิสัญญีแพทย์มีความเห็นว่านักศึกษาแพทย์ส่วนใหญ่ทำหัตถการทั้งสองตามขั้นตอนได้อย่างถูกต้อง นักศึกษาแพทย์ต้องการทำแต่ละหัตถการ 10 ครั้ง เพื่อให้เกิดความมั่นใจเพียงพอ

สรุป: การศึกษานี้บ่งชี้ว่าต้องเพิ่มเวลาและเครื่องมืออุปกรณ์เพื่อให้นักศึกษาแพทย์ได้ฝึกปฏิบัติการใส่ท่อช่วยหายใจและการฉีดยาชาเข้าช่องน้ำไขสันหลัง เพื่อให้มีความมั่นใจเพียงพอ

คำสำคัญ: การฉีดยาชาเข้าช่องน้ำไขสันหลัง, การใส่ท่อช่วยหายใจ, ความถูกต้อง, ความมั่นใจ, นักศึกษาแพทย์

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Abstract:

Objective: Endotracheal intubation and spinal anesthesia are essential skills required for each medical student. This study was conducted to assess the confidence and accuracy of medical students in performing these two procedures as well as to evaluate how many cases they require in order to achieve an adequate level of confidence.

Material and Method: After performing either endotracheal intubation or spinal anesthesia in patients under supervision, medical students completed a checklist related to their confidence while their supervisors completed a checklist concerning their procedure accuracy.

Results: One hundred and fifty-five endotracheal intubation questionnaire and 124 spinal anesthesia questionnaires were filled in. The majority of the medical students had moderate to maximal level of confidence in performing each step of endotracheal intubation and spinal anesthesia. From the staff's point of view, the majority of the medical students performed each step of endotracheal intubation and spinal anesthesia correctly. The medical students perceived that they required the performance of 10 endotracheal intubations and 10 spinal anesthesia procedures in order to reach an adequate level of confidence.

Conclusion: This study draws an attention to the need to increase the time and materials for medical students to practice endotracheal intubation and spinal anesthesia to a level that they will be sufficiently confident.

Keywords: accuracy, confidence, endotracheal intubation, medical students, spinal anesthesia

Introduction

Medical education in Thailand consists of 6 years of medical school and an additional year of internship. In our institution, the medical students are taught how to carry out endotracheal intubation and spinal anesthesia when they are in year 5 of medical school and doing their rotation at the Department of Anesthesiology for a period of 5 days. On the first day of their rotation, they are taught to perform these two procedures on manikins; one for endotracheal intubation and the other for spinal anesthesia. On the second day, they perform these two procedures under supervision on patients scheduled for elective surgery. Each of the medical students is required

to complete at least one endotracheal intubation and one spinal anesthesia.

Endotracheal intubation and spinal anesthesia are essential skills required for each medical student. Endotracheal intubation is a basic skill to save patients' lives. Even though spinal anesthesia is not as vital as endotracheal intubation, lumbar puncture is a procedure that each medical student should be able to perform for the diagnosis of some neurological disorders.

This study was conducted to assess the confidence and accuracy of medical students in performing endotracheal intubation and spinal anesthesia as well as to evaluate how many cases they require in order to achieve an adequate level of confidence.

Material and Method

After performing either endotracheal intubation or spinal anesthesia in patients under supervision, medical students completed a checklist related to their confidence while their supervisors (anesthesiology staff) completed a checklist concerning their procedure accuracy. All of the checklists are presented in the results section.

The data were analyzed and reported in terms of median and range, mean±S.D. or percentage.

Results

One hundred and fifty-five endotracheal intubation questionnaires and 124 spinal anesthesia questionnaires were filled in. Concerning endotracheal intubation, the mean age of the patients was 42.5±13.8 years. The mean values of weight, height and body mass index (BMI) were 58.3±10.4 kg, 156.8±12.1 cm and 23.5±3.6 kg/m², respectively. The majority of the patients (58.7%) were American Society of Anesthesiologists (ASA) class II, while 36.8% and 4.5% were ASA class I and III, respectively. The majority of the medical students performed only one endotracheal intubation (median 1, range 1-3).

In relation to spinal anesthesia, the mean age of patients was 41.2±16.8 years. The mean

values of weight, height and BMI were 63.4±10.9 kg, 159.6±8.1 cm and 24.5±3.9 kg/m², respectively. About half of the patients (54.6%) were ASA class II, while 41.2%, 3.4% and 0.8% were ASA class I, III and IV, respectively. The majority of the medical students performed one spinal anesthesia (median 1, range 1-4).

The airway assessment and laryngoscopic view classification are presented in Table 1. The confidence of the medical students performing each step of endotracheal intubation is demonstrated in Table 2. The accuracy of each step evaluated by the anesthesiology staff is demonstrated in Table 3.

Table 4 shows the confidence of the medical students performing each step of spinal anesthesia, while Table 5 shows their accuracy during each step of spinal anesthesia, assessed by the anesthesiology staff.

There were 86.9% of medical students who could perform endotracheal intubation successfully, while 59.8% of them were able to perform spinal anesthesia successfully. The medical students perceived that they required the performance of 10 endotracheal intubations (median 10, range 2-150) and 10 spinal anesthesia procedures (median 10, range 2-150) in order to reach an adequate level of confidence.

Table 1 Airway assessment and laryngoscopic view classification (percentage)

	Mallampati classification	Upper lip bite test	Laryngoscopic view
1	37.5	79.2	62.4
2	44.1	19.4	30.1
3	15.1	1.4	7.5
4	3.3	-	-

Table 2 Confidence of medical students performing each step of endotracheal intubation

Steps of endotracheal intubation	Confidence level (percentage)				
	Minimal	Low	Moderate	High	Maximal
Hold handle of laryngoscope correctly	0	1.3	17.4	46.5	34.8
Open mouth using cross-finger technique	0	2.0	20.6	47.1	30.3
Insert laryngoscope by deviating tongue aside and lifting it upward	0.6	7.7	43.9	36.8	11.0
Insert endotracheal tube using aseptic technique	0.6	3.2	28.4	49.7	18.1
Blow cuff of endotracheal tube with minimal volume	0.7	8.5	27.9	51.9	11.0
Check position of endotracheal tube by listening to lungs	0	0.6	14.3	48.1	37.0
Identify depth of endotracheal tube and fix tube with plaster	0	1.3	17.4	50.3	31.0
Listen to lungs again after fixing endotracheal tube	0	1.9	20.3	51	26.8

Table 3 Accuracy of each step of endotracheal intubation performed by medical students as evaluated by anesthesiology staff

Steps of endotracheal intubation	Did not do (%)	Did incorrectly (%)	Did correctly (%)
Assemble handle with laryngoscope blade correctly	22.4	1.4	76.2
Handle laryngoscope correctly	0	1.4	98.6
Open mouth using cross-finger technique	0	3.4	96.6
Insert laryngoscope by deviating tongue aside and lifting it upward	0.7	12.8	86.5
Insertion of endotracheal tube	2.0	5.4	92.6
Check leakage of endotracheal tube cuff	6.8	5.4	87.8
Check position of endotracheal tube by listening to lungs	0	0.7	99.3
Fix endotracheal tube with plaster	5.4	3.4	91.2
Define depth of endotracheal tube	6.8	2.7	90.5

Table 4 Confidence of medical students during each step of spinal anesthesia

Steps of spinal anesthesia	Confidence level (percentage)				
	Minimal	Low	Moderate	High	Maximal
Position patient correctly and palpate the correct space	0	3.3	30.6	50.8	15.3
Clean hands	0	0	3.2	26.6	70.2
Put on sterile gloves	0	0.8	1.6	29.1	68.5
Paint antiseptic solution on patient's back	0	0.8	13.1	32.8	53.3
Put dressing with hole in the middle on patient's back	0	1.7	9.8	45.1	43.4
Prepare medication and a spinal needle					
- Check type of medication	0	0.8	16.5	40.5	42.2
- Check expiration date	0	0.8	9.1	40.5	49.6
- Check spinal needle	1.6	0.8	15.6	36.9	45.1
Wipe off antiseptic solution	0.8	5.7	18.9	41.0	33.6
Palpate the correct space	3.3	8.9	38.2	39.8	9.8
Inform patient before performing local infiltration	0	0	5.7	42.3	52.0
Perform local infiltration	0.9	0.9	29.8	43.8	24.6
Insert spinal needle with correct bevel placement	0	3.2	15.3	34.7	46.8
Attach syringe with spinal needle and withdraw cerebrospinal fluid	1.6	7.3	24.4	46.4	20.3
Inject medication into cerebrospinal fluid	0.8	8.9	26.8	41.5	22.0

Table 5 Accuracy of each step of spinal anesthesia performed by medical students as assessed by anesthesiology staff

Steps of spinal anesthesia	Did not do (%)	Did incorrectly (%)	Did correctly (%)
Position patient correctly and palpate the correct space	7.6	4.2	88.2
Clean hands	0	0	100.0
Put on sterile gloves	0	2.5	97.5
Paint antiseptic solution on patient's back	6.7	5.1	88.2
Put dressing with hole in the middle on patient's back	2.5	2.5	95.0
Prepare medication and spinal needle			
- Check type of medication	8.6	0.9	90.5
- Check expiration date	7.8	0	92.2
- Check spinal needle	7.7	0	92.3

Table 5 (Continued)

Steps of spinal anesthesia	Did not do (%)	Did incorrectly (%)	Did correctly (%)
Wipe off antiseptic solution	8.4	3.4	88.2
Palpate the correct space	0.8	5.9	93.3
Inform patient before performing local infiltration	3.4	0	96.6
perform local infiltration	4.2	0.8	95.0
Insert spinal needle with correct bevel placement	0	0	100.0
Attach syringe with spinal needle and withdraw cerebrospinal fluid	4.2	5.9	89.9
Inject medication into cerebrospinal fluid	3.3	1.7	95.0

Discussion

Regarding endotracheal intubation, 86.9% of the medical students were able to perform this procedure successfully. The majority of them reported a moderate to high level of confidence in performing endotracheal intubation. Their lowest levels of confidence involved blowing the endotracheal tube cuff with minimal volume and using the laryngoscope blade to deviate the tongue aside and lift it upward. From the anesthesiology staff's point of view, the majority of the medical students could perform each step of endotracheal intubation correctly. The two weakest points were the medical students' difficulty in correctly assembling the laryngoscope blade to the handle as well as deviating the tongue (from the right side of the patient to the left - using the left-handed blade) and lifting it upward. The medical students stated that they required the performance of such procedure on about 10 cases in order to achieve an adequate confidence level to perform endotracheal intubation well.

Regarding spinal anesthesia, 59.8% of the medical students could perform this procedure correctly. Their confidence during each step varied considerably as shown in Table 4. Palpating the correct space seemed to be the step during which they felt the least confident. From the anesthesiology staff's point of view, the majority of medical students were able to perform spinal anesthesia correctly. Furthermore, the medical students reported the necessity of having an experience of 10 spinal anesthesia cases before achieving an adequate level of confidence to successfully perform spinal anesthesia.

According to our results, the medical students rated their confidence in performing each step of the two procedures lower than the rating perceived by the anesthesiology staff in terms of accuracy of their performance. This discrepancy might be a result of supervision by the anesthesiology staff who may have aided the medical students by giving them verbal guidance or partially doing some steps of the procedures themselves. All

of the procedures were performed under close supervision by our anesthesiology staff in order to maintain the standard level of care for the patients; therefore, it is uncertain what their level of accuracy would have been without supervision.

Focusing on the medical students' level of confidence, the majority of them rated their level of confidence as moderate or high, but not maximal. This is understandable as building confidence requires time and experience. When questioned about the number of cases required to obtain an adequate level of confidence, most medical students perceived that an experience of 10 cases was necessary for both procedures. Charuluxananan et al.¹ studied among their residents and reported that their institution's recommended number of cases for endotracheal intubation and spinal anesthesia were 27 and 112 cases, respectively. The learning model of Plummer et al.² indicated that a trainee learned about as much from 1 successful endotracheal intubation as from 12 unsuccessful attempts. O'Flaherty et al.³ assessed the ability and confidence of clinical medical students regarding the insertion of an endotracheal tube correctly and quickly, and identification of esophageal intubation. Their results showed that about one third of their medical students performed endotracheal intubation correctly at the first attempt, but almost half of them failed to recognize esophageal misplacement.

In the institution where the study took place, each medical student is required to perform at least one endotracheal intubation and one spinal anesthesia. In fact, they usually have the chance of performing only one case for each procedure, which fulfills the minimal requirement of the

institution but does not meet the medical students' request. Strategies to help improve the medical students' confidence could involve increasing the duration of their rotation and/or setting up a skill lab with manikins which are very similar to a real human being. Ideally, the skill lab should be supervised at all times by a person skilled in doing both endotracheal intubation and spinal anesthesia. However, it is impossible to achieve this in a place where shortage of manpower is a major issue. The other option is to record the performance of the medical students and then make recommendations to the medical students after the recording has been reviewed by anesthesiology staff.

Conclusion

This study draws attention to the need for more time and resources for the medical students to practice endotracheal intubation and spinal anesthesia to a level that helps them become sufficiently confident to perform these procedures.

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