An Educational Course for the Achievement of Confidence in Basic Focused Assessment with Sonography in Trauma (FAST): Evaluation of a Small Group Workshop in Thai Medical Student

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Background: *Trauma has become a leading cause of death in developing countries such as Thailand. After graduating from the medical school, medical students have to work as emergency physicians in rural areas in the first 3-year term of government service.*

Objective: *Our goal was to improve students' confidence on performing Focused Assessment with Sonography in Trauma (FAST).*

Material and Method: *The one-day small group-training course was organized at the Faculty of Medicine, Srinakharinwirot University between January and December 2016. A total of 120 medical students particitpated in the small group workshop; the participants were divided up into 7 to 8 participant/groups. The training program initiated with a one hour lecture by an instructor and spent 6 hours in hands-on practice sessions with simulated patients. The participants completed a questionnaire in the confidence of basic knowledge on equipment use, ability to illustrate 4 standard views and decision-making in FAST; based on a 5-point Likert scale. The confidence scores between pre-and post-workshop questionnaires were compared by paired t-test statistical analysis.*

Results: *There was a significant improvement of the confidence in basic ultrasound knowledge, comfort ability in equipment use, the ability to demonstrate 4 standard views in FAST and the ability to make decisions about trauma patients after the educational intervention. The mean overall score of pre-and post-workshop were 25.8 and 38.6, respectively ($p<0.001$). Our results verify the effectiveness of small group workshops as an excellent training model for practice in FAST.*

Conclusion: *The small group workshop is an effective model of training for better performance in FAST. Small group hands-on workshop is a valuable educational method for achieving an experience by the students even in the limited resources situation.*

Keywords: *Abdominal injury, Ultrasound, Focused assessment with sonography in trauma, Medical education*

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Trauma has become a leading cause of death in developing countries, such as Thailand, for which mortality rates are as high as 61.5 deaths per 100,000 of the population. Abdominal injury is major cause of death in trauma patients[1,2]. Focused Assessment with Sonography in Trauma (FAST) is helpful to diagnose abdominal trauma, with a sensitivity and specificity of 86% and 99%, respectively. The accuracy of FAST to diagnose blunt abdominal trauma is as high as 97%[3,4].

After graduating from medical school, physicians in Thailand spend the first three years of service working in hospitals in rural areas, including the emergency departments of such hospitals[5]. The ultrasound assessment of the patients with abdominal trauma is an important part of the initial evaluation at emergency room. Hence, basic ultrasound skills should be integrated into the curriculum. There was some variability in training models for medical students to gain experience in performing FAST, such as a simulator and animal or cadaver training models. However, such training methods are more expansive than training on simulated patients[6-8].

Therefore, we conducted a one-day intensive small group hands-on workshop for training in FAST using simulated patients for the undergraduate curriculum. To this end, it demonstrated whether the feasibility of the short course small group workshops could improve the confidence of the student in

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performing FAST. The confidence of the students was assessed on the basic knowledge of equipment setting and usage, the ability to demonstrate 4 standard views on FAST and decision making in FAST. The confidence scores before and after the training course were compared after completion of teaching sessions.

Material and Method

The one-day small group-training course was organized at Faculty of Medicine, Srinakharinwirot University from January to December 2016. One hundred and twenty, 6th year medical students participated in the small group workshop; the participants were divided into 7 to 8 participant/groups. The training program initiated with 1 hour lecture by the instructor of the course with the basic knowledge of ultrasound usage and how to demonstrate the 4 standard views in FAST. Afterwards, the medical students spent 6 hours in intensive hands-on practice session in a basic equipment setting and practiced the FAST procedure on a simulated patient (Fig. 1).

The authors applied the questionnaire from the study of Crouch AK et al, reported in 2010, and translated the questionnaire into Thai[9]. The questions included the ability to choose the correct ultrasound probe, to adjust settings of the ultrasound machine, to adjust depth and gain, to demonstrate the 4 standard views in FAST and to make decisions in trauma patients. The participants where ask to complete a questionnaire pre-and post-workshop, based on a 5-point Likert scale (0 = no confidence and 5 = high confidence).

The results were collected in an excel datasheet, the statistical analysis was performed by Microsoft excel 2016. The confidence scores from the pre-and post-workshop questionnaires were reported for mean scores (± standard deviation) and compared by paired t-test statistical analysis; with $p<0.05$ was considered statistically significant.

Results

The results of the study demonstrate that an intensive small group hands-on workshop significantly improved the confidence of the medical students in performing FAST. The pre-and post-workshop scores in each assessment questions included the ability to choose the corrected probe (pre: 3.5, post: 4.7, $p<0.001$), correct orientation of the probe (pre: 3.3, post: 4.6, $p<0.001$), and adjustment of depth and gain (pre: 2.4, post: 4.1, $p<0.001$).

The participants showed their confidence in demonstrating the 4 standard views in FAST as subcostal view (pre: 2.6, post: 4.2, $p<0.001$), right upper quadrant view (pre: 3.0, post: 4.3, $p<0.001$), left upper quadrant view (pre: 2.8, post: 4.2, $p<0.001$), pelvic view (pre: 2.8, post: 4.4, $p<0.001$), respectively.

The final assessment tools included the overall ability to perform FAST (pre: 2.6, post: 4.1, $p<0.001$), and make clinical decisions in trauma (pre: 2.6, post: 4.0, $p<0.001$). Total confidence scores for practice in FAST (pre: 25.8, post: 38.6, $p<0.001$) also improved at the end of the training session. The participant evaluation of the confidence scores on pre-and post-workshop in FAST skill are illustrated in Table 1.

Discussion

Diagnosis of abdominal injury is challenging for physicians working in an emergency department. FAST is as effective as diagnostic peritoneal lavage (DPL) and computed tomography (CT) scan for

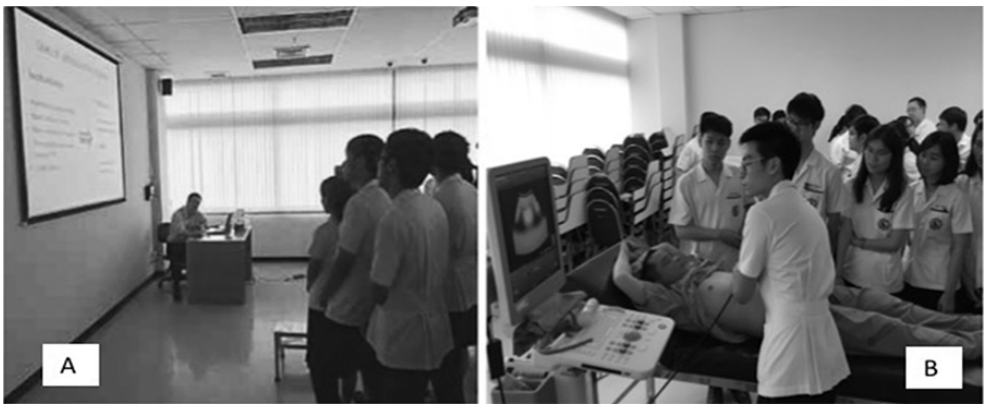

Fig. 1 Illustrated the small group hands-on training session in FAST. (A) A brief lecture from instructor of the course, (B) Hands-on training session on the simulated patient).

Table 1. The participant evaluation of the confidence score on pre- and post-workshop in FAST skill

Skill in FAST	Pre-workshop confidence score (mean ± SD)	Post-workshop confidence score (mean ± SD)	*p*-value
Ability to choose the correct probe	3.5±0.9	4.7±0.3	<0.001
Correct orientation of the probe	3.3±0.9	4.6±0.4	<0.001
Adjustment of depth and gain	2.4±0.9	4.1±0.5	<0.001
Illustration of subcostal view	2.6±0.9	4.2±0.5	<0.001
Illustration of RUQ view I	3.0±1.0	4.3±0.5	<0.001
llustration of LLQ view	2.8±0.9	4.2±0.6	<0.001
Illustration of pelvic view	2.8±0.9	4.4±0.5	<0.001
Ability to perform FAST in trauma patient	2.6±0.9	4.1±0.4	<0.001
Ability to make a clinical decision on FAST exam	2.6±0.92	4.0±0.5	<0.001
Overall confidence score on FAST skill	5.8±4.0	38.6±2.3	<0.001

FAST = Focused assessment of sonography in trauma; RUQ = Right upper quadrant; LLQ = Left upper quadrant

detection of hemoperitoneum[10]. The benefit of FAST includes 1) easy and quick diagnosis in abdominal trauma, 2) suitable for patients with unstable hemodynamic who cannot be transferred to the CT scan room, and 3) could be easily learnt by the physicians, even for non-radiologists or non-surgeons[11].

Currently, the standard hands-on training model for practice in FAST has not been determined. The traditional teaching in FAST usually requires live human models (simulated patients), which is an easy way to gain experience in demonstrating normal anatomic landmarks in FAST[12]. The ultrasound simulator is an effective teaching model, with the advantage of being able to simulate virtual normal anatomy as well as intra-peritoneal fluid[13]. However, training in ultrasound simulator is more expensive than training in simulated patients, for which a machine would cost 3372 USD plus a maintenance cost of 2618 USD/year[14]. This is not suitable for the socioeconomic status of Thailand. As a result, there is no widespread use of simulators in medical education in Thailand. Consequently, we conducted a small group hands-on training session in our department with the purpose to support the medical students to gain experience in performing FAST.

The previous studies demonstrated that the trauma ultrasound workshop in simulated patients was as effective as a simulator machine for the physicians in terms of basic knowledge of ultrasound, comfortability in using the ultrasound, and the ability to identify intra-peritoneal fluid[15,16]. These findings supported the results of our study that the small hands-on group workshop was helpful to improve the confidence of the students in ultrasound knowledge, ease in using the ultrasound machine, the ability to demonstrate 4 standard views in FAST and the ability to make decisions in trauma patients after the educational intervention.

The limitations of this study included; the study reported only the confidence and feasibility of the students to perform FAST do not include the patient's clinical data. The previous study demonstrated that the operator confidence was not associated with the accuracy of the interpretation of FAST[17]. Hence, the participants should be evaluated for their skills in FAST by OSCE examination; a long-term retention in skills to perfom the FAST should be evaluated in clinical practice after graduating from medical school.

Finally, the integration of basic emergency sonography in the curriculum could promote the concept of "point-of-care ultrasonography" in which, the physicians can use a bedside ultrasound as a part of the initial assessment and evaluation of the emergency patients especially FAST in traumatized patients[8,18]. The authors encourage the the FAST training program for undergraduate medical students be improved for clinical practice as an emergency physician in rural areas after graduating from medical school.

Conclusion

The intensive small group hands-on training workshop is an effective model for better performance in FAST. The training session could help participants

gain the basic knowledge in ultrasound setting, the feasibility in using the equipment, improvement in the confidence and experience in using FAST in emergency situations. The small group workshop benefits medical students even in a limited resources situation.

What is already known on this topic?

Focused Assessment with Sonography in Trauma (FAST) is helpful for diagnosis of hemoperitoneum with a high sensitivity and specificity in blunt abdominal trauma (86% and 99%, respectively). Currently, the education in FAST is based on an ultrasound simulator and traditional hands-on workshops in a simulated patient format.

What this study adds?

Small group hands-on workshops are a valuable educational method for gaining experience in FAST even for students in a limited resource situation.

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Potential conflicts of interest

None.

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การอบรมเชิงปฏิบัติการแบบกลุ่มย่อยเพื่อช่วยพัฒนาความรู้พื้นฐานและความมั่นใจของนิสิตแพทย์ในการทำหัตถการ Focused Assessment with Sonography in Trauma (FAST)

ธวัชชัย ตุลวรรธนะ, ธรรมนิจ รุกขชาติ

ภูมิหลัง: การเสียชีวิตจากอุบัติเหตุเป็นสาเหตุการตายที่พบได้บ่อยในประเทศไทย ซึ่งเมื่อนิสิตแพทย์สำเร็จการศึกษาแล้วจะต้องไปปฏิบัติงานในพื้นที่ต่างจังหวัดที่แผนกฉุกเฉิน จึงมีความสำคัญที่นิสิตแพทย์จะต้องมีความรู้และความชำนาญในการตรวจประเมินและให้การช่วยเหลือผู้ป่วยที่ได้รับอุบัติเหตุในเบื้องต้น

วัตถุประสงค์: เพื่อช่วยพัฒนาความรู้พื้นฐานและความมั่นใจของนิสิตแพทย์ในการทำหัตถการ Focused Assessment with Sonography in Trauma (FAST) เพื่อใช้ในการวินิจฉัยการบาดเจ็บในช่องท้อง

วัสดุและวิธีการ: เป็นการจัดการฝึกอบรมเชิงปฏิบัติการแบบกลุ่มย่อยโดยมีนิสิตแพทย์เข้าร่วมอบรมจำนวน 120 คน (นิสิตแพทย์ 7 ถึง 8 คน/กลุ่ม) ระหว่างเดือนมกราคม ถึง เดือนธันวาคม พ.ศ. 2559 การฝึกอบรมเริ่มจากการบรรยาย 1 ชั่วโมง โดยอาจารย์ผู้สอน จากนั้นให้นิสิตแพทย์ได้ฝึกทำหัตถการ FAST ในผู้ป่วยจำลองเป็นเวลา 6 ชั่วโมง และให้นิสิตแพทย์ทำแบบสอบถามเพื่อประเมินความรู้พื้นฐานในการทำ ultrasound ความมั่นใจในการทำหัตถการ FAST และการแปลผล FAST ในทางคลินิกโดยใช้แบบสอบถามแบบ 5-point Likert scale ทำการเปรียบเทียบคะแนนความมั่นใจก่อนและหลังการฝึกอบรมโดยใช้สถิติ paired t-test

ผลการศึกษา: การฝึกอบรมเชิงปฏิบัติการแบบกลุ่มย่อยสามารถช่วยพัฒนาความรู้พื้นฐานในการทำ ultrasound, ความเชื่อมั่นในการทำหัตถการ FAST และความเชื่อมั่นในการประยุกต์ใช้ผลของการทำ FAST มาใช้ในการวางแผนการรักษาผู้ป่วยที่ได้รับอุบัติเหตุได้อย่างมีนัยสำคัญ โดยพบว่าค่าเฉลี่ยของคะแนนความเชื่อมั่นโดยรวมก่อนและหลังการฝึกอบรมของนิสิตแพทย์เท่ากับ 25.8 และ 38.6 ตามลำดับ ($p<0.001$)

สรุป: การฝึกอบรมเชิงปฏิบัติการแบบกลุ่มย่อยสามารถช่วยพัฒนาความรู้และความมั่นใจให้กับนิสิตแพทย์ในการทำหัตถการ FAST ได้อย่างมีประสิทธิภาพ โดยมีค่าใช้จ่ายไม่สูงซึ่งเหมาะสมกับสภาพทางสังคมและเศรษฐกิจของประเทศไทย