

The Role of Clinical Supervision Teaching Basic Obstetric Ultrasound for Undergraduate Medical Students

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The Role of Clinical Supervision: Teaching Basic Obstetric Ultrasound for Undergraduate Medical Students

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Abstract

This study aimed to find the impact of clinical supervision on the achievement of medical student competence in basic obstetric ultrasound examination skills by using DOPS as the assessment method. Students' knowledge related to basic obstetric ultrasound examination in the beginning and in the end of their 10 weeks clinical rotation in Department of Obstetrics and Gynecology were assessed by using pre-test and post-test questionnaire. By employing mixed methods, one group pre and post-test design was positioned to assess student knowledge, one group post-test design to assess student's skills achievement and qualitative study to explore student perception about the new learning method we offered. The collected data were analyzed with computer program; means and standard deviation were calculated as descriptive parameters. Parametric test were used to test the hypothesis. The pre-post results were compared by using Wilcoxon test. The results showed a significant difference in the score of pre-test and post-test. Qualitative data showed positive perception. Clinical supervision as teaching method together with learning media in the form of module and ultrasound video gave positive result to improve achievement of student's competence in basic obstetric ultrasound examination skills.

Keywords

Clinical supervision, teaching ultrasound, undergraduate medical education

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Introduction

14 Ultrasound is one of the most often used imaging tools in clinical practice. Unlike computed tomography and magnetic resonance imaging, the technique is portable and quick. Ultrasound can be used to guide anamnestic findings, clinical examination and imaging tool in a short period of time (Heinzow et al., 2013; Herlambang et al., 2020). Ultrasound has been utilized for decades by specialist (radiologist, cardiologist, and obstetric-gynecologist). This is a clinically useful tool with relevant application across most specialists (Bahner et al., 1112). The use of ultrasound in obstetrics and gynecology has many advantages such as the patient experiences no discomfort, nor does she feel any sensation. The patient can be examined without moving from her bed. Unlike x-ray, there is no danger of exposing the fetus and the mother to adverse effects of radiation (Akhter, 1976). Advances in scanning techniques and the quality of ultrasound have enabled clinicians to accurately interpret findings in the context of both normal and high-risk pregnancies. Ultrasound is now widely used in routine antenatal care for pregnancy dating and location, screening for aneuploidy, fetal anomaly screening, determining chronicity in multiple pregnancy, and placental localization. The use of ultrasound is well established in assessing fetal growth and wellbeing, amniotic fluid volume, and cervical length (Coroyannakis & Thilaganathan, 2015; Herlambang et al., 2020).

The Indonesian Medical Doctor's Standard of Competence places the mastery of basic obstetric ultrasound examination in 4th level of competence. It means that graduates should be able to independently perform this skill in primary health care. Clinical skills need to be trained from the beginning to the end of continuing medical education. In carrying out the practice, graduates should master the clinical skills to diagnose and manage comprehensive health problems (Konsil Kedokteran Indonesia, 2015). Hence, ultrasound has only been incorporated in to undergraduate medical student curricula only to a limited degree and has not been systematically implemented as a curricular to be learned by every student in undergraduate medical education. Lately, numerous study groups have described their efforts to integrate ultrasound into a medical curriculum demonstrating the increased awareness of the relevance in undergraduate medical education (Heinzow et al., 2013).

There are many challenges to integrating basic obstetric ultrasound into medical education curricula. These include identifying appropriate clinical teacher, accessing to adequate resources, funding, and appropriate integration into existing medical education curricula. Other issues in teaching basic obstetric ultrasound lie in locating at the time, and clinical teacher should provide time and energy to give the supervision along their roles in medical services. However, Faculty should concern in these issues and determine at which level is integrating basic obstetric ultrasound within the curricula and learning method most appropriate. The curricula should ensure the student to experience learning process and lead them to achieved the 4th level competence related to basic obstetric ultrasound skills specialist (Bahner et al., 2012). The European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) recommends that ultrasound should be used

1 systematically as an easy accessible and instructive educational tool in the curriculum of modern medical schools. Medical students should acquire theoretical knowledge of the modality and hands-on training should be implemented and adhere to evidence-based principles (Heinzow et al., 2013).

6 Several models of ultrasound education were developed. One offers graduated level of exposure and images experience for medical students during third-year clerkships (Harvard Medical School, Boston, USA). The second model is more compact, organized as a dedicated 3-days program (Thomas Jefferson University Hospital, Philadelphia, USA). With the current wide variability in clinical clerkship requirements, it is conceivable that a student could complete a medical school curriculum without ev21 directly scanning a patient with ultrasound. Although not optimal, ultrasound imaging is largely skill based and requires hands-on training to achieve competency. To achieve this goal, blended learning method are considered in a busy clinical setting, these concept have a positive and supporting effect on ultrasound education. The students need to be thought the technical knowledge about basic obstetric ultrasound by using module and video, and the inclusion of the clinical supervision with 'hands-on' to the real patient develop their skill acquisition. There is abroad 9reement that medical educators should prepare students for further ultrasound education. Lately, numerous study groups have described their effort to integrated ultrasound into medical curriculum demonstrating the increased awareness of the relevance in undergraduate medical education (Heinzow et al., 2013). This study aimed to find the impact of clinical supervision on the achievement of medical student competence in basic obstetric ultrasound examination skills by using DOPS as assessment method.

Literature Review

5 Clinical supervision is the commonest form of supervision in most medical setting. It consists of the day-to-day discussion of clinical cases and their management, and any issues arising of clinical case. It may take a variety of forms from very brief discussion on ward rounds or in the clinic, to more extended and reflective discussion of complex cases or option for clinical management (Launer, 2011). Clinical teacher in clinical setting plays a significant role to facilitate students to mastery this skill. Supervision with constructive feedback has shown positive impact on the achievement of student's competence. Dreyfus and Dreyfus advance a model of five stages of skill acquisition; novice, advance beginner, competent, proficient and expert, and applied into the acquisition of competence in medicine (Dreyfus & Dreyfus, 1986; Ludmere, 2017). Since clinical supervision has become recognized as a distinct professional practice, competency based supervision has gained considerable traction internationally. Competency-based supervision enhances accountability and is compatible with evidence-based approaches.

Competency-based supervision is defined by supervisor and supervisee collaboratively and explicitly to identifying the knowledge, skills and attitudes, comprising each clinical competency, determining specific learning strategies, and monitoring and evaluating the development of those. Recommendations for supervision practice are

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described based on the growing evidence base for practice and responsive to emerging ethical and legal issues (Falender, 2020). Kolb's learning theory can be used as one of method to training students skills, it set out four distinct learning styles (or preferences) based on a four-stages of learning cycle interpreted as a 'training cycle'. Kolb includes this 'learning cycle' as a central principle of his experiential learning theory, typically expressed as four-stages of learning cycle in which immediate or concrete experiences to provide a basis for observations and reflections. These observations and reflections are assimilated and distilled into abstract concepts producing new implications for action which can be actively tested in turn creating new experiences. Kolb says that ideally, this process represents a learning cycle or spiral where the learner 'touches all the bases', for instance a cycle of experiencing, reflecting, thinking, and acting (Amin & Eng, 2006).

Conceptually, skills belong to the psychomotor domain in Bloom's classification. In reality required to perform, procedures are complex and involve knowledge, attitude as well as psychomotor skills. In clinical medicine, knowledge is absolute prerequisite to performing procedure in a safe and effective manner. Attitude and behavior are key components of skills as well. These affective components primarily involve communicating with the patient about the nature, needs and potential risk of the procedures, and understanding of and empathy to patients' problem (Amin & Eng, 2006). Whatever its form or context, good supervision depends on identical skill. These include affirmation, emotional attunement, awareness of external requirements and standards, and ability to question and challenge people appropriately (Launer, 2011).

There is a theory which states that there are three variables affected the effectiveness of learning in outpatient facilities; input variables, process variables and output variables. The input variables studied were room facilities available for the students to conduct the examination, the number of students involved in a clinical rotation in a certain section and the quality of organizing the implementation of the activity, and the variables of the process studied were the variation of patients in the number and type of disease and adequate supervision, while the output variable is the effectiveness of the rotation at the outpatient clinic (Dolmans, 2002). However, assessment covers learning and every learning process should assess to determine student achievement. In Miller's framework for assessing clinical competence, the lowest level of the pyramid is knowledge (knows), followed by competence (knows how), performance (shows how), and action (does) (4). 'Action' focuses on what occurs in practice rather than what happens in an artificial testing situation. Workplace-based methods of assessment targets the highest level of the pyramid and collect information about doctors' performance in their everyday practice. Direct Observation of Procedural Skill (DOPS) is one of the most commonly used methods of workplace-based assessments. These method can promote active, learner-centered learning and facilitate provision of developmental verbal feedback to the trainee immediately afterwards (Liu, 2012; Norcini & Burch, 2007).

DOPS is designed to provide feedback on procedural skills essential to the provision of good clinical care. Trainees are asked to undertake practical procedures with a different observer for each encounter. Each DOPS should represent a different procedure and will

normally be completed opportunistically during every day work. The trainee chooses the timing, procedure and the observer, which may be experienced Registrars, Consultants or appropriate nursing staff who are competent in the procedure assessed. The assessment involves an assessor observing the trainee perform a practical procedure within the workplace, and a structured checklist is designed to give guidance for the assessors. Most procedures take no longer than 15-20 minutes. Feedback would normally take about 5 minutes (Liu, 2012; Norcini & Burch, 2007). The following are the main advantages of DOPS as a valid assessment tool:

- The trainee is assessed during every day work performing procedures on real patients.
- Not only the technical ability is observed, but also interaction with patients, colleagues and professional behaviors can be assessed.
- A range of skills, from simple to very complex procedures can be assessed.
- Many trainees will need further development, so after receiving feedback, the strengths and weaknesses can be highlighted and the trainee can work on them and be assessed at a later date.
- There is a need to check that doctors' procedural skills have been retained and are used appropriately within the context of everyday practice. DOPS is a suitable assessment tool for this purpose (Liu, 2012; Norcini & Burch, 2007).

Methodology

Medical Faculty in Universitas Jambi has been applied competence based curriculum with problem-based learning approach. There are two phases that should be undertaken by the student, four years preclinical phase and two years clinical phase. In clinical phase, they have to go through 13 Department in teaching hospital. One of the Departments is Obstetrics and Gynecology; they have to undertake clinical rotation here for ten weeks. Students experience several teaching method during their rotation in Department that is obstetrics and gynecology, such as bed site teaching, meet the expert, case report session and clinical science session, but students have not had the opportunity to learn about basic obstetric ultrasound either through lectures, lab skills or hands on with real patients.

In the earlier of this study, we have developed learning media in the form of modules and videos about basic obstetric ultrasound, the development of this learning media refers to the basic obstetric ultrasound principles for general practitioners prepared by the Indonesian association of obstetric and gynecologist. This is in accordance with the theory described earlier that knowledge is absolute prerequisite to performing skill procedures in a safe and effective manner. As 21 students began their rotation in Department of Obstetric and Gynecology, we provided both of those learning media to help them learning about basic obstetric ultrasound, for the next 10 weeks, we scheduled three-times structured clinical supervision by clinical teacher who have fetomaternal consultant background, this learning process involves outpatients in ambulatory care who were pregnant in the first trimester,

second trimester and third trimester and undergo antenatal care in teaching hospital. Inclusion criteria are patients with single and normal pregnancy and willing to be the subject of the study (informed consent provided). Students were given the opportunity to actively study independently with a clinical teacher outside the scheduled we provided. Therefore, this activity was proven by filling out the log book signed by the clinical teacher who gave them chance to hands on with obstetric ultrasound to patients.

This was mixed method research by using one group pre and posttest design to assess student knowledge, one group post-test design to asses students' skill achievement and qualitative study to explore student perception on the new learning method we offered. In order to identify student's prior knowledge on basic obstetric ultrasound, we handed pre-test questionnaire consisted of 10 questions related basic obstetric ultrasound principal, then we provided modules and videos for them to learn during the rotation and for the preparation in undergoing clinical supervision with the real patient, then second ultrasound was used in this process. During the clinical supervision, clinical teacher gave the students concrete experience with the real patient, explained and demonstrated how to do the obstetric ultrasound in pregnant patient, determined the main targets to look for such as gestational age, the presence of yolk sac or gestational sac, the number of fetuses, the estimated fetal weight, the fetal position, the location of the head, the amount of amniotic fluid and anything else according to the patient's gestational age. The students observe and reflect on the experience to understand the meaning to develop some concept. As the final step, the student apply the concept, they were then given the opportunity trying to conduct their own obstetric ultrasound examination under supervision with the patient's consent. Basically, the Kolb's learning cycle principal was used by clinical teacher.

In the last 2 weeks of the rotation period, we schedule and performed DOPS to assess students' achievement in basic obstetric ultrasound examination. They also reassessed the knowledge of basic obstetric ultrasound by using the same previous questions we used in pretest questionnaire and adding open questions to know their perception of the new learning method they had undergone during rotation in Department of Obstetrics and Gynecology. The collected data were analyzed with computer program; Means and Standard Deviation were calculated as descriptive parameters. Parametric test were used to test the hypotheses. The pre post results were compared using Wilcoxon test.

Ethical considerations

In this study, all data of participants were concealed. All participants were also knowledgeable that their data would be kept privately by researchers.

Findings

The results showed significant differences in the score of pre-test and post-test. There was an increase in the average score of pre-test and post-test students after obtaining teaching media and clinical supervision. In the pre-test, we found the mean value of 25.24; minimum value of 10; and a maximum value of 50. In the post-test, we found the mean

value of 76.67, a minimum value of 50, and a maximum value of 90, as showed in the table as follows. The values of all individuals were also increased.

Table 1. *Results of the pre-post questionnaire*

Descriptive		
		Statistical value
Pre-test	Mean	25.24
	95% confidence interval for mean	
	Lower bound	20.33
	Upper bound	30.14
	Median	30.00
	Variance	116.190
	Std. Deviation	10.779
	Minimum	10
	Maximum	50
	Range	40
Post-test	Mean	76.67
	95% confidence interval for mean	
	Lower bound	70.85
	Upper bound	82.48
	Median	80.00
	Variance	163.333
	Std. Deviation	12.780
	Minimum	50
	Maximum	90
	Range	40

The result from the normality test for the pre and post-test data showed abnormal data distribution. According to this result, we used Wilcoxon test as selected statistical analysis test shown in the following table.

Table 2. *Normality test*

Normality Test						
	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig	Statistic	df	Sig
Pre-test	.194	21	.037	.907	21	.048
Post-test	.270	21	.000	.851	21	.004

The result of Wilcoxon statistical analysis test showed significant differences (Asymp Sig 2-tailed 0.000) between the value of pre-test and post-test. It meant that there was

improvement on student's knowledge of basic obstetric examination skill before and after giving of module, video and clinical supervision. Furthermore, at the end of the rotation, each student was given a final assessment by using DOPS as assessment method (the DOPS form attached), there were two components in the DOPS form not observed, for instance 'appropriate analgesia or safe sedation' and 'seeking help when appropriate.' Basically, DOPS has been evaluated to be a reliable and valid formative and summative assessment. The results of the DOPS showed that from 21 students had been assessed, two students reached 'above the expectation' level demonstrated understanding of indication, relevant anatomy, procedure technique, technical ability and overall ability to performed procedure area; two students reached "borderline" level and the rest reached "meet the expectation" level in the same area. All the 21 students reached "meet the expectation" in obtain informed consent, demonstrated appropriate preparation pre-procedure, aseptic technique, post procedure management, communication skills, and consideration of patient/ professionalism. This result was quite encouraging because most students were able to perform basic obstetric ultrasound well in real patient.

Table 3. DOPS results based on the number of students who reached each level of the assessment area

Area being assessed	Below the expectation	Borderline	Meet the expectation	Above the expectation
Demonstrate understanding of indication, relevant anatomy, technique of procedure		2	17	2
Obtain informed consent			21	
Demonstrate appropriate preparation pre-procedure			21	
Technical ability		2	17	2
Aseptic technique			21	
Post procedure management			21	
Communication skills			21	
Consideration of patient/ professionalism			21	
Overall ability to perform procedure		2	17	2

Based on DOPS results, we conducted interviews with two students, each representing student who had overall ability on the "borderline level" and "above the expectation level", there were four major questions as references in the interview: Do you know in what level of competence basic obstetric ultrasound examination places in The Indonesian Medical Doctor's Standard of Competence and what is it mean?, How do you think about the learning method we use in this study?, How do you prepare for DOPS?, and Does this learning method need to be incorporated and integrated into the clinical rotation

curriculum? For the first question both students knew that The Indonesian Medical Doctor's Standard of Competence places the mastery of basic obstetric ultrasound examination in 4th level of competence. It means that they should be able to perform this skill when they become doctors in primary health care. In the second question, students with "above expectation" achievement stated that ultrasound learning was very interesting because they got some learning resources that is module, video and special guidance from the experts, in addition they got a chance to try directly practice it to the real patient. They expressed,

"... this activity provides new experiences and skills that are very important to look for, we were fortunate to be part of this research activity, it is very nice experience to try it in to real patient..."

"... this activity is very good because the doctor not only teach us the theoretical aspects but also the direct affinity, the ultrasound guide video provided is also very helpful to direct us how to do basic obstetric ultrasound and the important things that should be found and delivered to the patient .."

While a student with "borderline level" stated that this activity was interesting, but it should be carried out more often with fewer students. They conveyed,

"...I was very interested in this learning activity, but I was still difficult to understand because our numbers were too much at the time of clinical supervision were given, the room is too small, but modules and videos help to repeat the learning after that ..."

In the third question, students with "above expectation" level stated that she prepared herself for DOPS by re-reading the module and reviewing the given video; she also got a chance to try again this skill in the pregnant patient outside the scheduled clinical supervision we provided (this activity was proven by filling out the log book signed by the clinical teacher who gave her chance to hands on with obstetric ultrasound to patients.). Additionally, due to the rotation in department of Obstetrics and Gynecology obligated, they should stay overnight at the hospital, they have the opportunity to gather and learned together before undergone DOPS. While students with "borderline levels" said that he was quite nervous about DOPS and realized that he had not learned enough how to perform this ultrasound examination, besides the burden of activities in the clinical rotation was enough to drain his time and energy so that his learning time for DOPS was still lack. For the last question, both of them agreed to answer that it was necessary to put this learning method into clinical rotation, but it needs several improvement in the process, such as the frequency of guidance, the opportunity to practice as much as possible, the ratio between clinical teacher and students at the time clinical supervision conducted and also the duration of each clinical supervision.

Discussion

The topic of this study occurred because the perceived gap between the competencies that are expected to be achieved by the students related to basic obstetric ultrasound examination with the learning method they got during their study. The current curriculum in Medical Faculty University of Jambi had not been able to encourage students to master this skill up to the 4th level of competence (Herlambang et al., 2020). In the preclinical phase curriculum, basic obstetric ultrasound examination was taught only in the form of a face-to-face lecture activity during two times meetings on the the reproductive system block in the second year of the preclinical phase. There was no clinical skills have been performed for obstetric ultrasound examination. It means that the curriculum only facilitated the student to achieve the lowest level competence of Miller's Pyramid, the "knows" level. One of the difficulties faced was the unavailability of ultrasound facilities in basic skills laboratories and mannequins that could support this skill activity (Heinzow et al., 2013). At the clinical stage, basic obstetric ultrasound learning were also not specially prepared in the curriculum on clinical rotation in the Department of Obstetrics and Gynecology, students only occasionally got a chance to practice basic obstetric ultrasound in pregnant women when there was a clinical teacher who provides the opportunity. Therefore, we were interested in trying to develop a learning method related to basic Obstetrics ultrasound, one of consideration was that ultrasound was available in the Department of Obstetrics and Gynecology ward and students could directly learn with real patient under supervision. In order to support this approach, we had also developed basic obstetrics ultrasound module and video guidance for general practitioners with reference to Indonesian Association of Obstetrics and Gynecologist, both of these learning resources were structured in such a way by using valid literature and competent expert to produce a systematic guide for basic usage steps, important matters to be identified in accordance with the competence of general practitioners (Heinzow et al., 2013).

In this study, we found that there was a significant difference in improving students' knowledge related to basic obstetrics ultrasound examination after the giving of module, video and three times clinical supervision. The findings proved that the learning method applied (blended method) together could improve students understanding about basic obstetric ultrasound examination. As the consequence, it is enough to prove their psychomotor skill. Therefore, it is necessary to conduct an assessment to assess their skills by DOPS method. This was consistent with the theory already described, that in clinical medicine, knowledge is absolute prerequisite to performing procedure in a safe and effective manner. So to development method in teaching basic obstetric ultrasound or any other skills activity, some learning media that can provide knowledge as a prerequisite before they get into clinical skills are needed (Dreyfus & Dreyfus, 1986; Ludmere, 2017). This learning method in this study has been applied for medical students during third-year clerkships in Harvard Medical School, Boston, USA). The European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) recommends that ultrasound should be

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used systematically as an easy accessible and instructive educational tool in the curriculum of modern medical schools. Medical students should acquire theoretical knowledge of the modality and hands-on training should be implemented and adhered to evidence-based principles.

The results of the DOPS showed that the students were able to performed basic obstetric ultrasound examination well enough, although there were 2 students still at the “borderline level”. DOPS can be considered as an instrument to assess skill competence at the ‘does’ level consistent with the Indonesian Medical Doctor’s Standard of Competence which places the mastery of basic obstetric ultrasound examination in 4th level of competence . DOPS also not only contains the assessment of psychomotor ability, but also assesses the attitude, behavior and communication. This was consistent with the theory already described that learning attitude and behavior are key components of skills as well. These affective components primarily involve communicating with the patient about the nature, needs and potential risk of the procedures, and understanding of and empathy to patient problem. Hence, the assessment method should be able to embrace all these aspect together.

However, this study is only the first step in building a learning system to ensure students to be able to achieve basic obstetric ultrasound examination competence in accordance with the Indonesian Medical Doctor’s Standard of Competence. It still needs further study to get a pattern that is really ideal, valid, visible and reliable for learning basic obstetric ultrasound examination in clinical phase. Based on the experience of this study, this clinical supervision activity is quite draining the time and energy of the clinical teacher, among other obligations in medical service and research. This study also use the ultrasound which is also used for the medical service in ambulatory care, we suggest that it should be available ultrasound which is used only for learning, but of course funding support is needed. Based on the results of interviews with students with borderline level, it should be considered that there is the availability of adequate room in accordance with the number of existing students. The comparative factors between the lecturers and the students ultimately still have to be a concern when conducting clinical supervision activities in learning of the clinical rotation. A theory which states that there are three variables that influence the effectiveness of learning in outpatient facilities input variables, process variables and output variables exists. The input variables studied were room facilities available for the students to conduct the examination, and the number of students involved in a clinical rotation in a certain section and the quality of organizing the implementation of the activity. The variables of the process studied were the variation of patients in the number and type of disease and adequate supervision, while the output variable is the effectiveness of the rotation at the outpatient clinic. Room facilities were available positively or directly proportional to patient variations found by students. The better the provision of room facilities, the greater the opportunity for students to interact with patient in comfort will be. This room facility also affected the supervision variable. It will be easier for the clinical teacher to provide supervision when the room is available. The number of students involved in certain parts of the rotation will be inversely proportional to the variation of patients encountered by

students. In this case, the more students involved eating, the less chance each student has to interact with the patient in terms of interviewing, physical examination or procedural skill.

Conclusion and Implications

In this study, clinical supervision as teaching method together with learning media in the form of module and ultrasound video transferred positive results to improve achievement of student's competence in basic obstetric ultrasound examination skill. DOPS can be considered as suitable assessment method to assess the skill competence as a formative and summative assessment. The assessment system has to be implemented in regards to achieved targeted competencies at the time of graduation. The Faculty should ensure the consistent summative assessment implemented for students at every stage of their education in the preclinical phase and in all departments in clinical phase. The emphasis is not only on the results or summative assessment, but also formative assessment which provides constructive feedback. We believe that assessment is a very important part of learning process where the student can realize where they stand and whether they are in the right direction to become a competent doctor. However, the integration of basic obstetrics ultrasound learning along with ideal assessment method in clinical rotation needs to be established to ensure that graduates can achieve the desired competencies. Therefore, the existence of exit exam called UKMPPD which is become a national level examination focusing on the achievement of final stage medical student in keeping with Indonesia Medical Doctor's Standard of competence. In addition to the demands of the 4th level of competence 4 for basic obstetric ultrasound, we considered basic obstetric ultrasound skill as one of the materials needs to be assessed in OSCE UKMPPD.

Disclosure statement

No conflict of interest was reported by the authors.

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