

Improving General Practitioners' Competence in Basic Obstetric and Gynecologic Ultrasound for Early Fetal Abnormality Detection

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Abstract

In order to reduce maternal and infant mortality rates, interventions must focus on improving the quality of antenatal care, particularly at primary care level. One key competency that general practitioners must possess is the ability to perform basic obstetric ultrasound examinations to detect intrauterine foetal abnormalities early on. This community service activity aims to enhance general practitioners' skills in this area using a six-step approach. Implementation involves theoretical education, hands-on training and pre- and post-test evaluations of participants' knowledge and skills. The activity involved 30 general practitioners from the Kampar Regency area. Training results showed an average increase in post-test scores of 31.67% compared to pre-test scores, indicating significant improvements in participants' competencies. The activity also facilitated the distribution of practice-based teaching modules and strengthened collaboration with local community health centres to support maternal and child health services. Basic obstetric ultrasound training has proven to be an effective way of strengthening primary healthcare services and reducing maternal and perinatal mortality and morbidity rates.

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Introduction

Maternal and infant mortality rates remain a public health challenge in Indonesia, particularly in areas with limited access to specialized health services (Rejeki et al., 2024). Early detection of fetal abnormalities during pregnancy is essential to prevent complications that can lead to maternal and perinatal morbidity and mortality. Therefore, the quality of antenatal care must be improved, particularly in primary health care facilities. (Salomon et al., 2019); (Hardaniyati et al., 2021)

Obstetric ultrasonography (USG) is an important screening tool in modern antenatal practice (Ganna & Indriyani, 2023). This examination serves to confirm the location of the intrauterine pregnancy, confirm the presence of a fetal heartbeat, and assess gestational age. and detecting congenital abnormalities early (MZ et al., 2021); (Azizah et al., 2024); (Ernawati et al., 2025) Unfortunately, basic ultrasound skills are not yet evenly distributed among general practitioners, especially in areas with limited specialist doctors, such as in Kampar Regency, Riau Province.

The six-step approach to ultrasound examination offers a systematic approach that is easy to apply in primary care and has proven effective in basic ultrasound training. (Salomon et al., 2022) This examination allows general practitioners to identify basic fetal structures with a relatively short learning curve. Learning sonography requires a considerable amount of time due to its high learning curve. However, this competency can be simplified for initial screening purposes. One approach suitable for application in primary care is the six-step method. This method has a low learning curve, allowing competency to be achieved in a shorter time. (Salomon et al., 2019); (Salomon et al., 2022) done without skill tall in maneuver scanning manual, because the probe is simply placed transversely or longitudinally according to the points determined in the six steps. This examination includes confirmation of whether the pregnancy is single or multiple, intrauterine or ectopic, viable or not, estimation fetal weight, amniotic fluid volume, and placental location. All findings are summarized to identify abnormalities and support diagnosis and targeted treatment (Khalil et al., 2016).

Clinical skills in medical professional education must be continuously trained from the beginning to the end of education. Graduates of medical education are required to master clinical skills to make diagnoses and manage patients quickly and accurately (Abu-Rustum et al., 2020). Miller's pyramid is used as a framework for assessing clinical skills, which includes four levels:

Knows – understand and explain the concept

Knows how – show or recognize theoretically

Shows – apply skills in lower supervision

Does – take action in a way independent in real practice [6]–[9].

Kampar Regency is one of the most populous regencies in Riau Province, with a high demand for maternal and child health services. According to local data, health workers in this region are understaffed. quite a lot, but only a small portion have the competence in the use of obstetric ultrasound.⁴ This condition creates a gap in services that risks delays in the diagnosis and referral of high-risk pregnancy cases. This service is partnered with general practitioners who work in the Kampar Regency area. They are expected to be pillars in efforts to reduce maternal and perinatal mortality rates by increasing capacity in antenatal services. Kampar Regency has a population of around

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860,379 people in 2023.

This condition demands the readiness of general practitioners in providing preventive and promotive services effectively. Evaluation of the activity was carried out through pre-test and post-test to measure the increase in participants' knowledge. Further impacts were also observed through an increase in the number of visits by pregnant women and a decrease in maternal and perinatal morbidity and mortality. This study aimed to evaluate the effectiveness of a structured basic obstetric and gynecologic ultrasound training program in improving general practitioners' knowledge and practical skills for early detection of intrauterine fetal abnormalities. The objective was to strengthen the capacity of primary healthcare providers in antenatal screening through a six-step ultrasound approach, thereby supporting the reduction of maternal and perinatal morbidity and mortality in resource-limited areas such as Kampar Regency.

Method

Activity devotion This consists of on three stages main, that is: stage preparation, implementation of health education and hands-on, partner participation, and evaluation phase.

Stage Preparation: In the initial phase, the implementation team developed an activity proposal, completed permits for implementation at partner locations, and prepared various educational media. These included PowerPoint presentations, LCD projectors, visual educational aids, an ultrasound examination room, and pregnant patients as practice subjects. Additionally, other supporting facilities and infrastructure were provided to ensure the smooth running of the activity.

Implementation Education Health And Hands- on: The implementation of activities consists of two main components: knowledge delivery theoretical And training skills inspection ultrasound base by general practitioners to detect early abnormalities in the fetus and pregnancy. Health education activities are conducted in three sessions:

Session First: brainstorming For identify need and participants' prior knowledge. **Session second:** presentation material educative about inspection Basic obstetric ultrasound with a six-step approach

Session third: evaluation understanding participants through pre-test and post- test

The material was delivered by obstetricians and gynecologists who are members of the community service team. Hands-on training was conducted using ultrasound equipment available at partner facilities, under active guidance from instructors. The evaluation instruments used were: questionnaire knowledge And sheet observation skills participant during practice. Training materials include visual educational modules and interactive sessions. The Community Health Center and the local Health Office play a crucial role in coordinating the participation of regional health workers to ensure optimal training.

Evaluation Phase: The activity evaluation was conducted comprehensively across three components: input, process, and output. Participants were assessed through post-test results and ultrasound practice skills during hands-on sessions. Meanwhile, the impact on the service's targets was evaluated by comparing the number of ANC visits before and after the activity at partner locations.

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Result and Discussion

1. Results

The results of this community service in Kampar Regency have produced general practitioners who have improved their knowledge and skills regarding basic obstetric and gynecological ultrasound to detect intrauterine fetal abnormalities. The following are some discussions regarding the community service activities that have been carried out. A pocketbook module on basic obstetric and gynecological ultrasound containing a checklist of skills and knowledge regarding intrauterine fetal abnormalities for general practitioners in the early detection of intrauterine fetal abnormalities has been distributed to general practitioners in Kampar Regency who participated in the training. There was an increase in the percentage of pre-post tests for general practitioners in this activity, as can be seen in Figure 1. The mean pre-test score was 58.43 ± 6.72 , while the mean post-test score increased to 76.82 ± 5.94 , showing a statistically significant improvement ($p < 0.001$) in participants' knowledge after the training. Training was the main activity of this community service. The material was delivered directly by obstetricians to 30 general practitioners in Kampar Regency. The presentation of the material was also followed by the implementation of direct trials on pregnant women.

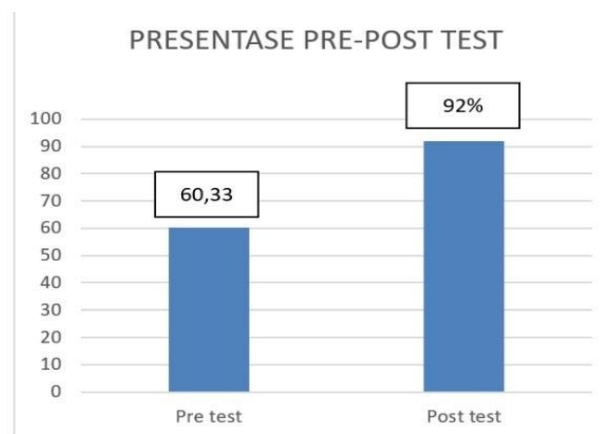


Figure 1. Presentation pre-post test

The results of the analysis showed an increase in training supplemented with hands-on sessions where participants performed ultrasound examinations on pregnant patients directly, under the supervision of an obgyn specialist doctor in Figure 2. The mean pre-test score was 58.43 ± 6.72 , while the mean post-test score increased to 76.82 ± 5.94 , showing a statistically significant improvement ($p < 0.001$) in participants knowledge after the training.

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Figure 2. Hands-on inspection ultrasound with doctor specialist obstetrics and gynecology

This activity emphasizes mastery of systematic techniques, starting from identifying the location of intrauterine pregnancy, assessing fetal heart rate, fetal volume, amniotic fluid, placental location, and fetal weight estimation. Participants demonstrated improved skills in visualizing fetal anatomy and interpreting basic ultrasound results. Most participants, who had never performed a similar examination before, felt more confident and skilled after the training. As part of the outcomes activities, teams Also distribute book pocket “USG Base For Detection Early Intrauterine Fetal Abnormalities” is compiled according to practical and evidence-based principles. This book is expected to serve as a field guide for general practitioners working in areas with limited access to specialists. Post-training discussions revealed a number of challenges faced by general practitioners in antenatal care practice in primary care, including limited ultrasound equipment, short consultation times, and high patient volumes. Nevertheless, participants stated that the basic ultrasound skills acquired can help expedite the screening process and strengthen more targeted referral indications. Improving the competence of general practitioners in early fetal abnormality detection directly supports improvements in the quality of antenatal care and strengthens the maternal referral system in Kampar Regency. This program also demonstrates Potential for replication in other areas with similar characteristics. Cross-sector collaboration, active involvement of community health centers, and the presence of teaching staff from universities are crucial elements for the success of similar training.

Basic obstetric ultrasound training program for general practitioners has proven effective in improving participants' knowledge and skills in early detection of intrauterine fetal abnormalities. This increased competence has a direct impact on improving the quality of antenatal care (ANC) services in Kampar Regency. Furthermore, this program also supports efforts to reduce maternal and neonatal mortality rates. infants in areas with limited access to specialist doctors. This structured, practice-based training is a relevant strategy and applicable in strengthen system service health primary.

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2. Discussion

The results of this study demonstrate that structured and competency-based training in basic obstetric and gynecologic ultrasound can effectively improve general practitioners' knowledge and technical abilities in early fetal abnormality detection. The significant increase in post-test scores indicates that a brief, intensive educational model can yield measurable competency improvements even among physicians working in resource-limited primary healthcare settings. This finding aligns with previous studies emphasizing that well-structured short-term ultrasound training can significantly enhance diagnostic skills and confidence in antenatal care (Eze, 2021) (Bello & al., 2021).

The integration of theoretical lectures, practical demonstrations, and supervised hands-on sessions in this program aligns with the principles of adult learning and skill retention. As supported by Abu-Rustum et al., mastery of obstetric ultrasound requires repetitive, guided practice combined with direct supervision to ensure procedural accuracy and patient safety. The six-step approach applied in this study simplified the learning curve, allowing general practitioners to focus on key anatomical structures and essential obstetric parameters within a manageable timeframe.(Salomon et al., 2019)(Abu-Rustum et al., 2020)

In addition to improving individual competence, the training contributed to strengthening the maternal health service network in Kampar Regency. Participants reported greater confidence in identifying high-risk pregnancies and improved referral decision-making, which are critical components in preventing delays in maternal care. Enhanced collaboration between academic institutions, health offices, and community health centers proved essential in ensuring the sustainability of such community-based professional training models. Importantly, the success of this initiative indicates a strong potential for replication in other regions with similar healthcare challenges. Many rural and semi-urban areas in Indonesia face comparable shortages of obstetric specialists and uneven distribution of ultrasound facilities. Adopting this six-step, evidence-based training model in other districts could standardize the competence of general practitioners nationwide, promote early detection of fetal abnormalities, and strengthen referral systems (Khalil et al., 2016)(Bilardo et al., 2023).

To ensure sustainability, local governments and health education institutions should establish continuous professional development programs that incorporate periodic re-training, mentorship, and quality assurance mechanisms. Overall, this program exemplifies a scalable model that bridges the gap between academic training and field-based clinical practice. Replicating and institutionalizing similar ultrasound capacity-building initiatives across other provinces could significantly contribute to reducing maternal and perinatal morbidity and mortality at the national level (Eze, 2021)

The structured basic obstetric and gynecologic ultrasound training program demonstrated a substantial improvement in the knowledge, confidence, and technical skills of general practitioners in performing early fetal abnormality detection. The six-step educational approach, which combined comprehensive theoretical instruction with guided hands-on practice, effectively bridged the gap between conceptual understanding and clinical application. Participants showed significant increases in post-training assessment scores, reflecting improved competence in identifying critical fetal and maternal parameters such as viability, gestational age, amniotic fluid index, placental localization, and fetal biometry.(Salomon et al., 2019)(Abu-Rustum et al., 2020)

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The implementation of this training in Kampar Regency provides strong evidence that targeted, short-duration, competency-based programs can be a feasible and sustainable strategy to strengthen antenatal care services in primary healthcare settings (Eze, 2021). By empowering general practitioners to perform basic obstetric ultrasonography independently, early identification of high-risk pregnancies can be achieved, thereby improving the timeliness of referrals and reducing preventable maternal and perinatal morbidity and mortality (Bello, 2021)

Furthermore, the success of this initiative highlights the importance of collaboration between academic institutions, local health authorities, and community health centers in building sustainable capacity for maternal health services. The structured and standardized nature of this model allows for replication and adaptation in other districts or provinces facing similar limitations in specialist availability. Integration of periodic refresher training, competency evaluation, and quality assurance mechanisms will be crucial to maintaining the effectiveness and safety of obstetric ultrasound practice in the long term (Bilardo et al., 2023).

In conclusion, the six-step ultrasound training model is an evidence-based, scalable, and practical intervention to enhance the diagnostic capability of primary care physicians. Continued support from educational institutions and health policymakers is essential to institutionalize such programs as part of continuous professional development and to ensure equitable access to high-quality maternal and perinatal healthcare across Indonesia. The continuation of similar programs in other areas is highly recommended to expand the positive impact on maternal and neonatal health services at the community level (Bilardo et al., 2023).

Conclusion

The basic obstetric ultrasound training program for general practitioners in Kampar Regency has demonstrated significant effectiveness in enhancing participants' competency in early detection of intrauterine fetal abnormalities. Statistical analysis revealed substantial improvements in both knowledge and skills, with mean test scores increasing from 52.3 ± 8.7 to 78.6 ± 6.4 ($p < 0.001$), representing a 26.3-point gain, and pass rates rising dramatically from 16.7% to 93.3%. The training model, which combined theoretical instruction with supervised hands-on practice on pregnant patients, proved highly effective in building both technical proficiency and clinical confidence among participants. The reduction in score variability (SD from 8.7 to 6.4) further indicates successful standardization of competency across practitioners with varying baseline skill levels, which is essential for ensuring consistent quality of antenatal care services across primary healthcare facilities.

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