

WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience: Ultrasound Examination

Highlights and Key Messages from the World Health Organization's 2016 Global Recommendations

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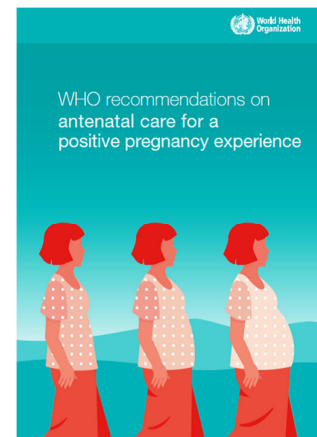
Key Messages

- In its 2016 antenatal care (ANC) recommendations for pregnant women, the World Health Organization (WHO) recommends one ultrasound (US) scan before 24 weeks gestation to estimate gestational age (GA), improve detection of fetal anomalies and multiple pregnancies, reduce induction of labour for post-term pregnancy, and improve a woman's pregnancy experience.
- WHO does not recommend a routine US scan after 24 weeks gestation for pregnant women who had an early US scan. If an early US scan was not performed, then stakeholders may consider performing a scan later in pregnancy to identify the number of fetuses, fetal presentation, and placental location.
- One potential benefit of an early US scan performed correctly is the increased accuracy and precision of GA assessment, which facilitates appropriate management of threatened preterm birth and post-term pregnancies.
- Comprehensive health system support for a minimum standard of US services, appropriate referral, and management of complications identified by US are important components of implementing the new US recommendation.
- Implementing and scaling up this US recommendation in low-resource settings require addressing a variety of logistical, infrastructural, human capacity, and financial challenges.

Background

Obstetric US is often performed to obtain fetal biometry (measurement), which facilitates estimation of GA, particularly when a scan is performed early in pregnancy. Accurate and precise GA assessment supports appropriate time-sensitive interventions during pregnancy and management of pregnancy complications, particularly pre-eclampsia and preterm labour and birth. Diagnostic US examination may also be used in specific situations during pregnancy to address concerns about fetal growth or evaluate clinical complications, such as suspected intrauterine fetal growth restriction or surveillance of fetal well-being. However, adverse outcomes may also occur in pregnancies without clear risk factors. Routine antenatal US performed by a competent provider may enable earlier detection of conditions that are not readily apparent, such as multiple pregnancies and placenta praevia, thereby facilitating timely and appropriate management of pregnancy complications by health systems with functioning referral processes and relevant provider expertise.¹ Additionally, some research suggests that US scans may reassure women about their pregnancies.²

This brief highlights the WHO recommendation on routine antenatal US examination and the policy and programme implications for translating this recommendation into action at the country level. Refer to the full WHO *Recommendations on antenatal care for a positive pregnancy experience* for other ANC guidance: http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/anc-positive-pregnancy-experience/en/. Additional guidance is available in volumes I and II of WHO *Manual of diagnostic ultrasound*.^{3,4}



¹ Whitworth M, Bricker L, Mullan C. Ultrasound for fetal assessment in early pregnancy. *Cochrane Database of Syst. Rev.* 2015;(7):CD007058. doi: 10.1002/14651858.CD007058.pub3.

² Oluoch DA, Mwangome N, Kemp B, Seale AC, Koech A, Papageorgiou AT, et al. "You cannot know if it's a baby or not a baby": uptake, provision and perceptions of antenatal care and routine antenatal ultrasound scanning in rural Kenya. *BMC Pregnancy and Childbirth.* 2015;15(127). doi: 10.1186/s12884-015-0565-5.

³ Manual of diagnostic ultrasound volume I, second edition. Geneva: World Health Organization; 2011 (<http://apps.who.int/medicinedocs/documents/s21383en/s21383en.pdf>, accessed 21 November 2017).

⁴ Manual of diagnostic ultrasound volume II, second edition. Geneva: World Health Organization; 2013 (<http://apps.who.int/medicinedocs/documents/s21384en/s21384en.pdf>, accessed 21 November 21, 2017).

Implementation Considerations

The WHO ANC recommendations aim to empower all women and adolescent girls to access the type of person-centred ANC that they want and need and to provide a sound foundation for such care in accordance with a human rights-based approach. These ANC recommendations complement WHO's ongoing work in developing evidence-based guidance to improve quality of care provided to all mothers and babies throughout the continuum of care. Notably, the US recommendation addresses routine use of obstetric US rather than assessment of suspected complications, such as threatened miscarriage or ectopic pregnancy. US may also be used to evaluate fetal presentation and heart rate, especially in obese women, as well as placental location and adherence in cases of antenatal and intrapartum haemorrhage. Before introducing routine antenatal US services in facilities, stakeholders should plan for the impact on national policies and standards of practice, health sector finance, equitable access to ANC, regulatory bodies, health worker training, and delivery of US and ANC services (see Table 1).

Before performing the US examination during antenatal screening, the provider should counsel the woman on potential benefits and limitations of the scan. In an antenatal screening US, providers should confirm fetal cardiac activity, accurately and precisely establish GA, determine number of fetuses, and, in the case of multiple pregnancies, assess chorionicity and amnionity (see Box 1).⁵ After the US scan, the provider should document results in the woman's care record and share the results with her, including any recommended follow-up care, particularly for findings requiring urgent intervention (e.g., ectopic pregnancy).

Box 1. Components of antenatal screening US

- Cardiac activity
- Fetal number
- Chorionicity if multiple pregnancy
- Gestational age
- Fetal size
- Presence of normal head, neck, face, spine, chest, heart, abdomen, abdominal wall, and extremities (more informative after 18 gestational weeks)
- Placental appearance and location (more informative after 18 weeks)

In a first trimester US, the provider can use the crown-rump length to estimate GA; in general, this measurement is superior to gestational sac diameter for GA estimation. Crown-rump length is optimally measured after 10 weeks gestation but before 14 weeks gestation. The following sonographic parameters are frequently used to estimate GA and assess fetal size in the second or third trimester: biparietal diameter (BPD); head circumference (HC); abdominal circumference (AC); and femur length (FL).

National Policy and Training Recommendations

Countries should review and update their policies and training standards, as appropriate, to support adoption of the new ANC recommendations:

- Update national standards and clinical guidelines for provision of obstetric US services.
- Update relevant training curricula for physicians, nurses, midwives, and other US providers (e.g., sonographers).
- Promote standards and training in clinical skills for routine GA assessment during ANC, e.g., strengthening skills of providers to conduct history and physical exams (uterine sizing) and understand the strengths and limitations of US, which is most accurate and precise for estimating GA in the first trimester compared to later in pregnancy.

Countries should adopt a standardized curriculum and competency assessment for teaching health care workers how to perform obstetric US scans to improve safety and quality of clinical care. Only health care workers who are trained and updated regularly in the appropriate clinical use of US and related counselling should conduct US examinations. Uncontrolled use of US for nonmedical purposes should be avoided.

Providers should have received training to perform standard components of antenatal screening US examination (see Box 1). To maximize the potential benefits of routine antenatal screening US, comprehensive training of US providers also includes understanding the importance of appropriate referral and management of abnormalities diagnosed by US. Obstetric US has an excellent safety record, and, to date, no independently confirmed study has suggested otherwise. In general, providers should understand how to monitor mechanical and thermal indices on US equipment and follow the "ALARA" principle—that total exposure be "as low as reasonably achievable."⁶

Programme Recommendations

Planning proactively and collaboratively with frontline ANC service providers will facilitate allocation of appropriate human resources needed to accommodate new US services and high-quality implementation of other routine ANC services. Programmes should promote adherence to evidence-based practices for routine obstetric US and management

⁵ Salomon LJ, Alfirevic Z, Bilardo CM, Chalouhi GE, Ghi T, Kagan KO, et al. ISUOG practice guidelines: performance of first-trimester fetal ultrasound scan. *Ultrasound Obstet Gynecol.* 2013;41(1):102–113. doi: 10.1002/uog.12342.

⁶ WHO manual of diagnostic ultrasound, second edition. Geneva: World Health Organization; 2011 (<http://apps.who.int/medicinedocs/documents/s21383en/s21383en.pdf>, accessed 14 November 2017).

of complications in pregnancy. To facilitate maximum clinical benefit to women, programmes should consider implementation strategies, with particular attention to the following:

- Increasing provider and community awareness of the benefits of ANC, especially beginning in the first trimester, while addressing cultural and health system barriers to ANC access
- Promoting provider practices that address women's personal desires and needs in ANC and developing counselling skills to share information and interact with women and their families
- Promoting service delivery readiness at different levels of the health system before offering services—readiness includes having trained staff, practice and referral guidelines, equipment and other supplies, infection prevention and control standards, environmental controls, routine quality assurance measures, etc.
- Establishing reliable referral pathways, and coordinating specialized care for women with abnormal findings that are suspected or diagnosed through obstetric US
- Engaging with national obstetrics, radiology, US, nursing, and midwifery associations to update members on the new ANC recommendations and contribute to discussions on implementation.

Box 2. Suggested equipment capacity for obstetric US

- Real-time, grayscale capabilities
- Transabdominal transducer (3–5 MHz)
- Transvaginal US transducer to help detect placental abnormalities and extrauterine pregnancies
- Adjustable acoustic power output controls with output display standards
- Freeze-frame capabilities and electronic calipers
- Obstetric presets (software) to estimate GA
- Capacity to print or store images
- Regular maintenance and servicing, important for optimal equipment performance

In general, service delivery settings that will **only** conduct routine basic obstetric US will **not** require a machine with additional features such as Doppler or 3-D/4-D imaging. A transvaginal transducer may also be useful in some examinations where an experienced provider is unable to visualize anatomy with a transabdominal transducer.

Equipment and Other Cost Considerations

The cost of US equipment, especially portable compact units, has decreased in recent years; some units are available for less than USD 10 000. However, additional costs, such as for different transducers, product guarantee (warranty), and yearly maintenance should also be considered.^{7,8} Given the cost of equipment, routine and incidental maintenance, conductive agents (US gel), initial and ongoing staff training and supervision, environmental and electrical surge protection for equipment, and staffing (allowing 15–45 minutes per scan), performing routine US examinations has multiple resource implications. Proper handling and care of equipment can prevent costly losses. Prior to purchasing US equipment, stakeholders should determine if warranties or repair engineers are locally available to maintain the make and model of equipment in question; if not, stakeholders should work to build this capacity. Given the financial investment required for performing US scans for antenatal screening, it may be advisable to use US equipment for other indications, such as obstetric emergencies, or to make equipment available to other departments. The opportunity costs of choosing to implement antenatal US should also be considered as investments may impact the availability of funds for other key lifesaving maternal and newborn interventions.

Monitoring, Evaluation, and Programme Learning

New routine antenatal US programmes should aim to design and implement a service delivery system that includes a strong evaluation component and, where possible, engages in implementation research to generate programme learning on implementation strategies in various settings, including health centre and hospital levels. A thorough approach to monitoring and evaluation should ensure that a minimum set of data are available and of good quality to facilitate improvements in obstetric US practice. These data collected should include the reason for the US (screening versus diagnostic), GA at examination, and appropriate referral and management of pregnancies with complications. These data should be used to track financial implications for the facility and health system overall, including attention to appropriate and inappropriate use of US. Finally, these data should enable an understanding of health and gender equity issues related to the availability and accessibility of routine antenatal US services. For example, if women are expected to pay for their US scans, or if scans are not available to women living in rural areas, this intervention could perpetuate existing inequalities. In some countries, determination of fetal sex via US has a negative impact on gender equity and should be monitored.

⁷ Harris RD, Marks WM. Compact ultrasound for improving maternal and perinatal care in low-resource settings: review of the potential benefits, implementation challenges, and public health issues. *J Ultrasound Med.* 2009;28(8):1067–76. doi: 10.7863/jum.2009.28.8.1067.

⁸ Compendium of innovative health technologies for low-resource settings. Geneva: World Health Organization; 2015 (http://www.who.int/medical_devices/innovation/compendium/en/, accessed 4 December 4, 2017).

Table 1. Implementation considerations for introduction of obstetric ultrasound (US) services

Consideration	Level			
	National	Subnational	Facility	Frontline provider
National policies and standards of practice	Create/update and promote evidence-based policies and standards for US use as part of routine ANC to cadres who will perform US. Establish and update standards for education, training, and maintaining US competencies to provider cadre. Promote legal scope of practice for different cadres who conduct routine obstetric US.	Provide supervision and training for adhering to standards. Oversee QI processes to achieve and sustain standards. Promote mechanisms that facilitate sharing US reports among facilities across the continuum of care.	Track a small number of key measures to assess adherence to national standards, including those that assess impact on overall quality and coverage of ANC services. Engage staff responsible for IPC in implementation of evidence-based standards.	Conduct/refer for obstetric US according to evidence-based practice, and document results. Understand how to update GA/estimated date of delivery, and conduct standard components of obstetric US using evidence-based guidelines. Understand legal scope of practice for conducting routine obstetric US.
Financial	As part of an overall national maternal health budget, calculate the cost of equipment, ongoing supplies, service contracts, power supply and surge protection, environmental upgrades, and provider capacity-building.	Contribute to budget estimation, particularly in regard to power supply and surge protection, environmental upgrades, and capacity-building of providers.		Understand the cost implications of adequate versus inadequate care and maintenance of equipment.
Service delivery, including environment of care and equipment	Understand current geographic distribution of functional machines, US providers, and maintenance providers. Confirm stable power supply and availability of surge protection for facilities where US services will be introduced. Purchase equipment based on distribution of working machines, trained providers, and clinical needs.	Contribute to national and regional discussions on appropriate settings and timeline for introduction of US services. Guide decisions about rational distribution of US services (geographic, health system levels, etc.).	Install equipment in facilities that have met conditions to protect equipment from heat, electrical power surges, moisture, damage, and theft. Maintain IPC practices. Comply with standards for equipment care, security, and maintenance.	Understand individual responsibilities for service delivery, including US assessment and/or referral, documentation, counselling, safe and effective use of US equipment, and IPC practices to avoid cross-contamination. Understand and comply with requirements for care, security, and maintenance of equipment at local levels.

ANC: antenatal care; GA: gestational age; IPC: infection prevention and control; QI: quality improvement; US: ultrasound

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For further information on the WHO guidelines, please contact reproductivehealth@who.int or mncah@who.int.

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