BMJ Global Health

Strengthening antenatal care services for all: implementing imaging ultrasound before 24 weeks of pregnancy

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To cite: Noguchi L, Bucagu M, Tunçalp Ö. Strengthening antenatal care services for all: implementing imaging ultrasound before 24 weeks of pregnancy. *BMJ Global Health* 2023;**8**:e011170. doi:10.1136/bmjgh-2022-011170

Handling editor Seye Abimbola

Received 4 November 2022
Accepted 15 April 2023

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INTRODUCTION

In high-income countries, ultrasound is a routinely used imaging assessment during pregnancy. Examination of the fetus, uterus, placenta and surrounding anatomy via ultrasound can generate results that inform clinical diagnosis and decision-making, and optimally improve experience of care. Importantly, ultrasound measurement of the fetus enables accurate gestational age estimation, which in turn facilitates appropriate, time-sensitive prevention and treatment interventions during pregnancy.[1] Routine antenatal ultrasound may also enable earlier detection of pregnancy states that are not readily apparent, but require special management, such as multiple pregnancies and placenta praevia. However, in many low-income and middle-income countries, access to routine, high-quality ultrasound within antenatal care (ANC) remains inconsistent.[2]

REAFFIRMED RECOMMENDATION FOR ONE OBSTETRIC ULTRASOUND SCAN BEFORE 24 WEEKS GESTATION

In 2016, the WHO published *WHO recommendations on antenatal care for a positive pregnancy experience*,[3] a landmark global guideline for pregnancy care. These recommendations aim to empower all women and adolescent girls to access the type of person-centred ANC that they want and need and provide a sound foundation for such care in accordance with a human rights-based approach. This was the first set of WHO guidelines that included one obstetric ultrasound scan before 24 weeks gestation. A guideline panel review of updated evidence convened by WHO has resulted in this recommendation being retained and reaffirmed (box 1).[4] Given the complexities surrounding inclusion of routine ultrasound services in ANC, WHO, in collaboration with MOMENTUM Country and Global Leadership, has published a new evidence brief highlighting implementation considerations to support countries to operationalise this recommendation.[5]

Summary box

⇒ A guideline panel review of updated evidence convened by the WHO has resulted in 2016 recommendation on routine antenatal ultrasound being retained and reaffirmed.
⇒ Given the many complexities surrounding the inclusion of routine ultrasound services in antenatal care, WHO, in collaboration with the MOMENTUM Country and Global Leadership project, has published a new evidence brief highlighting implementation considerations to support countries to implement this recommendation within their health systems.
⇒ As new evidence-based interventions emerge and are included in the global recommendations to improve health and well-being of pregnant populations, the global maternal newborn health community must ensure that their introduction and implementation takes local context into account and employs an inclusive, equitable, health systems approach with a continuous learning agenda.

IMPLEMENTATION CONSIDERATIONS

Evidence regarding conduct and impact of routine imaging ultrasound before 24 weeks of pregnancy has not changed substantially since the 2016 WHO recommendation. However, implementation considerations have been expanded based on findings of a qualitative evidence synthesis of views and experiences of ultrasound service users and health workers (box 2).[6] The ultimate goal of antenatal ultrasound services should be to support equitably provided, high-quality care (including experience of care) and individual clinical encounters that are safe, informative and integrated as part of the package of ANC.

Assessing health system readiness before introduction or expansion of ultrasound

Box 1

One ultrasound scan before 24 weeks of gestation is recommended for pregnant women to estimate gestational age, improve detection of fetal anomalies and multiple pregnancies, reduce induction of labour for post-term pregnancy and improve a woman's pregnancy experience.

services can help to identify bottlenecks in care that may impede their potential benefits.[7] Planning proactively with frontline health workers and professional associations (eg, nursing, midwifery, obstetrics and radiology) to address bottlenecks will facilitate allocation of appropriate human and other resources needed to accommodate high-quality implementation of new and routine ANC services. The first barrier to implementation may be cultural and health system barriers to early entry to ANC, including systemic factors that impede positive relationships between health workers and clients.[6] Other bottlenecks may include lack of trained staff for ultrasound practice and equipment maintenance, unclear practice and referral guidelines, limited equipment and routine supplies, inconsistent attention to infection prevention and control and environmental controls for equipment, routine quality assurance measures, and importantly, strong capacity to triage and manage complications safely and appropriately. Referral pathways for those with follow-up needs and abnormal findings suspected or diagnosed through obstetric ultrasound are necessary for comprehensive services, but are inadequate alone, as timely clinical management of complications will optimise impact of routine antenatal ultrasound on health outcomes. High-quality encounters include both clinical care and related counselling. Pregnant individuals and their partners/families should be provided with clear information about the purpose of routine antenatal ultrasound, potential consequences of fetal anomaly detection and any out-of-pocket costs for services. Pregnant individuals may have preferences around ultrasound that should be considered by health workers in a framework of shared decision-making. Health workers should document and share results, including recommended follow-up care, particularly for findings requiring urgent intervention. Families should receive additional counselling and access to social support when an abnormal diagnosis is possible or confirmed. Decision makers should also consider potential social, cultural and legal implications of documenting or revealing fetal sex. Gender bias, cultural preference for male infants in some settings, the ethical imperative to respect bodily autonomy, sex-selective abortion practices and possible impact on sex ratio imbalances are important considerations for effective and equitable implementation of this intervention.

Countries should consider adopting a standardised curriculum and competency assessment for teaching health workers how to perform ultrasound scans to improve safety and quality of clinical care.[4 5] Consideration should be given to distinguishing training curricula for basic scans (eg, for cardiac activity, fetal number, gestational age, selected anatomy and placental location) versus more advanced competencies (eg, targeted anomaly scan). Such training should include didactic and supervised clinical practicum components. Many settings use a tiered approach, whereby some components are performed routinely by health workers who are trained in selected basic ultrasound skills, and scans requiring more advanced skills are performed by more experienced specialists. Education programmes should promote standards and training in skills for routine gestational age

Box 2

Key Implementation Considerations

- ⇒ Plan guideline implementation proactively with a range of stakeholders.
- ⇒ Make safe, high-quality provision and experience of ultrasound care as the goal for patients and families. Sociocultural influences and expectations; the power of visual technology; potential consequences of antenatal ultrasound findings and the significance of human relationships in the ultrasound encounter all have substantial impacts on the experience of care.
- ⇒ Plan for antenatal ultrasound services that include a basic set of assessments.
  - ⇒ Location of pregnancy (intrauterine or extrauterine).
  - ⇒ Fetal number (singleton or multiple).
  - ⇒ Cardiac activity (present or absent, fetal heart rate).
  - ⇒ Fetal size and gestational age estimation.
  - ⇒ Chorionicity and amnionicity if multiple pregnancy.
  - ⇒ Where the skill set and health systems allow, the following, which are more informative after 18 weeks of pregnancy, may also be assessed:
    - ⇒ Presence of structural abnormality in the fetal head, neck, face, spine, chest, heart, abdomen, abdominal wall and/or extremities.
    - ⇒ Placental appearance and location.
- ⇒ Standardise the curriculum and competency assessment for teaching health workers how to perform ultrasound scans based on the purpose of the ultrasound scan to improve safety and quality of clinical care, going beyond technical skills to include counselling competencies.
- ⇒ Those who perform obstetric ultrasound should have specialised training that is appropriate to the practice of screening ultrasound in pregnancy.
- ⇒ Help ultrasound providers and recipients to understand the potential benefits and limitations of screening ultrasound. Many pregnancy complications, including fetal malformations, may develop later in pregnancy, may not be detectable by ultrasound or may not be detectable without appropriate ultrasound training and equipment.
- ⇒ Strengthen health system capacity to refer and manage complications in a safe and timely manner. Without this capacity, the potential positive impact of screening ultrasound will be significantly limited.
- ⇒ Consider potential impacts on health workers and their existing duties.
- ⇒ Determine which ultrasound systems are fit for purpose before purchasing.
- ⇒ Aim to design and implement a service delivery system that includes a strong evaluation component.

assessment during ANC, for example, strengthening skills of health workers to conduct history and physical examinations and understand the strengths and limitations of ultrasound, which is more accurate and precise for estimating gestational age in the first trimester than later in pregnancy. Training must go beyond capture and interpretation of images to include a range of competencies as part of a continuous approach to learning. Infection prevention and control measures, calculation of best obstetric estimate for gestational age, when and when not to redate pregnancies and special counselling considerations related to referral and management of suspected complications are all part of comprehensive training programmes.

Expanding the scope of practice for health workers to include additional skills like ultrasound can have both positive and negative consequences.[4 5] While the opportunity to acquire new skills may be rewarding for some, others may find new requirements to be burdensome and/or distracting from current duties. Policymakers should also be mindful of potential negative impact of shifting personnel in settings with staff shortages. The health system must be aware of the risk of medico-legal exposure and develop mechanisms to protect clinicians, including use of an informed consent process. Some complications, including fetal malformations, may develop later in pregnancy or may not be detectable, even with appropriate ultrasound training and equipment.

Before purchasing, health systems should clarify that ultrasound systems are fit for purpose and if associated software applications are subject to regulatory constraints, for example, for download, in their country. The cost of equipment, especially for point-of-care ultrasound (POCUS) devices, has decreased in the past decade. However, additional costs, such as for different transducers, additional viewing devices, if needed (eg, phone or tablet), product guarantee and periodic maintenance should also be considered. Some devices require paid accounts or cloud-based storage of reports and images. Other POCUS devices, while affordable, may lack capacity to calculate gestational age. Given cost of equipment, routine and incidental maintenance, conductive agents, initial and ongoing staff training and supervision, environmental and electrical surge protection for equipment and staffing (allowing 15–45 min/scan), performing routine examinations has multiple resource implications. Proper handling and care of equipment can prevent costly losses. Prior to purchasing equipment, stakeholders should determine if warranties or repair engineers are locally available to maintain equipment; if not, it will be important to build this capacity. A harmonised approach to procurement may also assist countries in keeping types of machines similar for ease of maintenance and to decrease maintenance cost. While introducing ultrasound in primary healthcare-level facilities, portable equipment may be considered. In isolated or rural areas, this may also be useful, especially in communities that may not have resources to engage with formal maternity services or where poor infrastructure limits access. However, these settings may face significant challenges in charging and protecting devices.

When introducing routine imaging ultrasound within ANC, it is important to design and implement a service delivery system that includes a strong evaluation component and, where possible, engages in implementation research in various settings, including health centre and hospital levels. The WHO ANC monitoring framework includes a specific indicator: 'Percentage of pregnant women with an ultrasound scan before 24 weeks'.[8] A thorough approach to monitoring and evaluation should ensure that data are available and of good quality to facilitate improvements in ultrasound practice. These data should include reason for ultrasound (screening vs diagnostic), gestational age at examination and appropriate referral and management. Tracking financial implications for facilities and health systems, including attention to appropriate and inappropriate ultrasound use, are important evaluation components. Finally, data should enable understanding of health and gender equity issues related to availability and accessibility of routine ultrasound services.

CONCLUSION

The future of ANC interventions, including for antenatal ultrasound, hold great promise, with a range of clinical, programmatic and digital innovations currently under exploration; the additions of artificial intelligence, simulators for education and self-care components of ultrasound are all at various stages of investigation and evaluation in under-resourced settings. As new evidence-based interventions emerge and are included in global recommendations to improve health and well-being of pregnant populations, the global maternal newborn health community must ensure introduction, and implementation takes local context into account and employs an inclusive, equitable, health systems approach with a continuous learning agenda.

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Acknowledgements The authors wish to acknowledge the contributions of the WHO Guideline Development Group and Steering Group on Imaging Ultrasound Before 24 Weeks of Pregnancy.

Contributors All three authors made substantial contributions to the conception of this commentary, drafted and revised it critically for content, provided final approval of the version to be published, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Funding This brief is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of the Cooperative Agreement AID-OAA-A-14-00028, led by Jhpiego and partners, and the WHO. The contents are the responsibility of MOMENTUM Country and Global Leadership and WHO and do not necessarily reflect the views of WHO, USAID or the US Government.

Disclaimer The author is a staff member of the World Health Organization. The author alone is responsible for the views expressed in this publication and they do not necessarily represent the views, decisions or policies of the World Health Organization.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval Not required.

Provenance and peer review Not commissioned; internally peer reviewed.

Data availability statement There are no data in this work.

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