

Recommendation and Guidelines for Perinatal Practice

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Ultrasound in Africa: what can really be done?

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Abstract: Today we are living in a globalized world in which information on what is happening in one part of the world is easily communicated to other parts of the world. This happens thanks to advancement in science and technology. One area where technology has made the greatest impact is health care provision. Ultrasound technology is now playing a critical role in health care provision particularly in Obstetrics and Gynaecology. This has significantly assisted in provision of quality health care to pregnant women and their unborn infants and in reducing maternal and neonatal morbidity and mortality in the developed world. Africa the continent with greatest health care challenges and with the highest maternal and neonatal mortalities is yet to fully utilize this important technology. The need for this technology is great as the conditions requiring

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its application abound. The effective application of Ultrasound however faces serious challenges in Africa. To successfully entrench Ultrasound in quality Obstetrics and Gynaecology care various approaches must be adopted to overcome the challenges. The aim of this paper is to identify the benefits and the challenges inimical to the application Ultrasound in Obstetrics and Gynecology in Africa. It also examines what needs to be done to achieve better application of Ultrasound in Obstetrics and Gynecology.

Keywords: Africa; benefits; challenges; ultrasound.

Introduction

During this time of fast globalization, it is clear that no human endeavor is more adapted to the globalized world than science and medicine [1]. Globalization is inevitable, usually desirable, and entails advantageous and disadvantageous issues [1]. It is what makes the contemporary world dynamic and constantly changing. This change transcends all aspects of life and has profound influence on our lives today. The changes are made possible thanks to science and technology. One area where technology has had its greatest impact is health care service delivery. One of the most important technological instruments in quality health care service provision is the ultrasound whose application is ever widening. It has been recommended by the World Health Organization (WHO) for dissemination to developing nations during the second phase of its earlier basic radiology system initiative [2]. It is considered a type of sustainable technology for developing countries, because of its relatively low cost of purchase, low cost for maintenance and supplies, portability, and durability compared with other imaging modalities [3]. In addition, the ultrasound is non-invasive, safe, readily available, and widely acceptable. Its widespread application in the developed world in the fields of obstetrics and gynecology has contributed significantly in eliminating maternal and neonatal morbidity and mortality.

Despite the immense benefits of using the ultrasound in the fields of obstetrics and gynecology, Africa is very

much lagging behind in harnessing these benefits compared with other regions of the world. Ironically, although Africa is the continent with the greater number of health care challenges, it has yet to fully take the initiative in entrenching the use of the ultrasound as part of its health care provision programs. Africa has the highest maternal and neonatal mortality rates, and as such, it needs to wake up and do more if it wants to achieve the Millennium Development Goals (MDGs) 4 and 5. It should use all available means, including the use of the ultrasound, to achieve these goals.

The aim of this paper is to identify the benefits and the challenges that are inimical to the application of the ultrasound in the fields of obstetrics and gynecology. The paper also examines the actions that need to be done to achieve better application of the ultrasound in this field.

The benefits of using the ultrasound in the fields of obstetrics and gynecology in Africa

Research and programs in maternal and neonatal health in developed countries has clearly shown that maternal and neonatal mortalities result from preventable causes. The WHO lists the most common causes of maternal mortality as hemorrhage, sepsis, complications of abortion, eclampsia, and obstructed labor [4]. Similarly, the WHO also listed the causes of neonatal mortality to include infections, birth asphyxia, birth injuries, preterm births, and birth defects [4]. It is worth noting that these mortality causes are conditions for which timely ultrasound imaging could be of immense help in early diagnosis and intervention, leading to a reduction of mortality rates among mothers and their babies [5]. It should also be noted that 99% of these avoidable deaths occur in developing countries where ultrasound imaging is currently underutilized [5]. As a result of comprehensive health care services in the developed world, the ultrasound has become a routine part of obstetric care, resulting in the detection of anomalies in pregnancy early in the gestation period [6]. Potential life-threatening complications, such as fetal malpresentation, multiple gestations, ectopic pregnancy and placenta praevia, may be earlier identified and appropriately managed with the use of ultrasound screening study [7]. This information, coupled with accurate gestational age dating from ultrasound, can assist in the management of pregnancies to allow the mother to reach appropriate obstetric care prior to delivery if a

high-risk pregnancy is identified [8]. In comparison, in the developing world, the coverage of obstetrics ultrasound is poor [9], and the opportunity to identify and manage risks during pregnancy is limited to clinical examination; in fact, obstetric care may be non-existent altogether [6]. This is more so in Africa where the limitations are more acute.

Maternal mortality rates in Africa range between 620 to 100,000 per live births [10] and much higher in some countries. As Africa grapples with this unacceptably high maternal and neonatal mortality rates, all efforts must be made to look for new approaches to reduce this rate. The potential to reduce maternal and neonatal deaths through the use of the ultrasound is significant and addresses two of the MDGs, including (1) MDG 4, which aims to reduce child mortality, and (2) MDG 5, which aims to improve maternal health [11]. Improving the level of obstetric care is critical in addressing MCH outcomes and accelerating progress towards achieving MDG 4 and MDG 5 [6].

Obstructed labor is an avoidable labor complication that may lead to infectious morbidity, ruptured uterus, and postpartum hemorrhage. It may arise due to macrosomia, abnormal fetal lie, and abnormal fetal morphology. Ultrasound fetal biometry and fetal morphology can diagnose these causes early and appropriate intervention can be given to forestall them. Ultrasound Doppler velocimetry can also be employed to screen for preeclampsia, abruptio placentae and fetal growth restriction; thus providing the opportunity for proper management and timely interventions to reduce the fetomaternal risks. Correct gestational age (GA) determination can also help in making correct diagnosis of preterm pregnancy, and avoid unnecessary interventions for misdiagnosed postdate. In most developed countries, the accurate estimation of GA by ultrasound imaging is likely to be more beneficial and significant than in developed countries, as the majority of pregnant women in the former areas can not recall their LMP [12], probably due to high illiteracy rates among the pregnant women. This lack of information makes them far more vulnerable to unrecognized preterm delivery (a major cause of perinatal mortality), and post-maturity syndromes associated with fetal distress and long-term development disorders [5].

The ultrasound also has useful applications in the field of gynecology. Early, correct, and widespread usage of this instrument has the potential to improve the lives and welfare of women from neglected uterine fibroids, molar pregnancy, and even ovarian tumors. Owing to illiteracy and poor health-seeking behaviors, lesions are allowed to grow to unimaginable sizes, thereby causing complications and even deaths.

Challenges to the utilization of ultrasound in the fields of obstetrics and gynecology

Many factors hinder the introduction and effective use of certain health care programs, services, and commodities in Africa. To effectively achieve results, there is a need to address the problem from different perspectives. The twin impediments of illiteracy and poverty have resulted in limited access to ultrasound utilization in Africa. Ultrasound services are more widely available in urban sub-Saharan Africa where 30% of the women have access compared with those in rural areas, in which only 6.9% have access to it. A study in South Africa showed that 68% of women in urban areas have access to ultrasound compared with 18% in the rural areas [9]. Related to illiteracy and poverty is the wrong belief that the use of the ultrasound is harmful. Cultural beliefs and norms in some communities dictate the choice of female health workers attending to women in need of medical services. In many instances, women overestimate the diagnostic benefits of ultrasound, as demonstrated in studies carried out in Tanzania, Nigeria, Botswana, and Vietnam [13]. This may have partly affected the successful introduction of the ultrasound into some communities in Africa.

Today, Africa lacks trained manpower in different spheres of its development, including the field of health care. Trained and experienced practitioners are the fulcrum of successful and quality ultrasound service provision. The lack of trained practitioners has created a lacuna for wrong diagnosis with grave consequences for pregnant women and their unborn child. The absence of proper supervision and guidelines for practitioners has also allowed untrained people to carry out the ultrasound service provision, which creates an environment for abuse and misuse of this tool that, in turn, leads to potential harm to women.

The use of old and obsolete ultrasound machines with poor picture quality coupled with lack of constant power supply and capacity of maintenance and servicing of these machines also hinder the quality and sustainability of ultrasound services, particularly in rural Africa.

The way forward

To achieve progress in this aspect requires providing solutions and making recommendations. It is obvious that policy-makers must be fully involved and foster an

environment that is conducive for the full utilization of the ultrasound in general and in the fields of obstetrics and gynecology in particular. General measures must be taken by governments of African nations to reduce the level of illiteracy and poverty. This will potentially create awareness about the need for ultrasound machines and the ability to access and pay for ultrasound services. Universal access and effective use of ultrasound services are bound to serve the society better.

In addition, governments must provide supervision and control of services wherever they are available by putting guidelines in place with regards the people who should provide the services and the level of training and certification these practitioners should have. All facilities providing ultrasound services must be registered with regulatory authorities, and there should be mandatory continuous education for all practitioners. These measures will improve the quality of the service, check the practice of untrained individuals, and reduce abuse and misuse of ultrasound services. In China and India, there is an emerging ethical problem with regards the use of ultrasound where fetal sexing has skewed the gender ratios as the laws guiding the practice are largely ignored [14]. In Africa, if this practice is not checked, it can also potentially have devastating sociodemographic implications on our population's worsening situation.

Currently in African ultrasound facilities, biometric nomograms of developed countries are used in the evaluation of fetal growth. This may, however, lead to inaccurate assessments resulting in wrong clinical judgements. In low resource settings, endemic malaria, maternal HIV, and nutritional factors, such as low pregnancy weight and weight gain, lead to a lower average fetal weight [6]. For this reason it may be necessary to customize nomographs to the local setting [6]. This is of importance in the accurate diagnosis of intrauterine growth restriction in low resource settings, such as in African facilities [15].

Two areas have greater implications on access to as well as the quality and sustainability of ultrasound service provision wherever it is established: ultrasound equipment and the maintenance and training of their users. It is not only the availability but also the quality of ultrasound machines in use that influence the reliability and accuracy of ultrasound service provision. A study in South Africa revealed that 42% of the machines in use were bought more than 5 years before the survey and one machine was bought 16 years ago [16]. The age of the machine plays a definite role in the quality of ultrasound investigations as ultrasound machine technology progresses constantly [16]. Even though it said that the cost of purchase of ultrasound machines is low, making it

relatively affordable, in Africa this may not necessarily be the case because of scarcity of financial resources. For this reason, agencies and organizations should be encouraged to continue donating ultrasound machines, both new and fairly used. The Rotary Club has done that before in some African countries, making ultrasound service provision available to many women in different parts of Africa. Yet, availability without maintenance will definitely lead to the unsustainability of the services provided. In this respect, manufacturers of ultrasound systems must support developing countries by providing offices, sales representatives, and application specialists, who can assist with the dissemination of equipment, installation, and instruction on equipment usage and maintenance [5].

Training is also critical in the sustainability, quality, and reliability of any service, especially ultrasound services. A study showed that only 18.6% of ultrasound practitioners had training in their postgraduate studies (MFamMed 5, Diploma 3) [16]. Another study reported that 40.4% of operators have short course in theory only, 38.3% of sonographers have no training at all, and only 14.9% have attended practical courses, of whom only 2.1% were carried out in a hospital environment [9]. In Senegal, the majority of ultrasound practitioners in the public sector do so without qualification [17], and this is what occurs in many other countries. Given that the quality of the ultrasound scan is dependent on the operator, both theoretical and practical training must be combined to enrich the experience of the operator and ensure service quality. Mindel advocates strengthening of local training programs [18], which may be more sustainable and cost-efficient than sending physicians abroad [6]. In the circumstances where quality local training is not available, the alternative is still foreign training or rotation of visiting experts. This approach has been put to good use in Sudan in the last decade, and through this practice, a large body of professionals have been trained and are now training other practitioners themselves.

Collaborations with foreign institutions and ultrasound schools, such as the Ian Donald School of Ultrasound in Obstetrics and Gynecology, should be established. The Ian Donald School has established such collaborative relationships and has branches in many countries, including those in Africa (e.g. Egypt, Sudan, Nigeria, and Ghana). Another collaboration is that between Authorities of the Republic of South Africa and the staff of the National Center for Fetal Medicine (NCFM) in Trondheim, Norway. The objective is to teach African midwives to use the ultrasound and be able to take care of pregnant women in rural areas. This program has been evaluated in a study, and results showed it has largely been able to meet its objectives.

It was also suggested that a Diploma in Clinical Ultrasound for medical graduates should be incorporated into the curricula of local universities. These universities can later expand the program to include a Bachelor's degree in Sonography so that the graduates can be instrumental in reducing the pressure on doctors in developing countries. The scope of any training should include ethics in ultrasound service provision to curtail misuse and abuse. Training in counselling and communication about the limitations and benefits of obstetric ultrasound are also important in alleviating fear and managing expectations [8]. One other proposal at using a low-cost system for providing training ultrasound imaging techniques has been through the use of a PC platform that uses interface components from the Nintendo Wii game console, which can serve as a simulator to aid remote mentoring by experienced ultrasound professionals [5]. The researchers cited their experience with this technique in Ghana as an example [20].

The application of new technologies has the potential to affect accessibility and quality of services as well as serve as a platform upon which some form of training can be provided. The use of portable ultrasound machines can improve access in remote parts of rural Africa and provide avenues to diagnose congenital anomalies. Given that many hospitals in Africa have no reliable power supply, the use of solar panels can provide relief to the challenge inadequate power supply to keep the system going in rural Africa. An effective referral system should also be established between primary centers and specialist centers. This will allow for referral of patients to specialists whenever there is doubt about certain findings.

Rules and regulations are also lacking when it comes to ultrasound service provision in Africa. To effectively guide and regulate the practice, rules and protocols should be introduced and enforced. These guidelines should address the following: (1) who should engage in obstetrics and gynecology ultrasound, (2) what qualifications should one have to qualify as a practitioner, (3) practitioners must register their clinics with the regulatory authorities, and (4) a program of prenatal screening and diagnosis must be established. All these will align ultrasound practice in Africa to international best practices.

Conclusion

Africa is at a crossroad with regards the quality of health care services provided to its own population. It has to incorporate all elements used by developed countries,

which have given them the opportunity to provide the best quality health care system to their people. Ultrasound service provision is one such element, which has the potential to qualitatively improve health care services particularly in the fields of obstetrics and gynecology. To achieve maximum benefits, a comprehensive regulation must be applied to ensure quality, reliability, and safety. Training in ultrasonography should be robust enough to include ethical issues. Finally, collaborations should be explored as a means to complement local training.

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