Obstetric ultrasonography practice in Fiji

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Abstract In Fiji, a Pacific island nation, ultrasonography practice is still in its infancy. Ultrasounds are performed by radiographers who independently interpret the ultrasonographic images and write the diagnostic reports on behalf of the radiologists. This paper presents research on the practices and procedures that are used to perform the mid-trimester obstetric ultrasonography examinations at an urban public hospital in Fiji. The participants comprised a cohort of “on-the-job” trained radiographers, radiologists and obstetricians involved in obstetric ultrasonography. In-field observations, questionnaires and interviews yielded predominantly qualitative data. The radiographers’ scanning criteria were evaluated against the stipulated ASUM mid-trimester guidelines. This study revealed that even the most experienced radiographers barely met 50% of ASUM’s mid-trimester scanning requirements. They spent less than five minutes performing a scan and insufficient expertise, training and supervision, excessive workload and a lack of resources were major constraints affecting the standards of ultrasonography practice in Fiji. However, the absence of a standard protocol was also a major cause for disparate scanning patterns amongst the radiographers. This paper highlights the gaps and limitations associated with the obstetric ultrasonography practice in Fiji, and suggests the need for international assistance in ultrasonography education.

Table 1: Obstetric sonography referrals with specific requests per month.

| Examination Types         | August 2007 | September 2007 | October 2007 |
|---------------------------|-------------|----------------|--------------|
| Gestational dating        | 781         | 663            | 876          |
| Amniotic fluid index      | 462         | 358            | 338          |
| Umbilical artery Doppler  | 47          | 74             | 87           |
| Fetal anomaly             | 31          | 37             | 37           |
| Estimated fetal weight    | 12          | 5              | 8            |
| Placenta                  | 11          | 11             | 11           |
| Fetal presentation        | 7           | 5              | 8            |
| Serial                    | 0           | 1              | 5            |
| TOTAL                     | 1371        | 1154           | 1362         |

Introduction

Over the years, ultrasound technology has made tremendous advances and has become the modality of choice for prenatal imaging. Ultrasonography was introduced as a diagnostic tool in Fiji in 1982 at the Colonial War Memorial Hospital (CWMH) in Suva. The first Toshiba (Toshiba Co, Tokyo, Japan) ultrasound machine was donated by the Fiji Medical Association. Later in 1998, two more ultrasound machines with Doppler and transvaginal capabilities were donated by a radiologist from Australia. With the donation of more ultrasound machines at CWMH, older machines were moved to other major hospitals in Fiji. Currently, at the hospital where this research was conducted (referred to as the host hospital), the majority of the obstetric examinations are performed using the Medison SonoAce X4 machine 2007 model (Medison, Seoul, Korea).

For the first 18 months following the introduction of ultrasound in Fiji, the ultrasonography examinations were performed by radiologists, as well as two radiographers who had six months of training in Australia. As the workload increased, these radiographers began to provide “on-the-job” training to other radiographers. In the absence of a formal ultrasound education program, “on-the-job” training is widespread in Fiji. While the ultrasonography examinations at the public and private hospitals are performed by the radiographers, physicians also perform ultrasonography in their respective clinics.

At the host hospital, there are only two radiologists, both of whom are remote to the obstetric ultrasonography examination room. Since the current obstetric equipment does not have Picture Archiving System (PACS) capabilities, which allows transmission of images from the ultrasound equipment to the remotely located radiologist’s workstation, it is not possible for the radiologists to review, provide consultations or write reports. Consequently, the obstetric sonography examinations are performed, interpreted and reported by “on-the-job” trained radiographers at the host hospital.

It is assumed that the appealing features of ultrasound, such as real-time images of the cardiac activity and fetal mobility, attracted a significant number of patients for
ultrasonography. Over the last 40 years, hospitals in Fiji have seen a rapid increase in the number of patients being referred for ultrasonography services. For instance at CWMH, the total number of patients referred for ultrasonography in 1982 was approximately 2000, however, in 1998 approximately 14,000 obstetric patients were scanned at the hospital. A recent CWMH ultrasound record shows that a single examination room receives at least 70 obstetric patients per day, which may rise to 80–100 patients on a very busy day (Table 1). Despite an overwhelming demand for obstetric ultrasonography, the radiology departments at the public hospitals in Fiji do not have a patient booking system in place.

Further, the host hospital does not have any standard obstetric ultrasonography protocol for the radiographers to follow during the examinations. The radiographers have been performing scans following unwritten departmental guidelines, presumably causing inconsistencies in their scanning patterns, with the potential for inappropriate intervention, perinatal compromise and medicolegal risk. Hence, this study was conducted to evaluate the practices and procedures used to perform the mid-trimester obstetric ultrasonography examinations at an urban public hospital in Fiji, to determine if it meets accepted standards.

Methodology
This study employed a case study approach positioned in an interpretive paradigm to investigate the current obstetric ultrasonography practice at an urban public hospital in Fiji. A “case study” is defined as an inquiry that investigates a “phenomenon in a real life context or a specific instance in action”. In this research the case for study was the “current obstetric ultrasonography practice at an urban public hospital in Fiji”. A mixed method approach was taken to collect predominantly qualitative data through methodological and data triangulation of observations, questionnaires and interviews. The participants comprised a cohort of six radiographers performing obstetric ultrasonography. The mid-trimester scans performed by these six radiographer participants were observed over a period of time, after which they completed a set of questionnaires. A total number of four specialists (two radiologists and two obstetricians) at the hospital were also interviewed. All the participants were purposively selected using a critical-case sampling scheme to obtain detailed descriptive data.

The radiographer participants were selected according to their availability on the duty roster and their years of experience in ultrasonography practice, namely, three months.
latter showed that even the most experienced radiographers the observations that were made at the clinical site, since the guidelines. The questionnaire data was in strong accord with only met 30% of the ASUM requirement stipulated in its radiographers’ scanning contents were limited, that is, they the fetal head, spine, heart motion and the placenta. The anomaly scans the radiographers placed major emphasis on the biometry measurements and only some aspects of mid-trimester sonography examinations for observation was that:

- During the data collection period, at most two patients per day presented for anatomy and/or anomaly scans. Of these, only a limited number of obstetric cases met the inclusion criteria stated earlier.
- The participants performed scans intermittently during the day, limiting the number of examinations (meeting the inclusion criteria) performed by the participant radiographers.
- The scans were performed without any prior bookings. Therefore, ultrasound cases that eventually met the selection criteria did not always coincide with the participants’ scanning period during the day.

A non-participant/complete observer role was adopted to take field notes using a structured observation protocol (Fig. 1) whereby categories or checklists were worked out prior to data collection. The observation protocol was prepared from the ASUM guidelines (ASUM Policies and Statements D2) with the assistance of an obstetrics and gynecology ultrasonography expert based at a clinical facility in Auckland. This international guideline was considered to be the gold-standard since it is the most commonly adopted ultrasound guideline followed by major public hospitals in Australia and New Zealand.

Findings
This study revealed that the radiographers had disparate patterns of performing the mid-trimester obstetric scans. There were obvious variations seen in the scanning patterns among the radiographers and between the individual examinations performed by each radiographer. The observation data revealed that during the mid-trimester anatomy/anomaly scans the radiographers placed major emphasis on the biometry measurements and only some aspects of the fetal head, spine, heart motion and the placenta. The radiographers’ scanning contents were limited, that is, they only met 30% of the ASUM requirement stipulated in its guidelines. The questionnaire data was in strong accord with the observations that were made at the clinical site, since the latter showed that even the most experienced radiographers barely met 50% of the ASUM scanning requirements for the mid-trimester sonography examinations.

Although this research was not designed to assess the radiographers’ diagnostic accuracy, some obvious discrepancies in biometry measurements were noted. These discrepancies comprised measurements taken at: incorrect anatomical levels; with inappropriate selection of technical factors; and with the anatomical structures being partially obscured by image artifacts (Fig. 2).

The ultrasonography specialist participants suggested that due to the radiographers’ limited expertise they occasionally may have misinterpreted the ultrasonographic findings. Further, the radiographers indicated in the questionnaire that they lacked both confidence and competence in anatomy/anomaly scanning. Despite their lack of confidence and expertise, the radiographers are expected to perform scans, interpret the images and write the diagnostic reports, as a routine practice at the host hospital. More than 80% of the radiographer participants indicated that they are reluctant to make diagnostic decisions on behalf of the radiologists, although it is anticipated that this practice, to some extent, meets the immediate needs of the radiologists since they are limited in number.

This research has unveiled several factors influencing the radiographers’ current practice of obstetric ultrasonography at the hospital where this research was located. The radiographers’ level of education, their inadequate supervision and ineffective training have been identified as some of the factors contributing towards their inconsistency in scanning. The research data established that none of the radiographer participants had any specific qualification and formal clinical training in obstetric ultrasonography. Hence, the radiographers strongly indicated the need for a formal educational program for their professional development. Analysis of the research data also showed that the host hospital does not have a written examination protocol for obstetric ultrasonography. This is exemplified by the disparate scanning patterns among the radiographers.

In addition, in the absence of a patient booking system, the radiographers have been performing 70–100 obstetric scans each day using a single ultrasound machine at the host hospital. Due to an extensive workload, the radiographers have not been able to spend sufficient time in performing the scans, therefore, compromising the quality of the scans. It was found that the radiographers spent an average of 4
minutes and 50 seconds (with a range of 2 to 8 minutes) per mid-trimester obstetric examination (Fig. 3). One of the obstetrician participants mentioned that the radiographers at the host hospital are not able to meet the international standards of practice since the duration of scans are extremely short. It was also noted that the short duration of scanning time led to ineffective communication between the radiographers and the patients.

Apart from the above mentioned issues, this study has also uncovered that limitation of resources at the host hospital may affect the radiographers’ performance, especially the extreme shortage of radiologists, limited scanning facilities and insufficient funds to optimise obstetric services at the public hospitals in Fiji. Further, the recurrent political instability has led to a weakening of the national economy and emigration of skilled health professionals. The 2006 military coup has also caused a delay in the establishment of a registration board to ensure standardisation of obstetric ultrasonography practice in Fiji. A summary of the key findings of this research is illustrated in Fig. 4.

As in any research, this study also encountered limitations, mainly:
- Possible observer bias
- Observation of a restricted number of cases that met the inclusion criteria
- Non-probability sampling disallowing calculation of sampling error(s).

**Conclusion**

This study strongly suggests that the obstetric ultrasonography practice at the host hospital neither meets international standards nor the expectations of obstetricians and radiologists. Thus, it is recommended that the Fiji School of Medicine and the Ministry of Health (Fiji) collaborate with an international ultrasound organisation such as ASUM to initiate a postgraduate training program in Fiji. Further, the hospitals should devise and implement standard ultrasound protocols and patient booking systems across all hospitals. The Health Ministry in Fiji should address shortages in the health workforce.

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ASUM assists regional medical ultrasound

ASUM is a multidisciplinary society whose mission is to advance the clinical practice of medical ultrasound for the highest standards of patient care. Among the goals of the society, is assisting the practice of medical ultrasound in the Asia / Pacific region. There are a number of ways this can be done and these include scholarships, sending someone for lectures and hands on workshops, as well as extending educational (eg. DMU) and locally relevant credentialing services. We also would welcome articles from these countries both of a scientific nature and those explaining the medical situation in that location. We are very pleased to publish this article from an ASUM member in Fiji.

Dr Fergus Scott
ASUM President