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COMPARISON BETWEEN THE WRITTEN OBSTETRIC ULTRASOUND REPORTS OF QUALIFIED SONOGRAPHERS AND IMAGING RADIOGRAPHERS AT A TERTIARY HOSPITAL IN LUSAKA, ZAMBIA

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Abstract

Background. A diagnostic ultrasound report serves as a channel of communication between the imaging team and the doctor to provide feedback on the requested ultrasound examination(s). In order to give high-quality healthcare, this feedback is crucial. Therefore, any gaps in the physicians' and imaging personnel's communication on the diagnostic ultrasonography report could undermine the clinicians' diagnosis. Sonographers and imaging radiographers both carry out diagnostic ultrasound scans in Zambia and write reports on the results. The main objective of this research study was to determine the quality of obstetric ultrasound reports written by sonographers compared to those written by imaging radiographers at a tertiary hospital.

Methods. This retrospective quantitative research study involved ultrasound reports of 108 patients who underwent an obstetric ultrasound examination at a tertiary hospital in Lusaka, Zambia. All the collected data, from the purposefully selected files, was analysed using SPPS version 24. Four experienced sonographers and imaging radiographers analysed the data in order to achieve objectivity. They helped achieve rigor in this research.

Results. The findings were that sonographers produce superior obstetric ultrasound reports compared to imaging radiographers. However, the interpretation of obstetric ultrasound reports by both followed a similar pattern across all trimesters (r=0.88). The results also showed that the majority of them neglected to comment on important components of an obstetric ultrasound scan in all trimesters. For example, both scored a total of 1 (1.9%) on commenting on the condition of the maternal kidneys. On the other hand, the majority of the assessed reports demonstrated that an effort was made to respond to the clinical question on the request forms: imaging radiographers scored 74 (68.5%) and sonographers 86 (79.6%).

Conclusion. Sonographers write better ultrasound reports than imaging radiographers. Following assessment of the reports by the researchers the average scores were sonographers (50.9%) and , imaging radiographers (40.7%). It is recommended that in view of the results of the sonographers that there is a need for more sonographers be trained.

Keywords. neonatal mortality; maternal deaths; trimester; clinical question

INTRODUCTION

Maternal and neonatal morbidity and mortality remain major public health challenges globally, particularly in low- and middle-income countries. The World Health Organisation (WHO) reported 295,000 maternal deaths in 2017; 66% were in Sub-Saharan Africa.[1] Neonatal mortality is equally high, with 7,000 neonates dying daily in the first month, resulting in 2.5 million deaths globally. In Sub- Saharan Africa, neonatal mortality is 1.5 times higher than that globally.[1] Antenatal care is crucial for all expectant mothers: it lowers maternal mortality rates, advancing Sustainable Development Goal number 3 (Maternal Mortality Reduction). One of the services that aids in identifying and keeping track of pregnancy is obstetric ultrasonography.[2] Ultrasound is usually requested during routine antenatal care for both normal monitoring and in an emergency situation involving trauma or pregnancy difficulties. In Sub-Saharan African nations, it was found that having at least one prenatal visit with a clinician lowers the risk of newborn mortality by 39%. Therefore, all pregnant women should get prenatal care throughout their pregnancies in order to hasten the reduction of neonatal deaths.[3]

The most often utilised diagnostic technique in obstetrics is ultrasound, which is operator dependent. It is a quick, painless, and generally safe imaging modality that can produce rapid results. Improvements in image quality and processing speed have dominated technical developments in obstetric imaging.[4] There is a need for high-quality obstetric ultrasound reports that can highlight abnormalities that may cause maternal or neonatal illnesses or death and may help identify cases that need specialised care. When carried out by trained personnel, ultrasound can be used to give accurate results.[5]

A study on trends in ultrasound use, in low- and middle-income countries, showed that there was nearly 70% usage of obstetric ultrasound in Southeast Asia and Sub-Saharan Africa, the latter being the region with the most innovative ultrasound use.[5] However, an in-depth assessment of ultrasound utilisation in these countries revealed an expanding use of ultrasound imaging in low-resource settings.[6]

Obstacles to the expansion of ultrasound use in low-resource nations like Zambia include extended training periods, such as those brought on by early closings of institutions, as was the case during the COVID era, limited recruitment, and poor sonographer retention. A shortage of qualified sonographers (hereafter referred to as sonographers) therefore necessitated imaging radiography training institutions to incorporate a component of ultrasound training in the imaging radiography curriculum, so as to help ease the shortage of sonographers. As a result of this, diagnostic imaging radiographers (DIRs) also perform diagnostic obstetric ultrasound examinations and provide reports on sonographic findings.

Any communication gaps on a diagnostic ultrasonography report between the physicians and imaging staff may impair the clinicians' ability to diagnose.[7] The main purpose of this study was to determine the quality of obstetric ultrasound reports produced by sonographers compared to those written by DIRs at a tertiary hospital, in Lusaka.

METHODOLOGY

This quantitative, retrospective, descriptive study was conducted at a single site. The study was undertaken at a tertiary hospital, in Lusaka, Zambia. The research was conducted over a period of three months. Retrospective data, over a three-year range, were retrieved for analysis.

The collected data included files of pregnant women who underwent an obstetric ultrasound examination at the research site and had an ultrasound report. These were for pregnant women aged 18 years and above. Files of pregnant women, who did not meet this criterion, were excluded. Purposive sampling was used and the sample size for collection of data from patients' files was calculated using the equation formula:[8]

$$n_0 = \frac{N}{1 + N(Q)^2}$$

Where:
n_0= sample size
N = sample frame (150 being the minimum number of obstetric patients seen per week at UTH[8])
Q = standard error (0.05)

$$n_0 = \frac{150}{1 + 150(0.5)^2}$$

$$n_0 = 109$$

The sample size was arrived at by obtaining the minimum number of patients seen per week at the antenatal ward at the study site.[9]

Before conducting this research, ethical approval was obtained from the Lusaka APEX Medical University Ethics Committee. This research was done according to the code of ethics of the World Medical Association (Declaration of Helsinki).[10] Being a retrospective study, particular attention was paid to issues of confidentiality, by ensuring that all information that came into the possession of the researchers, during the study, was not shared with any unauthorised person. To help achieve this, patients' names were not recorded; each patient's file was assigned a code. By adhering to strict confidentiality of data retrieved, no harm was done to the patients. Informed consent did not apply as the study was retrospective.

The sample for analysis was 108 (n=108) ultrasound reports. The latter were written by ten (n=10) qualified DIRs and sonographers. Five held bachelor's degrees in imaging radiography, two had imaging radiography diplomas, two held bachelor's degrees in sonography, and one had an ultrasound diploma.

Data results for obstetric ultrasound examinations were in the form of reports. The results of these reports were coded and entered into data collection spreadsheets. This data collection sheet also served as a checklist. Each report was evaluated using a rating chart. The data were then quality controlled; assured and analysed using SPSS version 24. Descriptive statistics (mean, median and percentages) were used for the acquired scores. Inferential statistics were also used with a level of statistical significance set at $p<0.05$. Chi-square test was also used to assess whether there was a significant difference between the two sets of variables: reports written by sonographers and those by DIRs.[11] Four experienced sonographers and DIRs analysed the data in order to achieve objectivity. Their respective qualifications

Table 1. Report distribution according to profession

		Frequency	Percentage
Valid	Radiographers	54	50
	Sonographers	54	50
	Total	108	100.0
Missing	System	0	
Total		**108**	

Table 2. Comparison of 27 analysed obstetrics reports in first trimester

Items addressed		Total marks scored per concern by the participants out of a total of 54 marks for each question	
		Total for all concerns 9 x 54 = 486	
		Radiographers total scores	Sonographers total scores
1	Addressing clinical question	27	32
2	Comment on site of implantation	35	40
3	Comment on the number of gestation sac/s, yolk sac/s, embryo sac and foetal anatomy	36	42
4	Comment on viability	34	38
5	Biometry entries	33	39
6	Cervical length- for cervical incompetence	14	19
7	Comment on maternal myometrial wall	2	6
8	Comment on the uterine adnexal regions	9	14
9	Comment on maternal abdominal organs	1	1
10	**Total**	**191**	**231**
11	**Total percentage score**	**39.3%**	**47. 5%**

Table 3. Comparison of 27 analysed obstetrics reports and concerns

Items addressed		Total marks scored per concern by the participants out of a total of 54 marks for each question	
		Total for all concerns 18 x 54 = 972	
		Radiographers total scores	Sonographers total scores
1	Addressing clinical question	47	54
2	Comment on foetal viability	52	54
3	Comment on number of foetuses	46	54
4	Comments on the foetal calvarium/face	12	23
5	Comment on foetal brain	3	5
6	Foetal cervical spine analysis	4	8
7	Lungs/heart	36	45
8	Foetal heart	2	9
9	Foetal kidney	2	10
10	Foetal stomach/urinary bladder	5	24
11	Foetal limbs	3	12
12	Comment on umbilical cord	2	4
13	Comment on foetal presentation	52	54
14	Comment on liquor volume	41	48
15	Comment on placenta location	37	35
16	Comment on cervical competence	14	34
17	Information on foetal biometry	49	54
18	Comment on maternal organs	1	1
	Total	**408 out of 972**	**528 out of 972**
	Total Percentage score	**42%**	**54.3%**

are: bachelor's degree in sonography; a master's degree in radiography and a diploma in ultrasound; a master's degree in medical physics and a bachelor of science in radiography; and a bachelor's degree in radiography.

RESULTS

• Report distribution according to the profession

Table 1 shows the distribution of reports. Sample size (n=108) comprised 50% of reports from each group as shown in Table 1.

• Comparison of the quality of obstetric ultrasound reports written by sonographers and DIRs

Table 2 presents the first trimester reports. Scoring: 0 = not addressed; 1 = partially addressed; 2 = fully addressed. As shown in Table 2 DIRs scored 191 (39.3%) out of 486 in terms of reporting on the required parameters on an obstetric ultrasound report in the first trimester. Most of them did not make valid comments on the maternal organs and scored 1 (1.9%). The highest score was their accurate comments on the number of gestation sacs for which they scored 36 (66.7%).

Sonographers, on the other hand, had an overall score of 231 (47.5%) out of 486 on the required parameters on an obstetric ultrasound report in the first trimester. Most of them did not make valid comments on the maternal organs and scored 1 (1.9%). The highest score was for accuracy on the number of gestation sacs, with a score of 42 (77.8%). Pearson's rank correlation (r) showed a strong positive correlation between the two reports (r=0.99) in the first trimester.

Table 3 presents the scores of 27 second-trimester and third-trimester reports. As shown in Table 3 the DIRs' score was 408 (42%) out of a total of 972 with respect to the required parameters on an obstetric ultrasound report in the second and third trimesters. Most of them did not provide valid comments on the maternal organs. Their total score in this regard was 1 (1.9%). Their highest score of 52 (96.3%) was based on their accurate comments on the foetal viability and presentation. Sonographers had a score of 528 (54.3%) out of 972 in terms of reporting on the required parameters on an obstetric ultrasound report in the second and third trimesters. Most of them did not provide valid comments on the maternal organs. Their score in this regard was 1 (1.9%). Their highest score was 54 (100%) for their accurate comments on the clinical question, foetal viability, number of foetuses, foetal presentation and foetal biometry measurements. The relationship between the 2nd and 3rd trimester reports by DIRs compared to those by sonographers was computed to identify any pattern. Pearson's rank correlation (r) showed a strong positive correlation between the two reports (r=0.98).

DISCUSSION

The results showed that in the first trimester, there was a difference between reports written by DIRs and sonographers. The former had an overall score of 191 (39.3%) regarding reporting the required parameters on an obstetric ultrasound report in the first trimester. Most of them did not provide valid comments on the maternal organs. Their highest score in this trimester was on their accurate comments on the number of gestation sacs. Sonographers had an overall score of 231 (47. 5%) in terms of reporting on the required parameters on an obstetric ultrasound report in the first trimester. Most of them did not provide valid comments on the maternal organs. However, all of them did make valid comments on the number of gestation sacs, foetal viability, addressed the clinical questions fully and all of them managed to conduct the biophysical profile examination.

The second-trimester results showed that the DIRs had an overall score of 408 (42%) regarding reporting the required parameters on an obstetric ultrasound report in the second and third trimesters. Most of them did not make valid comments on the maternal organs. Their highest score was based on their accurate comments on foetal viability and presentation. Sonographers had an overall score of 528 (54.3%) in terms of reporting on the required parameters on an obstetric ultrasound report in the second and third trimesters. Most of them did make valid comments on the maternal organs. They all answered the clinical question, commented on the foetal viability, number of foetuses, and foetal presentation and did a foetal biometry profile.

The first, second and third trimester reports show that the standard of the DIRs' reports writing skills was below those of the sonographers. These findings are similar to the study done in Australia,[12] namely that the quality of sonographic reports in pelvic ultrasound, in terms of quality levels, written by DIRs was below standard; and that sonographers could provide more accurate ultrasound reports than DIRs, hence having lower association levels regarding the ultrasound report format and contents. However, these findings are different from a study done by Williams et al.[13] They found that the reports of DIRs and sonographers were similar; they did not differ much in quality. They found that 84.9% of abdominal ultrasound reports written by DIRs and sonographers were similar; 14.0% only had minor discrepancy between them.

However, our findings show some similarities in quality with regard to addressing the clinical question. The two groups fully addressed the clinical questions in most of the reports evaluated. Most of the reports evaluated showed that there was an attempt to answer the clinical question on the request forms: 68.5% of the clinical questions were answered by DIRs; and 79.6% sonographers. These findings are in keeping with the demands by other researchers:[14] the importance of the ultrasound reports should be based on the fact that all referring clinicians rely on the accuracy of the reports answering the clinical question and, therefore, care should be taken to optimise reports.

Our study found that both groups used similar formats for their respective first, second and third trimester reports.

This is similar to a study done in Europe[15] which compared ultrasound report writing by sonographers and DIRs in the United Kingdom and Norway; the correlation of each groups was positive in terms of their report structure; sonographers did however provide more elaborate ultrasound definitive reports.

LIMITATIONS OF THE STUDY

There were some challenges in accessing information that could have been relevant to this study. The data was collected from patients' records, which in some cases could not be found or were incomplete. Purposive sampling was used at one study site; the findings may not apply to other sites.

RECOMMENDATIONS

The following recommendations are made.

- Sonographers and diagnostic imaging radiographers should be trained and made aware of the need to conduct an obstetric ultrasound scan in totality and not to concentrate on the clinical question being asked on the request form, as this may lead to omission of other relevant clinical information that may be of help to a successful pregnancy.
- More sonographers should be trained to provide ultrasound services.
- Specific posts should be created for sonographers.

CONCLUSION

This comparative study found that the first, second and third trimesters reports of sonographers for obstetric ultrasound examinations were of better quality than of diagnostic imaging radiographers. This study also showed that the two groups concentrated more on answering the clinical question on the request form, neglecting to image other important obstetric ultrasound parameters. It is reasonable to conclude that the discrepancies in report writing were due sonographers being more trained in ultrasound imaging and reporting.

CONTRIBUTIONS OF AUTHORS

NG (APEX Medical University) was the main researcher. MN (University Teaching hospital) was responsible for data collection and presentation of results. OH (APEX Medical University) helped in formulating the data collection sheet, analysing results and making sure the ultrasound machines used had similar imaging parameters.

CONFLICT OF INTEREST

Nil

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