Original Article

Audit of stillbirths in a Nigerian teaching hospital

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ABSTRACT

Objective: The purpose of this study is to classify the stillbirths (SBs) in our institution and to determine the avoidable contributors using a pro forma that was developed in our perinatal unit.

Materials and Method: All mothers who delivered SBs at Obafemi Awolowo University Hospitals Complex Ile-Ife, Nigeria, from April 2014 to August 2015 were the subjects of this study. At our weekly perinatal mortality meeting, every SB was reviewed in detail to determine the cause of death and identify gaps in the care. The causes of fetal death were classified using three classification systems – Simplified CODAC, ReCoDe, and our newly developed Ife Perinatal Death Classification System. Remote contributors to fetal demise were assigned using a purpose–designed "Avoidable Factor Proforma" A SB was deemed avoidable if one or more factors were identified.

Results: The total number of deliveries during the study was 2,142 with 109 SBs giving a gross SB rate of 51/1000 total births. The SB rate was significantly lower among booked patients than their unbooked counterparts (15 vs. 140 per 1000; $P < 0.005$). Antepartum death constituted 82.6% of SB among booked patients compared to 41.2% in the unbooked. The most common cause of SB among booked mother was intrauterine growth restriction (21.7%) while obstructed labor (23.3%) was the leading cause among unbooked mothers. Using our classification system, only 3.8% of SBs were unexplained, as against 5.7% for ReCode, and 26.4% for Simplified CODAC. Majority (81.7%) of the SBs were avoidable; and the most common avoidable factor was deficiency in health care. Access to the point of care was not associated with any of the avoidable deaths.

Conclusion: Our SB rate remains unacceptably high, with a preponderance of antepartum deaths among booked patients. Majority of the SBs are avoidable dictating the need for training in modern methods of fetal surveillance and improved efficiency of our health-delivery systems.

Key Words : Avoidable Factors , Classification,. Stillbirths.

Introduction

Of the world's 2.64 million stillbirths (SBs), more than 70% is from the developing countries.[1] With a SB rate of 40 per 1000 total births, Nigeria has one of the highest SB rates in the world.[2] While many of these deaths are avoidable,[3] what is of greater concern is that majority of the SBs are normally formed babies weighing more than 2.5 kg.[4,5]

If the global effort at reducing the world's high incidence of SB is to achieve any result, effort should be focused on reducing this unfortunate outcome of pregnancy in the developing countries. This requires not only the determination of the causes of the SBs but also the evaluation of the factors that facilitated the deaths of the babies. The previous studies of

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SBs in our environment had used classification systems that resulted in a high percentage of unexplained SB and most did not address the more important issue of factors that facilitated the death of the babies, the avoidable factors. [5-7] Furthermore, none of these studies used a standardized protocol of evaluation as is commonly done in developed countries.

The purpose of this study is to classify the SBs in our institution using three classification systems, the simplified Codac system,[8] ReCoDe[9] and our newly developed Ife Perinatal Death Classification system; and to determine the avoidable contributors to the fetal demise using a pro forma that was developed in our perinatal unit.

Materials and Methods

All mothers who delivered SBs at Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria, from April 2014 to August 2015 were the subjects of the study. In our center, an SB is defined as a baby delivered without signs of life and at gestational age of 28 weeks or more OR weighing 1000 g or more OR with a body length of 35 cm or more.[10] For the purpose of this study, women are classified as booked if they register for antenatal care in our unit and attended at least two antenatal clinics and unbooked if they presented as emergency and had not registered for antenatal care in our hospital or had only attended only one antenatal clinic. As the study was completely anonymous and did not involve any additional step other than the routine care usually offered to women with SB at the hospital, ethical approval was not deemed necessary.

There is no agreed standard for the extent of evaluation required for the complete assessment of SBs. Owing to the limited financial resources and facilities available in our center, a staged assessment of each case was carried out.

The first stage involved obtaining detailed history from the mother and her relatives. This includes details of the past obstetric history, antenatal care, and labor events. Further, information was obtained from the attending medical personnel when necessary. After a thorough physical examination, all mothers had basic investigations done which included blood group, genotype, blood film for malaria parasite, fasting blood sugar and 2 h postprandial, HbA1C level, HIV screening, indirect Coomb's test, endocervical, liquor, and high vaginal swabs for culture and antimicrobial sensitivity pattern. At delivery, a detailed gross examination of each baby, placenta and umbilical cord was conducted. Examination of the baby included noting any dysmorphic features, taking measurements of the birth weight, length, and head circumference. The placenta was examined for

infarcts, missing lobes, and umbilical cords were checked for true knots and missing vessels.

If at the end of the first-stage assessment a cause of the SB was not found, the mother's consent was sought for postmortem. Facility for placental histology and fetal karyotype were not readily available.

At the weekly perinatal unit audit meeting every case was reviewed in detail to identify the cause of death as well as the avoidable contributory factors. The cause of fetal demise was thereafter classified using three classification systems– the simplified CODAC.[8] ReCoDe[9] and our locally adapted Ife Pernatal Death Classification System [Appendix 1]. Avoidable contributory factors were assigned using our unit's avoidable factor pro forma [Appendix 2]. The pro forma was developed based on our experience of the factors that hindered delivery of effective and efficient life-saving treatment to pregnant women in our environment. The pro forma has 5 major groups, with each group having subdivisions to further pin down the specific cause of delay in receiving appropriate care. It is our belief that this will help identify specific areas of need for focused intervention.

Result

The total number of deliveries during the study was 2,142 of which 613 (28.6%) were unbooked. There were 109 SBs giving a gross SB rate of 51/1000 total births. Eighty-six SBs (78.9%) were from the unbooked mothers while 23 (21.1%) were from booked mothers, giving SB rates of 140/1000 and 15/1000 births, respectively.

The time of death could not be ascertained in one of the unbooked patients. Of the remaining 85 fetal deaths from this group, 50 (58.8%) were intrapartum deaths while 35 (41.2%) were antepartum. Of the 23 SBs from booked mothers, 4 (17.4%) were intrapartum deaths while 19 (82.6%) were antepartum deaths.

Sixteen (69.6%) of the SBs in booked patients weighed 2.00 kg or above while 77.9% weighed 2 kg and above among the unbooked patients. Table 1 showed the weight distribution of the babies.

Table 1: Birth weight distribution of stillbirths at OAUTHC Ile-Ife

Birth weight (kg)	Booked, *n* (%)	Unbooked, *n* (%)	Total, *n* (%)
<2.0	7 (30.4)	19 (22.1)	26 (23.9)
2-2.5	6 (26.1)	15 (17.4)	21 (19.3)
2.6-2.9	3 (13.1)	10 (11.6)	13 (11.9)
≥3.0	7 (30.4)	42 (48.9)	49 (44.9)
Total	23 (100)	86 (100)	100 (100)

The SB was adjudged avoidable in 14 (60.9%) and 75 (87.2%) among booked and unbooked patients, respectively. The most common avoidable factor was deficiency in health care in both groups which constitute 71.4% and 54.7% of the avoidable factors in booked and unbooked cases, respectively. Difficulty in accessing health-care facilities was not a contributory avoidable factor in any of the patients. Table 2 shows details of the avoidable factors.

The two most common causes of death among booked patients were intrauterine growth restriction (IUGR) (21.7%) and abruptio placenta (17.4) while obstructed labor (23.3%) and abruption placenta (17.4%) were the leading causes of death among unbooked patients. Table 3a and b show details of the causes of SB in booked and unbooked patients, respectively. Three of the SBs was unclassifiable by all the three classification systems due to inadequate information and all the three babies were from unbooked mothers. With the simplified Codac classification system, 26.4% of the 106 babies with sufficient information were unexplained as against 5.7% when the ReCoDe classification was used. Using the Ife Perinatal Death classification system, only 3.8% were unexplained. The common causes of death in our communities that were not coded for in the simplified CODAC and ReCoDe classification systems.

Discussion

This study confirms the persistently high incidence of SBs in our society. With the current rate of 51/1000 births, there has been no significant change since year 2000 when a rate of 52/1000 was reported from the same institution.[4] Even in Europe, SB rate has remained constant over the last three decades.[2]

Majority of the SBs were from unbooked patients. Although they constituted 28.6% of our deliveries and 78.9% of the SBs were from this group. This is similar to the findings from other centers in Nigeria where unbooked patients were responsible for majority of the perinatal deaths.[3,5]

The SBs were adjudged avoidable in 81.7% of cases with the most common avoidable factor being deficiency in healthcare. This is similar to the report from Enugu, South East Nigeria by Chigbu *et al.*,[11] where Phase 3 delay was the avoidable factor in the majority of their cases. Misdiagnosis and delayed in treatment were the two most common health-related avoidable factors in both groups of patients. There is, therefore, an urgent need for update courses in perinatal care among our health personnel.

In the current series, accessibility to health-care facilities (phase 2 delay) was not a barrier in accessing health

Table 2: Avoidable factors associated with stillbirths at OAUTHC Ile-Ife April 2014 to August 2016, *n* (%)

Avoidable factor	Booked, *n* (%)	Unbooked, *n* (%)	Total, *n* (%)
Deficiency in health care	10 (71.4)	41 (54.7)	51 (57.3)
Ignorance	3 (21.4)	7 (9.3)	10 (11.2)
Cost of care	1 (7.1)	14 (18.7)	15 (1.9)
Religion	0	13 (17.3)	13 (14.6)
Accessibility	0	0	0
Total	14 (100)	75 (100)	89 (100)

Table 3a: Causes of stillbirth among booked patients at OAUTHC Ile-Ife April 2014 to August 2015, *n* (%)

Causes of stillbirth	*n* (%)
IUGR	5 (21.7)
Abruptio	4 (17.4)
Hypertension in pregnancy	3 (13.0)
Cord accident	2 (8.7)
Malaria	2 (8.7)
HbSS	1 (4.4)
Preterm pregnancy	1 (4.4)
UTI	1 (4.4)
Congenital malformation	1 (4.4)
Unexplained	3 (13.0)

IUGR - Intrauterine growth restriction; HbSS - Hank's balanced salt solution; UTI - Urinary tract infection

Table 3b: Causes of stillbirth among unbooked patients at OAUTHC Ile-Ife April 2014 to August 2015, *n* (%)

Causes of stillbirth	*n* (%)
Obstructed labor	20 (23.3)
Abruptio placenta	15 (17.4)
Intrapartum asphyxia	6 (7.0)
Ruptured uterus	6 (7.0)
Cord problems	6 (7.0)
PIH/eclepsia	6 (7.0)
Birth trauma	4 (4.6)
Chronic medical disease	4 (4.6)
Infection	3 (3.5)
Placenta previa	3 (3.5)
Congenital malformation	3 (3.5)
IUGR	2 (2.3)
Others	4 (4.6)
Unexplained	1 (1.2)
Unclassifiable	3 (3.5)

IUGR - Intrauterine growth restriction; PIH - Pregnancy-induced hypertension

care. This is supported by 2013 Nigerian Demographic and Health Survey[12] which revealed that more than 80% of the deliveries in the South West Nigeria, where our hospital is located, were supervised by Skilled Birth Attendants. This is probably an indication of the wide availability and easy access to health facilities in this region as against what obtains in the northern part of the country where more than 80% of deliveries still occur at home.[12]

There is a significant difference between booked and unbooked mothers with respect to the time of fetal death. The majority (82.6%) of SBs in the booked patients were antepartum deaths while intrapartum fetal deaths constituted the majority (58.8%) of cases in unbooked mothers. This is probably because most emergency referrals in obstetrics are due to intrapartum complications from labor mismanagement.

IUGR was the leading cause of antepartum death among booked mothers in this series. Most reports on the analysis of SBs from developing countries have lumped booked and unbooked patients together and have been unable to identify the contribution of IUGR as a major cause of SBs,[3,6] In our center, all mothers have routine ultrasound performed at booking for the accurate dating of pregnancies. Our finding is in agreement with that of Gardosi and Madurasinghe,[13] who found IUGR a major risk factor for SBs in a population-based study in England. Early identification of IUGR through improved fetal surveillance with ultrasound biometry and Doppler Monitoring of at-risk mothers will reduce the current high rate of antepartum deaths in our community.

Majority of the SBs weighed 2 kg or more (69.6% for booked and 77.9%% for unbooked women) a birth weight at which more than 90% of babies are expected to survive even in low resource settings. This is similar to the findings of Fawole *et al*.[5] in a national survey of perinatal mortality involving 21 institutions across Nigeria. However, this observation is very different from reports from developed countries where majority of SBs were <1 kg. Hence, the real disparity in the stillbirth rate between developed and developing countries may, in fact, be far higher than widely reported.

Codac classification system has been reported to be the best classification system and adjudged easy to use in both developed and developing countries.[14] However, the simplified Codac was unable to classify 26.4% of the SBs in this series. Using the ReCoDe classification system, only 5.7% of the cases were unexplained. The percentage of unexplained SB was further reduced to 3.8% with the newly developed Ife Perinatal Death Classification System. The disparity in the percentage of unexplained SBs was because the two other systems did not include some common causes of fetal death in our environment. For instance, the ReCoDe System did not include prolonged pregnancy and malaria while Codac did not include IUGR, cord prolapse, sickle cell disease, and ruptured uterus [Table 4]. To reduce the percentage of unexplained SBs, each community should develop its own classification system that will capture the relevant causes of death in that community.

This will facilitate the development of community-specific intervention strategies to reduce SB rate.

Using the newly developed pro forma of avoidable factors instead of the 3 delay system[15] enabled us to be very specific in the determination of barriers to accessing health care in our community. In the 3 delay system, Level 1 involves delay in taking decision to seek health care. The reason for such delays may include cost, ignorance, religion, and customs and other factors peculiar to the Community. With our pro forma, we have been able to elicit the role of each of these specific causes of delay in seeking care from orthodox facilities. We discovered that cost is the main cause of delay in seeking help (18.7%) followed closely by religion (17.3%). Specific identification of these causes of delay as proposed in the avoidable factor proforma will help device targeted intervention to address the barriers to accessing care in orthodox health facilities.

CONCLUSION

The rate of SB remained high in our hospital with no reduction in the last two decades. Majority of the cases were avoidable deaths involving babies weighing more than 2 kg. Deficiency in health care was the major avoidable factor.

Among booked patients, antepartum death is the predominant type of death. Training in modern antepartum fetal surveillance for the early identification of IUGR in our tertiary institutions and intensive update in intrapartum care in primary and secondary health centers are recommended to reduce the currently high SB rate in our community.

Table 4: Causes of SB at OAUTHC not Coded in Simplified CODAC and ReCoDe Classification systems

Class of causes	Not coded for in	
	CODAC	ReCoDe
Fetal	UGR	-
Placenta	Vasa previa Placenta praevia Placenta infarcts	-
Cord	Prolapse	-
Obstetrics complication	Ruptured uterus Prolonged pregnancy	Prolonged pregnancy
Infection	-	Malaria Typhoid Syphilis
Maternal chronic medical disease	Sickle cell disease	-
Intrapartum	Ruptured uterus	-
Trauma	RTA Home accident	-

CODAC - Causes of death and associated condition; ReCoDe - Relevant condition at death; RTA - Roaad traffic accident; UGR - Uterine growth restriction

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Conflicts of interest

There are no conflicts of interest.

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Appendixes

Appendix 1: Ife perinatal death classification system

1. Fetal
    1. Iugr
    2. Congenital abnormalities
    3. Alloimmunization
    4. Complications related to multiple gestation

2. Placental
    1. Abruption
    2. Placental praevia
    3. Vasa previa
    4. Placental infacts

3. Cord
    1. Prolapse
    2. Knots
    3. Loops
    4. Abnormal insertions into placenta

4. Obstetrics complication
    1. Pregnancy induced hypertension
    2. Gestational diabetes
    3. Polyhydramnios
    4. Prolonged pregnancy

5. Infection
    1. Malaria
    2. Typhoid
    3. Chorioamnionitis
        a. Group B *Streptococcus*
        b. Other bacterial infection
    4. Syphilis
    5. Others (specify)

6. Maternal chronic medical diseases
    1. Hypertension
    2. Diabetes
    3. Cardiac disease
    4. Chronic renal disease
    5. Complications related to scd/hemoglobinopathy
    6. Others

7. Intrapartum
    1. Prolonged/obstructed labor
    2. Trauma
    3. Asphyxia unrelated to 1 and 2
    4. Ruptured uterus

8. Trauma
    1. RTA
    2. Home accident

9. Neonatal
    1. Cardiorespiratory
    2. Infection
    3. Prematuriry
    4. Sepsis
    5. Hyperbilirubinemia

10. Unknown
    1. Unexplained
    2. Unclassifiable

Appendix 2: Barriers that are associated with perinatal mortality in Ile-Ife, Nigeria

1. Cost
    1. Single mother; not working
    2. Single mother; working but with inadequate income
    3. Married; husband out of job, wife with inadequate income
    4. Married; both partners out of job
    5. Married; both partners working but with inadequate income
    6. Married; wife not working husband inadequate income

2. Religion
    1. Preference for religious birthing centers
    2. Advice against orthodox care by religious leaders
    3. Family influence based on religious disposition
    4. Advice against management plan by religious leaders despite patient being in the hospital premises

3. Factors related to health care/service providers
    1. Inappropriate booking of high risk patients at peripheral centers
    2. Misdiagnosis of obstetric conditions/complications
    3. Undue detention/late referrals by peripheral centers
    4. Unavailability of utility services such as electricity, water and theatre space
    5. Unavailability of personnel, including periods of strike action
    6. Wrong treatment/delayed treatment/negligence

4. Access
    1. Patient's home is very far from the hospital
    2. Unavailability of vehicle to transport patient to the hospital
    3. Lack of funds to secure vehicle for transportation
    4. Onset of labour/complications at odd hours when transportation is difficult
    5. Security barriers across roads

5. Ignorance
    1. Lack of formal education
    2. Poor access to information
    3. Wrong source of information/wrong information
    4. Traditional beliefs and superstition
    5. Defiance to instruction