Obstetrics; *Maternal-Fetal Medicine and Perinatology*

Low Fifth-Minute Apgar Score Analysed According to Robson Ten Group Classification at a Tertiary Hospital in Nigeria

Olakunle I. MAKINDE[1], Benjamin O. AWOTUNDUN[1], Nkencho OSEGI[1]

Bayelsa State, Nigeria

ABSTRACT

OBJECTIVE: Robson classification can be used to analyze and audit other indices of delivery outcome besides cesarean section (CS). The objective is to analyze low fifth-minute APGAR scores according to Robson's classification and present deducible conclusions.

STUDY DESIGN: A cross-sectional dataset of 584 neonates of parturients at the Federal Medical Centre Yenagoa (FMCY), Bayelsa State, Nigeria between July 2020 and April 2021 was analyzed. Neonates were classified by the corresponding Robson group with subgroup modification of their mothers. Data was analyzed using IBM SPSS Statistics version 25. Descriptive statistics and association between low fifth-minute APGAR Score and the Robson group are presented. The statistical significance is a p value <0.05.

RESULTS: The largest contribution (29.6%) to the low fifth-minute APGAR score was from Robson group 3. Group rate was high in groups 10b (66.7%), 7a (61.1%), 10a (53.6%), 9a (50.0%), 6a (50.0%), 5.2a (33.3%) and 10c (30.3%) relative to others. Neonates of parturients in Robson groups 6a (OR - 11.00; 95% CI-1.27-95.18; p Value-0.029), 7a (OR-17.29; 95% CI-3.06-97.52; p value-0.001), 9a (OR-11.00; 95% CI-1.48-81.61; p Value-0.019), 10a (OR-12.69; 95% CI-2.49 - 64.58; p value-0.002) and 10b (OR-22.00; 95% CI-1.33 -362.92; p value-0.031) had significantly higher odds of low fifth minute APGAR score relative to 8c with the lowest group rate.

CONCLUSION: Meaningful deduction is possible with use of the Robson's classification for audit of low APGAR Score. By this study, parturients in Robson groups 3, 5.2a, 6a, 7a, 9a, 10a, 10b, and 10c are identified for focused interventions towards improving APGAR score outcomes at FMCY.

Keywords: Audit, Delivery outcomes, Low APGAR score, Robson classification

Introduction

The Robson classification system has been a useful tool for hospital-level audits of cesarean section (CS), helping to identify the groups of parturients who contribute most and least to CS rates out of ten prospectively determined, well-defined,

[1] Department of Obstetrics and Gynaecology, Federal Medical Centre Yenagoa, Bayelsa State, Nigeria

Address of Correspondence: Olakunle Ifeoluwa Makinde
                              Department of Obstetrics and Gynaecology,
                              Federal Medical Centre Yenagoa
                              Bayelsa State, Nigeria.
                              olakunleife@gmail.com

Quick Response Code:	Access this article online
	Website: www.gorm.com.tr
e- mail: info@gorm.com.tr
	DOI:10.21613/GORM.2023.1439

clinically relevant groups. The endpoint of the design of the Robson classification is a mode of delivery (vaginal delivery or cesarean section) and although its role in the assessment of the quality of intrapartum care has been criticized (1), the utility of this classification system for quantitative measure and audit of other delivery outcomes is also being explored (2).

Cesarean section rate cannot stand alone as an index for audit of delivery outcome, it needs to be combined with other maternal and perinatal outcomes to give a robust picture (3-5). The benefits of the Robson classification system can be harnessed when used in the analysis of the delivery outcomes other than CS. The usefulness of the Robson classification system in the audit of other maternal and perinatal outcomes has been demonstrated with APGAR score (2,6), postpartum hemorrhage (2,7), operative vaginal delivery (2,8,9), and obstetric anal sphincter injury (2,10).

The APGAR score is an important delivery outcome index and a component of the data recorded at every birth. A low APGAR score at the fifth minute of birth is associated with neonatal morbidity and mortality and remains a significant concern in many countries, especially in Africa (11). The audit

of the APGAR score with the Robson classification system can aid the understanding of determinants and hence reduce associated morbidity and mortality. This study aimed to analyze the low fifth-minute APGAR score based on the Robson groups of parturients and present deducible conclusions at the Federal Medical Centre Yenagoa, Bayelsa State, Nigeria.

Material and Method

This was a retrospective, cross-sectional analysis carried out at the Federal Medical Centre Yenagoa, Bayelsa State, Nigeria. The Department of Obstetrics and Gynaecology of the hospital conducts an average of 1800 deliveries annually. However, the COVID-19 global pandemic caused a reduction in the patient load received by the department during the collection of the data used for this study.

Eligibility criteria: All deliveries at the Federal Medical Centre, Yenagoa between July 2020 and April 2021 were eligible and included in the study.

Data collection: This study was conducted in accordance with the 2013 Helsinki Declaration. Being a retrospective analysis of data, informed consent could not be obtained from the subjects. However, the data was anonymized, and ethical clearance was obtained from the research ethics committee, at Federal Medical Centre Yenagoa (18/4/2023 #187). A cross-sectional dataset of parturients and their 584 neonates delivered at the Federal Medical Centre Yenagoa between July 2020 and April 2021 was used. Data included the six parameters of the Robson classification system: parity, previous CS, onset of labor, gestational age, number of fetuses, fetal lie and presentation, together with parturients' age, mode of delivery, indication for cesarean section, and APGAR score. A low fifth-minute APGAR score was defined as an APGAR score <7 at the fifth minute. Neonates were manually classified based on the corresponding Robson groups of their mothers using the Robson classification with subgroup modification (12) as shown in Table I.

Table I: Robson Ten Group Classification with Subgroup Modification

Robson Group	Parturients'Characteristics
1	**Nulliparous, singleton, cephalic, ≥ 37 weeks gestation, spontaneous labor**
2	**Nulliparous, singleton, cephalic, ≥ 37 weeks gestation**
2a	Induced labour
2b	CS before labor
3	**Primiparous or multiparous, singleton, cephalic, ≥ 37 weeks gestation, no previous CS, spontaneous labor**
4	**Primiparous or multiparous, singleton, cephalic, ≥ 37 weeks gestation, no previous CS**
4a	Induced labour
4b	CS before labor
5	**Primiparous or multiparous, singleton, cephalic, ≥ 37 weeks gestation, has had previous CS**
5.1	Primiparous or multiparous, singleton, cephalic, ≥ 37 weeks gestation, has had one previous CS
a	Spontaneous labour
b	Induced labour
c	CS before labor
5.2	Primiparous or multiparous, singleton, cephalic, ≥ 37 weeks gestation, has had two or more previous CS
a	Spontaneous labour
b	Induced labour
c	CS before labor
6	**Nulliparous, singleton, breech presentation (irrespective of gestational age)**
6a	Spontaneous labour
6b	Induced labour
6c	CS before labor
7	**Primiparous or multiparous, singleton, breech presentation (irrespective of gestational age, previous CS)**
7a	Spontaneous labour
7b	Induced labour
7c	CS before labor
8	**All multiple pregnancies (irrespective of gestational age, parity, previous CS, fetal lie & presentation)**
8a	Spontaneous labour
8b	Induced labour
8c	CS before labor
9	**All singleton transverse or oblique lie (irrespective of gestational age, parity, previous CS)**
9a	Spontaneous labour
9b	Induced labour

9c	CS before labor
10	**All singleton, cephalic, < 37 weeks gestation (irrespective of parity, previous CS)**
10a	Spontaneous labour
10b	Induced labour
10c	CS before labor

CS = Caesarean section

Data Analysis: Data obtained was analyzed using IBM SPSS Statistics version 25. The low fifth-minute APGAR score was analyzed by Robson groups. The contribution of each Robson group to the overall rate of APGAR score <7 was determined and the group rate was analyzed within each Robson group. A low fifth-minute APGAR score was analyzed based on the mode of delivery and CS indications. Categorical data were summarized using frequencies and percentages and continuous data was summarized using mean and standard deviation. The chi-square test was used to determine an association between fifth minute APGAR score and the Robson group of parturients. A binary logistic regression analysis was done to further define the association between low fifth-minute APGAR scores and Robson groups. The statistical significance is a p value <0.05.

Results

Table II shows the parturients' characteristics and APGAR score of their neonates. As shown in Table III, of the 584 neonates delivered within the study period, 486 (83.2%) had reassuring, and 98 (16.8%) had low fifth-minute APGAR scores across Robson groups. The largest contribution to low fifth-minute APGAR score was made by neonates of parturients in Robson group 3 (29.6%). Robson groups 10b (66.7%), 7a (61.1%), 10a (53.6%), 9a (50.0%), and 6a (50.0%) had high group rates of low APGAR scores. Other Robson groups with high group rates of low APGAR scores were group 5.2a (33.3%) and 10c (30.3%).

Fifth-minute APGAR score was significantly associated with the Robson group of the parturients (p<0.001). Relative to neonates of parturients in Robson group 8c with the lowest group rate of low APGAR score, the odd of low fifth-minute APGAR score was significantly higher; 11 times in neonates of parturients in Robson group 6a (OR-11.00; 95% CI-1.27-95.18; p value-0.029), over 17 times in group 7a (OR-17.29; 95% CI-3.06-97.52; p value-0.001), 11 times in group 9a (OR-11.00; 95% CI-1.48-81.61; p value-0.019), over 12 times in group 10a (OR-12.69; CI-2.49-64.58; p value-0.002), and 22 times in group 10b (OR-22.00; CI-1.33-362.92; p value-0.031). See Table IV.

Table II: Characteristics of parturients and fifth-minute APGAR score of their neonates at the Federal Medical Centre Yenagoa

Characteristics (Maternal)	Frequency n = 556	Percent (%)
Age group		
<20 years	14	2.5
20 - 24 years	42	7.6
25 - 29 years	147	26.4
30 - 34 years	191	34.4
35 - 39 years	129	23.2
>40 years	33	5.9
Mean Age ±SD in years	31.16±5.4	
Parity (previous deliveries)		
0	124	22.3
1	128	23.0
≥2	258	46.4
5 and above	46	8.3
Number of Fetuses		
Singleton	529	95.1
Twin	24	4.3
Triplet	3	0.5
Any Previous CS		
Previous CS	55	9.9
No previous CS	501	90.1
Number of Previous CS	n = 55	
1	39	70.9
2	13	23.6
3	3	5.5

Onset of Labour

Spontaneous	438	78.8
Induction of Labour	15	2.7
Pre-Labour CS	103	18.5

Mode of Delivery

Vaginal delivery	287	51.6
Cesarean section	269	48.4

Gestational Age

Term	462	83.1
Preterm	94	16.9

Characteristics (Fetal & Neonatal)	Frequency n = 584	Percent (%)
Fetal Lie		
Longitudinal	569	97.4
Transverse	14	2.4
Oblique	1	0.2
Fetal Presentation		
Cephalic	508	87.0
Breech	62	10.6
Shoulder	14	2.4
APGAR Score		
≥7	486	83.2
4-6	40	6.8
0-3	58	10.0

Table III: *Low fifth-minute APGAR score by Robson classification at the Federal Medical Centre Yenagoa*

Robson Group	Number of Neonates Delivered Within Group	APGAR Score (n = 584)					
		≥7 (n = 486)			<7 (n = 98)		
		≥7	Group Rate of APGAR Score ≥7 %	Group Contribution to Overall APGAR Score ≥7 %	<7	Group Rate of APGAR Score <7 %	Group Contribution to Overall APGAR Score <7 %
1	**85**	**76**	**89.4**	**15.6**	**9**	**10.6**	**9.2**
2	**13**	**13**	**100.0**	**2.7**	**0**	**0.0**	**0.0**
2a	6	6	100.0	1.2	0	0.0	0.0
2b	7	7	100.0	1.4	0	0.0	0.0
3	**252**	**223**	**88.5**	**45.9**	**29**	**11.5**	**29.6**
4	**24**	**23**	**95.8**	**4.7**	**1**	**4.2**	**1.0**
4a	6	5	83.3	1.0	1	16.7	1.0
4b	18	18	100.0	3.7	0	0.0	0.0
5	**44**	**39**	**88.6**	**8.0**	**5**	**11.4**	**5.1**
5.1a	22	19	86.4	3.9	3	13.6	3.1
5.1c	11	11	100.0	2.3	0	0.0	0.0
5.2a	6	4	66.7	0.8	2	33.3	2.0
5.2c	5	5	100.0	1.0	0	0.0	0.0
6a	**6**	**3**	**50.0**	**0.6**	**3**	**50.0**	**3.1**
7	**29**	**17**	**58.6**	**3.5**	**12**	**41.4**	**12.2**
7a	18	7	38.9	1.4	11	61.1	11.2
7c	11	10	90.9	2.1	1	9.1	1.0
8	**55**	**48**	**87.3**	**10.0**	**7**	**12.7**	**7.1**
8a	31	26	83.9	5.3	5	16.1	5.1
8c	24	22	91.7	4.5	2	8.3	2.0
9	**12**	**7**	**58.3**	**1.4**	**5**	**41.7**	**5.1**

9a	8	4	50.0	0.8	4	50.0	4.1
9c	4	3	75.0	0.6	1	25.0	1.0
10	**64**	**37**	**57.8**	**7.6**	**27**	**42.2**	**27.6**
10a	28	13	46.4	2.7	15	53.6	15.3
10b	3	1	33.3	0.2	2	66.7	2.0
10c	33	23	69.7	4.7	10	30.3	10.2
	584	486	83.2	100.0%	98	16.8%	100.0%

Table IV: Association between low fifth-minute APGAR score and Robson group of parturients at the Federal Medical Centre Yenagoa

Robson Group	APGAR Score		Exact Test p	OR (95%CI)	p
	≥7 n = 486 (%)	<7 n = 98 (%)			
1	76 (89.4)	9 (10.6)	74.75 (0.000*)	1.30 (0.26 – 6.48)	0.747
2a	6 (100.0)	0 (0.0)			
2b	7 (100.0)	0 (0.0)			
3	223 (88.5)	29 (11.5)		1.43 (0.32 – 6.40)	0.640
4a	5 (83.3)	1 (16.7)			
4b	18 (100.0)	0 (0.0)			
5.1a	19 (86.4)	3 (13.6)		1.74 (0.26 – 11.52)	0.567
5.1c	11 (100.0)	0 (0.0)			
5.2a	4 (66.7)	2 (33.3)		5.50 (0.59 – 51.19)	0.895
5.2c	5 (100.0)	0 (0.0)			
6a	3 (50.0)	3 (50.0)		11.00 (1.27 – 95.18)	0.029*
7a	7 (38.9)	11 (61.1)		17.29 (3.06 – 97.52)	0.001*
7c	10 (90.9)	1 (9.1)		1.10 (0.89 – 13.59)	0.941
8a	26 (83.9)	5 (16.1)		2.12 (0.37 – 11.99)	0.397
8c	22 (91.7)	2 (8.3)		1	
9a	4 (50.0)	4 (50.0)		11.00 (1.48 – 81.61)	0.019*
9c	3 (75.0)	1 (25.0		3.67 (0.25 – 53.83)	0.343
10a	13 (46.4)	15 (53.6)		12.69 (2.49 – 64.58)	0.002*
10b	1 (33.3)	2 (66.7)		22.00 (1.33 – 362.92)	0.031*
10c	23 (69.7)	10 (10.3)		4.78 (0.94 – 24.33)	0.059

*Statistically Significant; OR – Odd ratio. Shaded categories were not included in the logistic regression analysis since the category did not have a dependent variable.

Most (62.2%) of the neonates with low fifth-minute APGAR scores were eventually delivered by CS. The leading indication for CS associated with low APGAR score was obstructed labor (24.6%) mostly in Robson group 3, followed by persistent fetal heart rate abnormality (14.8%), severe preeclampsia (9.8%), and eclampsia (6.6%). Others are as shown in Table V. More than half (53 out of 98) of low fifth-minute APGAR scores were APGAR score 0 at birth (stillbirth). Table VI shows contributions to APGAR score 0 by Robson groups.

Table V: Mode of delivery of neonates with low fifth-minute APGAR score across Robson groups with large contributions at the Federal Medical Centre Yenagoa

	APGAR Score <7 (N = 98)									
	Robson Group									n (%)
	3	5.2a	6a	7a	9a	10a	10b	10c	Others	
Mode of Delivery										
Vaginal Delivery	9	0	3	4	0	11	2	0	8	37 (37.8)
Cesarean Section	20	2	0	7	4	4	0	10	14	61 (62.2)
n (%)	29 (29.6)	2 (2.0)	3 (3.1)	11 (11.2)	4 (4.1)	15 (15.3)	2 (2.0)	10 (10.2	22 (22.4)	98 (100.0)
Cesarean Section Indications					n = 61					

Obstructed Labour	11	0	-	1	0	0	-	0	3	15 (24.6)
Persistent Fetal Heart Rate Abnormality	5	0	-	2	0	1	-	0	1	9 (14.8)
Severe preeclampsia	0	0	-	0	0	1	-	4	1	6 (9.8)
Eclampsia	0	0	-	0	0	0	-	3	1	4 (6.6)
Abruptio Placentae	0	0	-	0	0	1	-	1	2	4 (6.6)
Placenta Previa	2	0	-	0	1	0	-	0	0	3 (4.9)
Transverse Lie	0	0	-	0	2	0	-	0	1	3 (4.9)
Cord Prolapse	1	0	-	1	0	0	-	0	0	2 (3.3)
Cephalopelvic Disproportion	1	0	-	0	0	0	-	0	1	2 (3.3)
One Previous CS Not Eligible for Vaginal Delivery	0	0	-	0	0	1	-	0	1	2 (3.3)
Two Previous CS	0	1	-	0	0	0	-	1	0	2 (3.3)
Breech Presentation Not Eligible for Vaginal Delivery	0	0	-	1	0	0	-	0	0	1 (1.6)
Others	-	1	-	2	1	0	-	1	3	8 (13.1)

CS = Caesarean section

Table VI: *APGAR score 0 at birth (stillbirth) by Robson classification at the Federal Medical Centre Yenagoa*

Robson Group	Number of Neonates Delivered Within Group	APGAR Score 0 (N = 53)		
		APGAR Score 0	Group Rate of APGAR Score 0 %	Group Contribution to Overall APGAR Score 0 %
1	**85**	**4**	**4.7**	**7.5**
2	**13**	**0**	**0.0**	**0.0**
2a	6	0	0.0	0.0
2b	7	0	0.0	0.0
3	**252**	**18**	**7.1**	**34.0**
4	**24**	**1**	**4.2**	**1.9**
4a	6	1	16.7	1.0
4b	18	0	0.0	0.0
5	**44**	**2**	**4.5**	**3.8**
5.1a	22	1	4.5	1.9
5.1c	11	0	0.0	0.0
5.2a	6	1	16.7	1.9
5.2c	5	0	0.0	0.0
6a	**6**	**2**	**33.3**	**3.8**
7	**29**	**7**	**24.1**	**13.2**
7a	18	7	38.9	13.2
7c	11	0	0.0	0.0
8	55	3	5.5	5.7
8a	31	3	9.7	5.7
8c	24	0	0.0	0.0
9	12	3	25.0	5.7
9a	8	2	25.0	3.8

9c	4	1	25.0	1.9
10	64	13	20.3	24.5
10a	28	10	35.7	18.9
10b	3	1	33.3	1.9
10c	33	2	6.1	3.8
	584	53	9.1%	100.0%

Discussion

From our analysis of low fifth-minute APGAR scores according to the Robson classification system, Robson group 3 made the largest contributions to low APGAR score at 5 minutes, while group rate was highest in Robson subgroups 10b, 7a, 10a, 9a, 6a, 5.2a, and 10c. Neonates of parturients in Robson groups 6a, 7a, 9a, 10a, and 10b had significantly high odds of low fifth-minute APGAR scores. Most of the neonates were delivered by CS. The commonest CS indication associated with a low fifth-minute APGAR score was obstructed labor, followed by persistent fetal heart rate abnormality, severe preeclampsia, and eclampsia. More than half of low fifth-minute APGAR scores were APGAR score 0 at birth (stillbirth).

Similar to the result from this study, a previous study by Savchenko et al (2) reported Robson groups 7, 9, and 10c as having the highest rates of low fifth-minute APGAR scores. However, while group 6a was also reported in our study, it was groups 8a and 8c that were also reported in their study. Group contribution to overall fifth-minute APGAR score <7 also showed similarity as both studies reported Robson group 3.

The contribution of Robson group 3 to the overall low fifth-minute APGAR score is attributable to the size of the group in this study. Robson group 3 was the largest group of parturients, similar to the Swedish obstetric population studied by Savchenko et al (2). But while Robson group 10 followed after group 3 in size in our sample, groups 1 and 2 followed in the Swedish sample. Contribution to low fifth-minute APGAR score is also attributable to the inherent obstetric risk that characterizes Robson groups. Robson group 3 parturients are generally adjudged to be low risk (13) and a poor delivery outcome implicates risk factors or challenges peculiar to this Robson group during labor and delivery in our setting. For example, most of the neonates of group 3 parturients in this study with low fifth-minute APGAR scores were delivered following obstructed labour which is exclusively a complication in unbooked parturients in our setting. Besides, a previous study had identified an unbooked status as one of the determinants of low fifth-minute APGAR scores in FMCY (11).

Prematurity is a major risk factor in neonates of Robson group 10 parturients. By subgrouping the parturients based on the onset of labor, we could differentiate the neonates whose preterm birth followed spontaneous preterm labor (10a) from those of iatrogenic preterm birth following induction of labor (10b) and pre-labour CS (10c). Pregnancy complications like established preterm labor, preterm pre-labor rupture of membranes, fetal congenital anomalies, intrauterine fetal death, severe preeclampsia, and eclampsia are implicated in these situations.

Among other possibilities, the risk of low fifth-minute APGAR score in neonates of parturients in Robson subgroup 5.2a (primiparous or multiparous, singleton, cephalic, ≥ 37 weeks gestation, has had two or more previous CS in spontaneous labor) is associated with the increased risk of uterine rupture in the mother. The usual practice in our department is to offer a repeat CS to women with two or more previous CS, thus placing them exclusively in Robson subgroup 5.2c. Therefore, documenting a contribution to low fifth-minute APGAR score from Robson subgroup 5.2a in this study indicates that the parturients are either part of the unbooked population managed in our facility being a referral hospital, or those who default on appointment for elective CS, sometimes intentionally to risk a chance at vaginal delivery.

Vaginal breech delivery is associated with an increased risk of fetal morbidity and mortality from complications like cord prolapse, cord compression, injuries to fetal abdominal organs, obstructed labor, etc. Many obstetricians are especially careful in nulliparous parturients with an unproven pelvis. Nulliparity has been documented to increase adverse perinatal outcomes in planned vaginal breech delivery (14). In our setting, the routine practice is to deliver Robson group 6 parturients by pre-labor CS (6c) and we do not induce labor (6b) in them. Primiparous or multiparous parturients with breech presentation are offered an external cephalic version or pre-labor CS (7c) as the case may be, we also do not induce labor (7b) in them and they are only allowed an assisted vaginal breech delivery after a careful and individualized selection process. Low fifth-minute APGAR scores from breech delivery in our study were in neonates of parturients in subgroups 6a and 7a and the bulk can be attributed to unbooked parturients or those who were booked but had declined the management option offered.

Persistent transverse and oblique lie in parturients is a contraindication to vaginal delivery because of the attendant obstruction to the normal mechanism of labor and the high risk of fetal and maternal morbidity and mortality. Cesarean section is often offered for delivery besides the option of external

cephalic version then vaginal cephalic delivery. In our study, Robson subgroup 9a which constitutes Robson group 9 parturients with spontaneous onset of labor made a high contribution to a low fifth-minute APGAR score. As prematurity is a major risk factor for abnormal lies, some of them may be part of the relatively large population of parturients with preterm births outside Robson group 10 noticed in this study. Others are likely to be part of the unbooked population. Occasionally, extraction of the fetus in an abnormal lie during CS can be difficult or complicated by other comorbidities e.g., placenta previa, and can increase the risk of fetomaternal morbidity and mortality during pre-labor CS in subgroup 9c.

The number of neonates with low fifth-minute APGAR scores delivered by CS and the indications for CS in this study show that maternal and/or fetal compromise was already identified before or during the course of labor in most of the cases. It is noteworthy that stillbirth accounted for over half of low fifth-minute APGAR scores in this study despite the number of CSs done. The possible explanations include institutional factors that contribute to poor outcomes despite intervention by CS e.g., delayed decision to delivery interval or CSs done in parturients with already dead fetuses. In our opinion, if fetal status e.g., alive or not alive at presentation in labor is used as an added parameter and a Robson subgroup, cases of APGAR score 0 at birth attributable to intrauterine fetal death (IUFD) occurring during labor management, and those arising from IUFD previously diagnosed at presentation in labor can be depicted in a simple table according to Robson group. This distinction between factors associated with APGAR score 0 at birth will improve the audit of the quality of intrapartum care in health facilities. Moreover, where the CS rate is the outcome index, the number of CSs done despite a dead fetus e.g., in obstructed labor with a dead fetus will be highlighted for needed intervention. We therefore propose that "fetus alive" and "fetus not alive" should be an additional subgroup modification to the Robson classification.

Although retrospectively analyzed, the dataset used for this study was cross-sectional, missing data was therefore avoided and all parturients were classified into Robson groups. This contributed to the accuracy of the data and is a strength of this study.

The timing of the collection of the dataset used for this study was a limitation, in that it was during the COVID-19 pandemic and the sample size was limited. Even though the study center was taking an average of 1800 deliveries before COVID-19, only 584 neonates were delivered over the 10 months of data collection.

Conclusion

Meaningful deduction is possible when the Robson classification system is used for auditing the APGAR score as a delivery outcome. By this study, parturients in the Robson group

and subgroups 3, 5.2a, 6a, 7a, 9a, 10a, 10b, and 10c are identified for focused interventions towards improving APGAR score outcomes at FMCY.

Recommendation: In auditing the APGAR score based on Robson ten group classification, we propose that the status of the fetus at presentation in labor, i.e., "fetus alive" or "fetus not alive" should be included as one of the parameters collected for analysis and made a subgroup of the Robson classification. In neonates ending up as a stillbirth, this will further highlight the role of quality of intrapartum care or other causes. In developing countries especially, with the considerable burden of parturients having labor dystocia with a dead fetus, it will also improve the audit of labor-management protocols in such a situation.

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