

Trends and outcome of instrumental vaginal delivery at Irrua Specialist Teaching Hospital: a five-year review

Njoku AI^{1,2}, Aituma LO.², Omorogbe F^{1,2}, Ikkeloa J^{1,2}, Momoh M^{1,2}, Okoeguale J^{1,2}, Eifediyi RA^{1,2}

1. Department of Obstetrics and Gynaecology, Faculty of Clinical Sciences, College of Medicine, Ambrose Alli University, Ekpoma, Edo State.
2. Department of Obstetrics and Gynaecology, Irrua Specialist Teaching Hospital, Irrua, Edo State.

Abstract

Background: Instrumental Vaginal delivery (IVD), a key component of essential obstetric care is a procedure used to shorten the second stage of labour reducing the need for caesarean sections in women who require assistance using either the forceps or Vacuum. However, despite its value in improving Obstetric outcomes in resource-limited situations, instrumental deliveries are steadily declining. The study aimed to ascertain the trend and outcome of instrumental vaginal deliveries at the Irrua Specialist Teaching Hospital over a 5-year period. **Methods:** A retrospective cross-sectional study was done among women who gave birth in Irrua Specialist Teaching Hospital, located in Irrua, Edo state over a 5-year period; from 1st January 2016 to 31 December 2020. The labour ward registers and patient case notes were used to gather information on sociodemographic factors, the type of instrumental delivery used, the Apgar scores of newborns delivered, indication s, and complications. The information was then entered into a proforma and analyzed using SPSS software for Windows version 24.0. **Results:** During this study period, there were 4,703 deliveries, 41 (0.87%) of which were instrumental deliveries. The rates were 0.77% and 0.10% for vacuum and forceps deliveries respectively. The mean age of the parturient was 29.1 ±5.1 years; Unbooked patients were 8 (19.5%) while 33 (80.5%) were booked. Prolonged second stage of labour was the commonest indication for IVD 19 (46.3%). The perinatal outcome showed that 82.5% had Apgar scores of 7 and above at one minute. This was increased to 95% at the 5th minute. Nineteen of the mothers were free of complications. The commonest complication was perineal laceration occurring in 22 women who had IVD with vacuum extraction contributing 21(95%). **Conclusion:** Despite being a less invasive procedure than a caesarean section, this study is relatively low with a declining trend and indications for the procedure are similar to those found elsewhere. To prevent its extinction, efforts must be undertaken (via training and retraining) to revitalize the practice of Instrumental Vaginal Deliveries especially in tertiary institutions such as this setting where Obstetricians are being trained.

Keywords: Instrumental vaginal Delivery, Forceps delivery, Vacuum delivery, Maternal Mortality, Perinatal Outcome, Irrua, trends, Complications

Introduction

Since the beginning of time, childbirth has been a fundamental aspect of human existence. It is a powerful and transformational experience. Although giving birth is a natural act, several interventions have been developed thanks to medical advances to improve safety for both the mother and the baby.

Instrumental deliveries have become a crucial part of obstetric care among these interventions, especially when vaginal delivery becomes difficult or even dangerous.

Most pregnant women anticipate having a spontaneous vaginal delivery at the end of their pregnancy with little to no need for Operative procedures. For the majority, this anticipation comes true still, for some, assistance may be needed in the form of cesarean sections or operational vaginal

Corresponding Author Dr. Anthonia I. Njoku
Department of Obstetrics and Gynaecology,
Irrua Specialist Teaching Hospital, Irrua Edo State.
Email: toniainjoku@yahoo.com, inibokun@gmail.com

delivery to prevent harmful results for both the mother and the fetus.¹

Instrumental vaginal delivery is applying obstetric forceps or vacuum devices to the vaginal delivery of the fetus to avoid poor birth outcomes and reduce the cesarean-section rate.² It is a practice that has been modified and improved over its history, spanning over two centuries. It is a key element of essential obstetric care, and significantly reduces maternal and neonatal morbidity and mortality, especially in resource-poor countries.^{1,3} It is an alternative to caesarean section (CS) especially in our environment with a high aversion to CS where appropriate anaesthesia, efficient blood transfusion services, and efficacious and qualified personnel are not readily available for safe caesarean section.

In any circumstance when the mother or fetus may be compromised, Instrumental vaginal delivery is advised. Maternal indications for IVD include delayed second stage of labour, poor progress of labour due to maternal fatigue or exhaustion, situations when the second stage of labour needs to be shortened such as pre-eclampsia/eclampsia, cardiac disease in pregnancy, particularly those that are New York Heart Association (NYHA) class III/IV. Two primary fetal indications of IVD are fetal distress or non-reassuring fetal heart rate tracing in the second stage of labour. No indication is absolute and every situation deserves careful consideration.⁴

The rate of IVD varies from one country to another, and even in the same country, from one obstetric unit to another. The global incidence of IVD rates varies greatly between 1% and 15%⁵. In developed countries, the rates vary: from 10% to 15% in the United Kingdom to around 4.5% in the United States of America where the rate has halved in the last 20 years⁶. Lower rates of 1.4% and 2.8%, respectively, were observed for Istanbul and India.^{7,8}

In poor nations, the incidence of IVDs is quite low, ranging from 1% to 3% in places like Niger, Mali, and Burkina Faso^{9,10}. The IVD rate in Nigeria ranges from 0.69% to 3.7%.^{3,4,9,11,12}

Also, the rate of IVD in Nigeria appears to be on the decline as recent studies from Jos and Lagos showed

an incidence of 0.4% and 0.71 % respectively which is lower than 1.95% and 4.9% reported previously from the same institutions^{13, 14}. Sadly, the fact that IVD, an emergency obstetric operative intervention is underutilised in our setting is quite worrisome where our cesarean section rates are high and oftentimes not readily available

The World Health Organization and other United Nations organizations have identified IVD as one of the crucial elements of fundamental emergency obstetric treatment.¹⁵ By providing the necessary training and equipment, scaling up its usage in resource-limited nations will probably dramatically lower maternal and perinatal morbidity and mortality rates.

From the foregoing background, we set out to review the utilisation of this basic component of Emergency obstetric care at the Irrua Specialist Teaching Hospital, a training institution. The findings of this study can inform healthcare policies, guidelines, and practices in low-resource settings like ours.

Objectives

1. To examine trends in the utilisation of instrumental vaginal deliveries over a 5-year period at Irrua Specialist Teaching Hospital.
2. To identify indications for instrumental vaginal deliveries at Irrua Specialist Teaching Hospital.
3. To assess maternal and neonatal outcomes following instrumental vaginal deliveries in the rural context.
4. To explore healthcare workers' perspectives and experiences in performing instrumental deliveries.

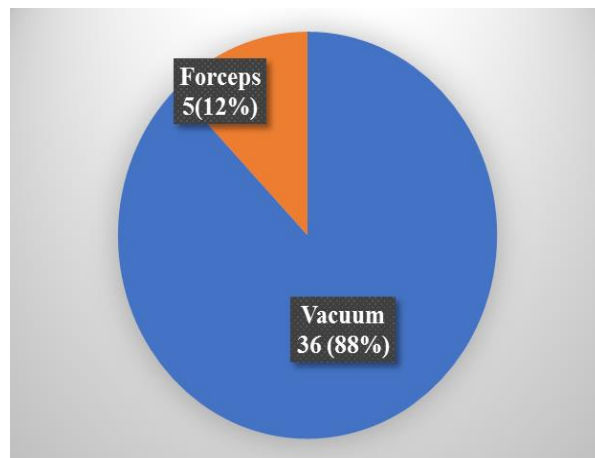
Materials and Methods

This was a retrospective cross-sectional study conducted at the Department of Obstetrics and Gynaecology, Irrua Specialist Teaching Hospital from 1st January 2016 to 31st December 2020. All women who gave birth during the study period in the hospital formed the source population. However, only women who had instrumental vaginal delivery within the study period were included in the study. Data was collected from the labour ward register. Relevant information on age, parity, booking status,

indications and type of procedure performed the APGAR scores of the babies and complications in the parturient and baby were obtained using a structured proforma designed for this study. The primary outcome measure was prevalence and trend of instrumental deliveries. Secondary outcome measures were the prevalence of complications such as perineal tears, post-partum haemorrhage, and APGAR scores at one and five minutes.

Results

During the period under review, there were 4,703 deliveries recorded; out of which 41 patients had instrumental vaginal delivery giving a prevalence of 0.87%. Amongst the women who had IVD, there were 5 forceps deliveries(0.10%) and 36 vacuumextractions(0.77%); (figure 1).



N=41

Figure 1. Type of IVD and prevalence

The majority of Parturients were in the age group of 25-30 years (48.7%), with a mean age of (27.7± 5.1) years and more than half of them had a tertiary level of Education (26, 63.4%). Most of the cases were booked (33, 80.5%) and were women of low parity with primigravidas accounting for 23, (56.1%) cases and para 1 accounting for 11(26.8%). The mean gestational age at delivery was 39 ± 3.0 weeks and the majority of the IVD (39; 95.1%%) were performed on term neonates (Gestational age ≥37 weeks). The socio-demographic and Obstetrics characteristics of the patients are shown in Table 1.

Table 1. Distribution of Socio-demographic and obstetric variables

Sociodemographic & obstetric variables	Frequency	Percentage
AGE (years)		
15-19	2	4.9
20-24	8	19.5
25-30	20	48.8
31-34	8	19.5
35 and above	3	7.3
Mean age ± SD. 27.7± 5.1 years		
LEVEL OF EDUCATION		
None	1	2.4
Primary	2	4.9
Secondary	12	29.3
Tertiary	26	63.4
BOOKING STATUS		
Booked	33	80.5
Unbooked	8	19.5
PARITY		
0 Primigravida	23	56.1
1	11	26.8
2	3	7.3
3	4	9.8
GESTATIONAL AGE GA in weeks		
<37	2	4.9
≥37	39	95.1
Mean GA = 39 Weeks and 3days		

Prolonged second stage of labour was found to be the commonest indication for IVD (19; 46.3%), this was followed by maternal fatigue (16; 39.0%), presumed fetal distress in the second stage (4; 9.7%), and the least was in shortening the second stage of labour in cases of severe pre-eclampsia and Eclampsia (1; 2.4%).These are depicted in Figure 2

The trend of Instrumental deliveries over the years under review is shown in Figure 2, The highest number of forceps deliveries occurred in 2017 and 2019(2) respectively, while the lowest number(1) of vacuum extractions was observed in 2016. Conversely, the most vacuum extractions (19) occurred in 2019.

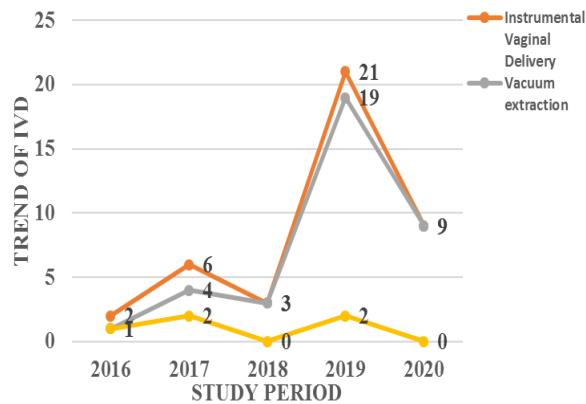


Figure 2. Yearly distribution of instrumental vaginal deliveries.

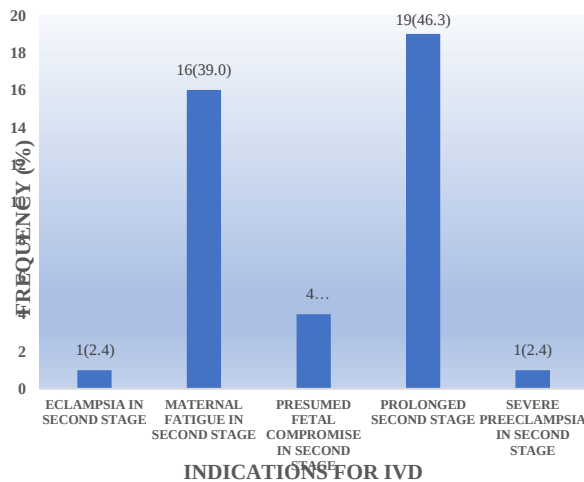


Figure 3: Indications for instrumental vaginal delivery (IVD)

Table 2 compares the birth outcome and that of instrumental vaginal deliveries. All newborns had normal birth weights. There was a case of fresh stillbirth observed (2.43%) which occurred with forceps delivery. In Table 3, seven (17.5%) babies born alive were assessed as being asphyxiated (Apgar scores <7) at 1 min of birth and (2; 5.0%) assessed as being asphyxiated at 5 min. Vacuum extraction was found to be not less likely associated with a low Apgar score at 5mins than forceps delivery as the difference between them was not statistically significant [p value = 0.18; OR =0.08 (0.00-1.69)]. There were no cases of scalp laceration following IVD but two cases each (4.8%) of cephalohematoma observed exclusively among subjects who had vacuum extraction. Five (12.2%)

neonates were admitted in the Special Care Baby Unit (SCBU) and discharged to their mothers after treatment.

Table 2. A comparison of birth outcome and the type of instrumental vaginal deliveries.

BIRTH OUTCOME	TYPE OF INSTRUMENTAL VAGINAL DELIVERY						<i>p</i> - value	OR (95%CI)
	VACUUM		FORCEPS		TOTAL			
	n	(%)	N	(%)	n	(%)		
APGAR SCORE AT 1ST MIN							0.41	
0	0		1	(100.0)	1	(100.0)		
2	1	(100.0)	0		1	(100.0)		
5	1	(100.0)	0		1	(100.0)		
6	4	(100.0)	0		4	(100.0)		
7	15	(88.2)	2	(11.8)	17	(100.0)		
8	14	(93.3)	1	(6.7)	15	(100.0)		
9	2	(100.0)	0		2	(100.0)		
Mean±SD	7.19±		5.50±	3.69				
D (95% CI of mean)	1.22 (6.78- 7.60)		(-0.38-11.38)					
APGAR SCORE AT 5TH MIN							0.16	
0	0		1	(100.0)	1	(100.0)		
5	1	(100.0)	0		1	(100.0)		
7	2	(100.0)	0		2	(100.0)		
8	7	(87.5)	1	(12.5)	8	(100.0)		
9	27	(93.1)	2	(6.9)	29	(100.0)		
Mean±SD	8.59±		6.50±	4.35				
(95% CI of mean)	0.83 (8.32- 8.87)		(-0.44- 13.44)					
FRESH STILLBIRTH							0.09	13.33 (4.49- 39.59)
YES	0		1	(100.0)	1	(100.0)		
NO	37	(92.5)	3	(7.5)	40	(100.0)		
BIRTH WEIGHT								
<2.5kg	0		0		0			
2.5-3.9kg	37	(90.2%)	4	(9.8)	41	(100.0)		
Mean±SD	3.23±		3.10±	0.41				
(95%CI of mean)	0.34 (3.11- 3.35)		(2.43- 3.76)					

Fisher exact-test used

*Significant at $p<0.05$; OR -Odd ratio; CI- Confidence interval; SD-Standard Deviation

Table 3. A comparison of neonatal complications and the type of instrumental vaginal deliveries.

NEONATAL COMPLICATIONS	TYPE OF INSTRUMENTAL VAGINAL DELIVERY				p-value	OR(95 %CI)	
	VACUUM		FORCEPS				TOTAL
	n	(%)	n	(%)			n
APGAR SCORES LESS THAN 7 IN 1MIN					0.54	0.58(0.05-6.57)	
YES	6	(85.7)	1(14.3)	7	(100.0)		
NO	31	(91.2)	3 (8.8)	34	(100.0)		
RR(95% CI)	0.94	(0.68-1.29)	1.61 (0.19-13.38)				
APGAR SCORES LESS THAN 7 IN 5MIN					0.18	0.08(0.00-1.69)	
YES	1	(50.0)	1(50.0)	2	(100.0)		
NO	36	(92.3)	3 (7.7)	39	(100.0)		
RR(95% CI)	0.54	(0.14-2.17)	6.50 (1.11-37.80)				
CEPHALHAE MATOMA					0.81	1.11(1.00-1.24)	
YES	2	(100.0)	0	2	(100.0)		
NO	35	(89.7)	4 (10.3)	39	(100.0)		
SCALP LACERATION							
NO	37	(90.2)	4 (9.8)	41	(100.0)		
FEEDING DIFFICULTY (n=40)					0.85	1.08(0.98-1.19)	
YES	2	(100.0)	0	2	(100.0)		
NO	35	(92.1)	3 (7.9)	38	(100.0)		
SPECIAL CARE BABY UNIT ADMISSION (n=40)					0.66	1.09(0.98-1.21)	
YES	5	(100.0)	0	5	(100.0)		
NO	32	(91.4)	3 (8.6)	35	(100.0)		

Fisher exact-test used

*Significant at $p<0.05$; RR-Relative risk.

Table 4 compares maternal complications and the type of instrumental delivery. There were 3 (7.3%) subjects who had an extension of episiotomy exclusively due to vacuum extraction, 22 subjects had perineal lacerations with vacuum extraction contributing up to (21; 95%), there were similarly more cases of cervical laceration observed following delivery exclusively following vacuum extraction (5; 12.2%). Postpartum haemorrhage (>500 mL of blood loss) was recorded in a parturient post-vacuum

extraction. There were no cases of failed instrumentation or recourse to caesarean section delivery in the second stage of labour. Maternal complications were however not statistically significant for either vacuum extraction or forceps delivery.

Table 4: A Comparison of maternal complications and the type of instrumental vaginal deliveries.

MATERNAL COMPLICATIONS	TYPE OF INSTRUMENTAL VAGINAL DELIVERY						p-value	OR (95% CI)
	VACUUM		FORCEPS		TOTAL			
	n	(%)	n	(%)	N	(%)		
EXTENSION OF EPISIOTOMY(n=29)							0.71	1.13 (0.98-1.29)
YES	3	(100.0)	0		3	(100.0)		
NO	23	(88.5)	3	(11.5)	26	(100.0)		
PERINEAL LACERATIONS							0.25	3.93 (0.37-41.48)
YES	21	(95.5)	1	(4.5)	22	(100.0)		
NO	16	(84.2)	3	(15.8)	19	(100.0)		
RR(95%CI)	1.13	(0.91-1.40)	2.28	(0.03-2.54)				
DEGREE OF PERINEAL LACERATIONS (n=22)							0.31	1.16 (0.86-1.57)
1ST DEGREE	15	(100.0)	0		15	(100.0)		
2ND DEGREE	6	(85.7)	1	(14.3)	7	(100.0)		
CERVICAL LACERATION							0.58	1.12 (1.00-1.26)
YES	5	(100.0)	0		5	(100.0)		
NO	32	(88.9)	4	(11.1)	36	(100.0)		
UTERINE RUPTURE								
NO	37	(90.2)	4	(9.8)	41	(100.0)		
PRIMARY POSTPARTUM HAEMORRHAGE							0.90	1.11 (1.00-1.23)
YES	1	(100.0)	0		1	(100.0)		
NO	36	(90.0)	4	(10.0)	40	(100.0)		
FAILED INSTRUMENTAL DELIVERY								
NO	37	(90.2)	4	(9.8)	41	(100.0)		
SECOND STAGE DELIVERY BY CAESAREAN SECTION								
NO	37	(90.2)	4	9.8%	41	(100.0)		

Fisher exact-test used

*Significant at $p<0.05$

Senior residents conducted the majority 33 (80.5%) of the procedures, and consultant obstetricians conducted 8 (19.5%) procedures (Figure 4).

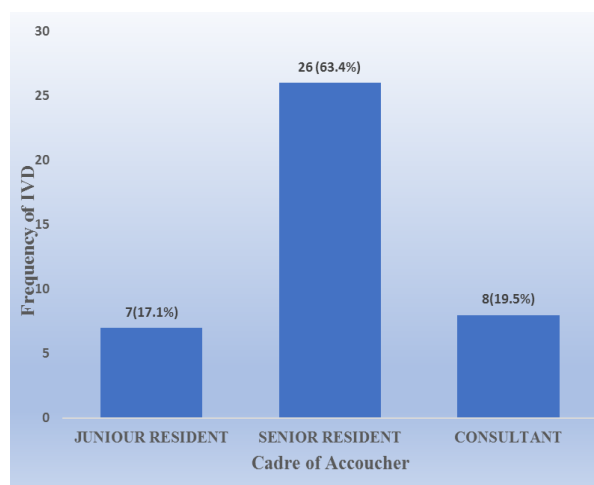


Figure 3. Cadre of accoucher and the number of IVD performed.

Discussion

In this study, the rate of instrumental vaginal births was 0.87 of all deliveries, with vacuum and forceps accounting for 0.77 and 0.1% of deliveries, respectively. The rate of instrumental deliveries at Irrua Specialist Teaching Hospital is low and this reported rate was lower than 1.61% in Uyo,¹¹ 3.7% reported in Abakaliki,¹⁶ 3.6% reported in Zaria. However, it was higher than the 0.69%, 0.4% and 0.77%^{9,13,14} reported in Bauchi, Jos and Lagos respectively. The preponderance of vacuum extractions over forceps deliveries was similar to what was reported in other Nigerian and West African countries like Niger, Mali and Burkina Faso.^{4,9,11-14,18} This might be due to the simplicity of the vacuum extractor's operation and the fact that fewer foetal-maternal problems have been reported since plastic and silicone cups have replaced metal cups.^{9,14}

Contrary to popular belief, most reports from Nigeria show that the rate of instrumental deliveries is lower than that of industrialised nations, with rates of 4.5% in the US, more than 10% in the UK, and up to 15% in Canada.^{9,11} Additionally, it is far lower than the RCOG's 8.5% recommendation.¹⁹ Furthermore, the use of instrumental vaginal deliveries is progressively going out of style, as evidenced by the sharp decline in prevalence in Lagos from 4.9% in 2004 to 0.71%¹⁴ over the past ten years, which is comparable to the trend in prevalence patterns seen in Jos where similar studies have been conducted.¹³ This is quite

worrisome since patients' reluctance to caesarean deliveries due to sociocultural and religious beliefs (mainly seen in developing countries) can make instrumental deliveries a more affordable and minimally invasive alternative to delivery, particularly in a society with limited resources like Nigeria. The predilection for caesarean sections by modern obstetricians even in situations perfect for forceps or vacuum extraction is cited as one of the reasons for the low rate of instrumental births, either relating to medico-legal considerations or their lack of training.

This study showed a declining trend in the use of instrumental vaginal deliveries. This is similar to previous reports from other parts of the country. In contrast there was a surge of instrumental deliveries observed in 2019. This may result from a training organised by the Department of Obstetrics and Gynaecology ISTH, targeted at equipping residents with the requisite knowledge, experience and skills in performing IVD.

This study's findings about the majority of instrumental deliveries on booked women with low parity (Para 0 and 1) are similar to findings from Bauchi and Zaria, where the majority of these procedures were performed on primigravidae (52.2% and 78.6%, respectively), and also to findings from Port Harcourt and Benin who are the same geopolitical zone of the country where this study was conducted.

Women with low parity are more prone to experience dysfunctional labour and require more assistance during labour, which may account for the higher rate of instrumental vaginal births among them. This may also explain the fact that more of the younger age group were primigravidae. On the other hand, prior investigations on parturient parity did not find any connection between IVD use and parity.^{9,13}

The reasons for assisted vaginal births in this study are the same as those described in earlier investigations.^{9,11,14} The most frequent indicator was found to be the prolonged second stage of labour, followed by maternal exhaustion, which may be due to the fact that studies have shown that maternal morbidity increases after 3 hours and further increases after 4 hours of the second stage of labour.²⁰

Vacuum and forceps delivery can be associated with significant complications both maternal and foetal. The most common maternal complication in this study was perineal tears which were followed by primary post-partum hemorrhage. Surprisingly, parturients who underwent vacuum delivery tended to have more of them.

This could be as a result of an episiotomy that extended or because an episiotomy was not administered prior to the procedure as prophylactic episiotomy is not routinely administered to parturients having a vacuum delivery as compared to forceps, the suction cups occupy less space in the perineum as compared to the forceps. Similar reports were obtained from other studies^{9,13,14} but different from a study that showed that primary post-partum haemorrhage was the common complication.¹⁰

The most frequent newborn problem in almost half of the parturients was birth asphyxia. This is not surprising given the variety of purposes for which the procedures were performed. This finding is consistent with earlier studies, although it differs from one from India that identified cephalohematoma as the most frequent newborn complication.⁸

The fact that this study was a retrospective analysis of the delivery records and a lot of data was missing was a significant limitation.

Additionally, the small number of instrumental vaginal deliveries reduced the statistical analysis's power and the ability to compare the results of forceps deliveries and vacuum extractions.

This study may be utilized by researchers to carry out more extensive research that incorporates more factors and triangulation with qualitative data.

There is no justification for allowing the skill of utilizing ventouse and forceps to help delivery to go extinct given the relative safety of instrumental delivery as revealed in this study and its advantages. There is a need to investigate the causes that prevent its use in many obstetric units and attempt to change them, as well as to advocate its use and educate healthcare providers for expectant mothers about the use of instrumental births in our nation.

Conclusion

This setting of this study has a very low rate of instrumental births, resulting in a high caesarean section rate, which may adversely affect resident doctors' IVD training. The most common indication was delayed second stage of labour due to malposition. The majority of the cases had no complications and the foetal outcome was good for most of the cases indicating that the procedure can be safe in an experienced hand. Despite its safety profile seen in this study as documented by very good fetal outcomes, the rate is also fast declining. Considering, that IVD is adjudged a key element of essential obstetric care by the WHO it behooves us that efforts should be geared towards training and retraining skilled birth attendants to improve the uptake of IVDs, and equipping our training Centre's would add a boost to basic obstetric skills. This is particularly important as IVD provides an option to caesarean section in carefully selected cases, thereby reducing our cesarean section rate which is already high with our limited health resources. Furthermore, our environment is bedeviled with an aversion to ccaesarean section.

This study has demonstrated that instrumental deliveries in this hospital are low but generally safe. Therefore, we advise buying mannequins to train resident doctors, implement routine instrumental vaginal delivery drills and upscale consultant expertise.

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