THE IMPACT OF DECISION – DELIVERY INTERVAL ON MATERNAL AND FETAL OUTCOME: A THREE- YEAR EXPERIENCE IN A TERTIARY HOSPITAL.

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ABSTRACT

Background: Human resources development has been identified as a very important tool in improving maternal and child health. An enhanced human resource capability helps in the reduction of the decision-delivery interval (DDI), which has been identified as a key factor in improving the feto-maternal outcome in emergency caesarean delivery (ECD) for fetal and maternal reason.

Aim: This study aims to find out the feasibility of 30-minute decision-delivery interval (DDI) and the average decision-delivery interval in our setting, the effect of delayed decision-delivery interval on maternal and fetal outcome; to identity the prevailing factors and to proffer solutions.

Materials and Methods: This was a retrospective study carried out over a 3-year period between 1st January 2011 and 31st December 2013. The case notes of 577 patients who had emergency caesarean delivery during this period were reviewed and information relating to socio-demographic characteristics, indications for the caesarean delivery, decision-delivery interval, reasons for delay and feto-maternal outcome were obtained. All cases of preterm deliveries, intra-uterine fetal demise and multiple pregnancies were excluded.

Results: The prevalence of caesarean delivery during this period of study was 36.4% with 83.3% done as emergency. Seventy One percent of the parturients were multiparous women who were mostly unbooked (54.8%). The indication for surgery was fetal distress in majority of cases (40.4%). None of the parturient was delivered within 30 minutes of decision and the mean DDI was 120.35±40.26 minutes overall but lower for cases of fetal distress (96.38±34.72 minutes, P<0.001). The major reasons for delay in delivery were laboratory challenges and financial constraint (63.6% and 53.4% respectively). There was a statistically significant reduced mean time interval for instituting general anaesthesia compared with spinal anaesthesia. Severe fetal morbidity and mortality occurred with increase in DDI but was not shown to be statistically significant. Perinatal mortality rate among study group was 7.3%. Maternal mortality and near misses increased with increase in DDI and was shown to be significant (P=0.014). The maternal mortality rate from this study was 2.6%.

Conclusion: The decision-delivery interval of 30-minutes is difficult to achieve in low resource settings; even in the face of emergency, due to prevailing factors which include poor human capital development, poor standard of living, bad attitude of health workers and infrastructural challenges.

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However, it is advisable to expedite delivery in cases of acute fetal/maternal distress since prolonged decision-delivery interval has detrimental effects on feto-maternal outcome.

Keywords: Decision-Delivery Interval (DDI), Emergency Caesarean Delivery (ECD), Feto-maternal outcome, Maternal Mortality.

INTRODUCTION

Caesarean delivery is an important aspect of emergency obstetric care and a major tool in the reduction of maternal and prenatal morbidity and mortality[1]. It is well documented that prolonged decision – delivery interval adversely affects the feto-maternal outcome in cases of emergency caesarean delivery due to acute fetal / maternal distress. Decision – delivery interval greater than 75 minutes is known to adversely affect perinatal outcome[2]. RCOG/NICE guidelines and American College of Obstetrician and Gynaecologist (ACOG) recommended an ideal time frame of 30 minutes for delivery to be accomplished for cases of fetal compromise in labour[3,4,5].

However, this recommended time limit is mostly unachievable in most instances and various studies in the developing countries put the average decision – delivery interval DDI between 100 – 180 minutes [6,7,8.] Several factors have been identified to contribute to the inability to achieve delivery within 30minutes of taking decision. The reasons attributable to prolongation of the DDI include delay in giving consent by patients and relatives, inadequate staff strength and poor staff training, lack of appropriate/adequate facilities, type of anaesthesia, laboratory delay, lack of harmonious working relationship between different disciplines involved and poor financial standing of patient [6,9,10,11,12]. More so, it requires an effective multidisciplinary team approach before the caesarean section can be done [13].

Conclusion from several investigations revealed that it is difficult to attain the 30-minutes DDI in developing countries due to challenges encountered during the pre – operative preparation [5,6,7,11,14,15.] Notwithstanding, it is generally agreed that once a decision has been taken to deliver abdominally, it is better to quicken the process so as to avoid adverse maternal and fetal outcome, especially in cases of acute fetal or maternal distress, cord prolapse and placental abruption [2,12,16.]

Lucas et al classified caesarean delivery according to the severity of the fetal and maternal condition as Emergency, Urgent, Scheduled and Elective caesarean deliveries[17]. Emergency Caesarean delivery is done for cases of fetal or maternal compromise that are life- threatening to both fetus and mother, Urgent Caesarean delivery for cases of fetal or maternal compromise which is not immediately life threatening, scheduled caesarean delivery for cases that need early delivery but with no maternal or fetal compromise while elective caesarean delivery is planned for a time to suit both the patient and the managing team [8,10,14,17]. Timing is essential in cases of emergency caesarean delivery and unnecessary delay could be detrimental to the mother and the foetus[11].

Maternal and perinatal morbidity and mortality associated with delay in carrying out emergency caesarean delivery can be prevented by developing human capital, improving infrastructure and increasing social, economic and political rights with the focus of increasing basic standard of living (Millennium Development Goals) [18]. In addition, behavioral and attitudinal change of health workers, and the political will on the part of policy makers to make maternal and child health delivery care more

effective is important [19].

This study was carried out to find out the average Decision – Delivery Interval in our setting, the effect of delay on feto-maternal outcome and to identity the prevailing factors responsible for the delay. It is our sincere hope that the findings from this study will assist the hospital management and policy makers to formulate guidelines so as to surmount the challenges and ultimately improve delivery outcome.

MATERIALS AND METHODS

This was a retrospective study of cases of emergency caesarean delivery performed by the obstetric unit of Olabisi Onabanjo University Teaching Hospital (OOUTH), Sagamu, Nigeria, over a 3-year period from January 1st 2011 to December 31st, 2013. Cases of emergency caesarean deliveries for parturients with intra-uterine fetal deaths, preterm pregnancies and multiple pregnancies were excluded from the study so as to remove biases from these cases. Five hundred and seventy seven (577) case notes (out of 608) were available from the medical records and used for this study, giving a retrieval rate of 94.9%.

Relevant data were obtained from the labour ward records, theatre records and parturients case files. Information obtained were entered into a data sheet and these included socio-demographic characteristics such as age, parity, educational level, occupation, booking status and indication for caesarean delivery. Areas of delay were identified from the case notes, the type of anaesthesia instituted and the decision – delivery interval extrapolated. The fetal outcome, which included the Apgar scores, still birth and need for admission to Special Care Baby Unit (SCBU), were recorded. Maternal outcome, which also included the need for intensive care unit admission, post-operative complications and maternal deaths were recorded. The total number of deliveries and the total number of elective caesarean deliveries were extrapolated from the delivery register in the labour ward and recorded.

The data obtained were entered into a computer and analyzed using the IBM statistical package for social sciences version 20(IBM SPSS 20) and data presented in the form of tables, percentages, numerical and simple proportions. Student t-test was used to compare means and a p – value of <0.05 was considered statistically significant.

RESULTS

During the period under review, a total of 2006 deliveries took place at the maternity unit of Olabisi Onabanjo University Teaching Hospital. A total of 730 Caesarean deliveries were performed of which 608 were performed as emergencies and 122 as elective procedures. Therefore, the caesarean delivery rate for the period under review was 36.4% and the emergency caesarean delivery rate was 83.3%.

Table I shows the socio-demographic parameters of the parturients. Most of the patients are within the age bracket of 30-39 years (42.8%) and closely followed by ages 20-29years (42.1%). Most of the patients in our study have had 1-2 parous experience (35.7%) followed by those with 3-4 parous experiences (35.3%). A large number of the patients were either unbooked or referred from other centres where they received antenatal care (54.8%).

Table II shows the various indications for emergency caesarean delivery (ECD) in our centre. Fetal distress was the major indication for caesarean delivery (40.4%) while other fetal indications (31.7%) and maternal indications (27.9%) accounted for other reasons.

Table III revealed the various reasons for delay in the DDI. Some patients had more than one reason. It showed that the reason for delay in DDI in our setting is majorly because of laboratory challenges (63.6%) and closely followed by financial

constraints (53.4%).

Table IV revealed the delay between the decision and delivery and delay in instituting anaesthesia. No parturient had delay that is ≤30minutes and majority of the parturient (54.5%) had delay for over 120minutes. The minimum DDI was 50minutes and the maximum was 256 minutes giving a mean DDI for ECD of 120.35±40.26 minutes. Fetal distress had the shortest mean DDI of 96.38±34.72 minutes while that for non-fetal distress was 128.72±39.83 minutes. This is *statistically significant (T-tests = - 8.69, P<0.001).* Table IV further showed that only 106(13.4%) of the parturients had a time for ≤ 30 minutes and majority, 324(56.2%), took about 31-60 minutes before anaesthesia could be instituted.

Table V** shows the type of anaesthesia instituted in all the patients who had ECD.** Majority of the patients had spinal anaesthesia (60.7%) while the others had general anaesthesia (38.7%) and epidural anaesthesia (0.7%) respectively. The mean time taken to institute general anaesthesia was 42.71±18.32 minutes and that for regional anaesthesia was 48.44±16.39 minutes. This is also statistically significant (T-test=-3.803, P=0.001).

Table VI shows the fetal outcome for all the ECD. Severe morbidity and mortality occurred in 53 (9.2%) of cases. It also compared the fetal outcome in the different DDI group. Though, the DDI increases, perinatal morbidity and mortality also increase but is not statistically significant (Chi – square test = 4.125 and p-value =0.247). The perinatal mortality rate among the study population was 72.8 per 1000.

Table VII compared the maternal outcome against the different DDI. There was no complication in 552 (95.7%) cases. There were, however, 10(1.7%) cases of near misses requiring ICU admission and 15(2.6%) cases of maternal mortality. The longer the delay, the worse the maternal outcome. This was also statistically significant (T-Test – 10.683, p=0.014).

DISCUSSION

Caesarean delivery (CD) has now become one of the oldest and commonly performed surgical obstetric procedures done for various reasons as an alternate route to vaginal delivery with the fetus and the mother in mind[20]. This study designed to assess the feasibility of the 30-minute DDI and the likely effect of delay on the maternal and neonatal outcome found the prevalence of CD rate to be 36.4%. This is similar to the findings of 34.5% in South – South[21] and 35.9% in South -West[22] but higher than 10.5% in North-Central[1] parts of Nigeria, 12.2% in North -East[23] and 27.6% in South-East[24] parts of Nigeria. This further corroborate findings by Oladapo et al of a rise in CD rate in this study centre from 10.3% in 1989 – 1991 to 23.1% in 2000 – 2003[25].

The caesarean deliveries done were majorly emergencies (83.3%) and this is similar to findings by other researchers in other parts of Nigeria of 83.6% by Swende et al[1], 93.7% by Ugwu et al[24] and 72.4% by Bukar et al[23].

The vast majority of the parturients in our study fall within the age bracket of 30-39 years, which could be a coincidence with the period of highest reproductive activity. Findings by Chukwudi et al[6], Igberase et al[21] and Inyang –Etoh[10] et al revealed a modal age group of 25-30 years This study also revealed a higher rate of ECD among more than half of the multiparous women similar to findings by Inyang – Etoh et al[10]

A large proportion of our parturients were unbooked (54.8%). This is because the centre serves as a referral centre to other health facilities around and this is similar to findings by Igberase et al (59.5%)[21] and Bukar et al (58.4%)[23] but a sharp contrast to the reports from Inyang –Etoh et al (10. 3%)[10] and Ugwu et al (36.2%)[24].

Our result showed that fetal distress is a major indication for ECD (40.4%), which is in tandem

with findings from the works of other researchers[6, 10,26]. This could be attributed to the fact that majority of our parturients are unbooked patients who might have been on a long period of unsupervised labour at centres with unskilled manpower and the fact that other indications for caesarean delivery like cephalopelvic disproportion, Placenta abruption, severe pre-eclampsia, cord prolapse, prolonged rupture of membranes, injudicious use of oxytocics, poor progress in labour could be the cause of fetal distress.

One of the greatest contributions to the delay in performing ECD in a poor resource setting like ours, after decision has been made, is the fact that there may be poor laboratory support that is made worse by the poor attitude to team work by laboratory staff, inability to recognize emergency situation, inadequate poor blood banking system, inadequate staffing and poor facilities[12].

Financial incapability of parturients and their relations is another major factor influencing DDI, most especially in our setting where the health insurance scheme is still poorly understood. The decision not to give consent for surgery in most cases is due to the poor financial status aside from traditional believes. This is in contrast to findings by other researchers in other parts of the country who found anaesthetic delay and busy theatre suites as the major reason for delay.[5, 6,10,26] Studies revealed that the major reasons for delay in achieving the 30-minute DD1 in developed countries are due to hierarchy of the surgeon and transit time between the labour ward and the theatre[27].

It has been advocated that general anesthesia is faster for ECD for fetal distress and this is supported by findings from this work. Though, most of the patients in our study had spinal anaesthesia (60.7%) because it has been documented to be safer and the technique of choice[28], but general anaesthesia is preferable in few cases of failed spinal anaesthesia, bleeding cases and acute fetal condition.[14]

This present work revealed that no parturient for ECD during the study period was delivered within the 30-minute interval. This is in tandem with the works of other researchers in low resource settings.[5]

The mean DDI of 120 ± 40.26 minutes from our study is slightly higher than that of Chukwudi et al (106. 3 ± 79.5 minutes) [6] but lower than that of Radhakrishnan et al (183.24 minutes)[7]. The need to deliver fast in cases of fetal distress is further demonstrated with the difference in the mean DDI for cases with fetal distress and non-fetal distress. The result of 96.38 ± 34.72 minutes for fetal distress in this study is higher than result from other local work by Chukwudi et al (68.7± 39.7 minutes).[6]

Our work also corroborate findings from other studies that fetal morbidity and mortality may increase especially after 120 minutes if delivery is delayed but it has not been shown to have any statistical significance (P= 0.247) because of lack of correlation between the perinatal mortality rate in DDI and perinatal outcome.[6,13]. The perinatal mortality rate of 7.3% in this group is similar to 8.2% found by Bukar et al but higher than those of Onwudiegwu et al (3.7%)[26] and Ugwu et al (3.9%)[24].

Lastly, maternal outcome worsen with delay in delivery, especially when the indication for delivery is maternal. The present work has shown an increase in the number of near –misses and significant increase in maternal mortality (2.6%). This is similar to the maternal mortality rate of 3% by Onwudiegwu[26] al and 2.1 % by swende[1], but higher than those of Bukar et al (0.8%)[23], Ugwu et al (0.7%)[24] and Igberase et al (1.4%)[21].

CONCLUSION

The decision to –delivery interval of 30 minutes is difficult to achieve in low resource settings, even in the face of emergency, due to prevailing factors, which include poor human resource development

and infrastructural challenges. It is however expedient to quicken delivery in cases of acute effect / material distress as a prolonged decision – to – delivery interval has an adverse effect on feto-maternal outcome. Policy makers should target other measures of emergency preparedness in order to improve feto-maternal outcome.

Table 1: Socio Demographic Parameter

Parameter	No of Parturients (%)	
Age group (years)		
=19	29	(5)
20-29	243	(42.12)
30-39	247	(42.8)
= 40	58	(100)
Total	577	100
Parity		
0	144	(25)
1-2	206 (35.7)	
3-4	204 (35.3)	
=5	23 (4)	
Total	577 (100)	
Booking Status		
Booked	261	(45.2)
Unbooked	316	(54.8)
Total	577	(100)

Table II: Indications for Emergency Caesarean Delivery

Indication	No of Parturients (%)	
Fetal distress	233	(40.4)
Other fetal indications	183	(31.7)
Maternal Indication	161	(27.9)
Total	577	(100)

Table III: Reasons for Delay

Reason	No of Parturients (%)	
Consent by patient /Relatives	39	(6.8)
Laboratory Challenges	367	(63.6)
Institution of Anaesthesia	61	(10.6)
Transportation to Theatre	7	(1.2)
Lack of Electricity	66	(11.4)
Finance	308	(53.4)
Availability of Theartre Space	51	(8.8)

Table IV: Frequency Distribution Indicating DDI And Time Taken To Institute Anaesthesia

Interval (Minute)	DDI	Institution of Anaesthesia
	No of Parturient (%)	No of Parturients (%)
= 30	0 (0)	106 (18.4)
31 – 60	39 (6.8)	324 (56.2)
61 – 90	108 (18.7)	117 (20.3)
91 – 120	115 (19.9)	30 (5.2)
> 120	315 (54.6)	0 (0)
Total	577(100)	577(100)

Table V: Type of Anaesthesia and Mean time interval of institution of anaesthesia

Type	No of Parturient (%)	Mean time interval of Institution (minute)
General Anesthesia	223 (38.6)	42.71± 18.32
Spinal Anesthesia	350 (60.7)	48.44 ± 16.39
Epidural Anesthesia	4 (0.7)	

T- test = 3.803P – Value = 0.001

Table Vi: Fetal Outcome against DDI

DDI (Minutes)	None / Mild Morbidity (%)	**Severe morbidity & Mortality (%)
31 – 60	20 (10)	0 (0)
61 – 90	119 (93.7)	8 (6.3)
91 – 120	103 (89.6)	12 (10.4)
=120	282 (89.5)	33 (10.5)

Chi-Square test 4.135, P value = 0.247 (not statistically significant)

** Serve Birth Asphyxia 11 (1.92 %), Perinatal death 42 (7.3%)

Table VII: Maternal Outcome Against Ddi

DDI (Minutes)	*No Complication (%)	**Near Miss	Mortality (%)
31-60	20 (100)	0 (0)	Chi – Square Test
61-90	123 (96.9)	4 (3.1)	= 10.683
91- 120	115 (100)	0 (0)	P Value = 0.014
=120	294 (93.3)	21 (6.7)	StatisticallySignificant

* Total = 552 (95.7%)

** ICU admission 10 (1.7%), Maternal death 15 (2.6%)

Chi-Square Test = 10.683, P value = 0.014 (statistically significant)

DATA CAPTURE SHEET

The Impact of Decision – Delivery Interval on Maternal and

Child Health: A three year experience in a tertiary hospital

(A)BIODATA

1. Age (years):
2. Educational level: Informal

Primary Secondary Tertiary

3. Occupation:

Housewife Artisan Trader Civil Servants

4. Parity:
5. Booking Status: Booked Unbooked
6. Indication for surgery: Fetal Distress Non – Fetal distress maternal indication

B. DELAY

1. Areas of delay: Consent by patients and relatives Laboratory Transport to theatre
2. Institution of Anaesthesia Availability of theatre space Lack of electricity Finance
3. Type of Anaesthesia: General Anaesthesia Spinal Anaesthesia Epidural Anaesthesia
4. Time taken to institute Anaesthesia:
5. Decision to delivery interval:

C. MATERNAL AND FETAL OUTCOME

1. Fetal outcome: Fresh stillbirth Severe Birth asphyxia Moderate asphyxia Non-asphyxiated
2. Maternal outcome: No complication ICU admission Ruptured uterus Maternal death

REFERENCES

1. Swende Tz. Emergency caesarean section in a Nigerian tertiary health centre. Niger Jmed. 2008; 17(4)**:** 396 – 398.
2. Thomas J, Paranjothy S, James D. National cross – sectional survey to determine whether the decision to delivery interval is critical in emergency caesarean section. BMJ 2004; 328: 665 – 668.
3. National Collaborating Centre for women's and Children's Health, Caesarean Section, National Evidence Based Guideline, RCOG Press, London, UK, 2004.
4. Guidelines for perinatal care, 5th ed. Elk Grove III. American College of Obstetricians and Gynaecologists 2002.
5. Onah HE, Ibeziako N, Nmezulike AC, Effetie ER, Ogbuokiri CM. Decision-delivery interval and perinatal outcome in emergency caesarean section. J Obstet. Gynecol. 2005; 25:342-346.
6. Chukwudi OE, Okonkwo CA. Decision-delivery interval and perinatal outcome of emergency caesarean sections at a tertiary institution. Pak J Med Sci. 2014; 30 (5): 964 – 950.
7. Radhakrishnan G, Yadav G, Valid NB, Alli H. Factors affecting decision to delivery interval in emergency caesarean section in a tertiary care hospital: a cross – sectional observational study. Contracept Obstet Gynaecol. 2013; 2 (4): 651 – 656.
8. Inyang – Etoh EC. Decision- Delivery interval for emergency caesarean section and perinatal outcome in the university of Calabar Teaching Hospital, Calabar, Nigeria. Trop J Obstet Gynaecol 2010;27(2):63-68.
9. Cerbinskaite A, Malone S, Mc-Dermott J, Loughney AD. Emergency Caesarean

Section influences on the decision – delivery interval. J pregnancy 2011; 13 (2011) Article ID 640379, 6 Pages.

10. Inyang – Etoh EC, Umoiyoho AJ, Abasiattai AM. Reasons for delay to perform emergency caesarean section among Parturients in Tertiary Health care facility in south-south Nigeria. Ibom Medical Journal 2014; 7(1): 9 pages.
11. Kwawukume EY. Caesarean section in the Tropics. In: Kwawukume EY and Emuveyan EE. (Eds) Comprehensive Obstetrics in the tropics Dansoman. Asante & Hittscher Printing Press Ltd. 2002; 321 – 329.
12. Rashid N, Nalliah S. Understanding the Decision – Delivery interval in caesarean Births. IeJSME 2007; 1 (2): 61-68.
13. Tuffnell DJ, Wilkson K, Beresford N. Interval between decision and delivery by caesarean section - are current standards achievable? Observational case series. BMJ 2001; 322: 1330 – 1333.
14. Mackenzie IZ , Cooke I. What is a reasonable time from decision –to- delivery by caesarean section? Evidence from 415 deliveries. BJOG 2002: 109 (5) 498 – 504.
15. Sayegh I, Dupuis O, Clement HJ, Rudigoz RC. Evaluating the decision to – delivery interval in emergency caesarean sections Euro J Obstets and Gynaecol and Reprodbiol 2004; 116 (1) : 28-33.
16. Oladapo O.T, Sotimehin SA, Ayoola – Sotubo O. Prediction of severe Neonatal compromise following caesarean section for clinically Diagnosed Foetal Distress. WAJM 2009; 28 (5): 327 – 332.
17. Lucas DN, Yentis SM, Kinsella SM Holucroft A, May AE, Wee M. Urgency of Caesarean section: a New classification J Royal Soc Med. 2000; 93 (7) : 346 – 350.
18. World Health Organization. Accelerating progress towards the health – related Millennium Development Goals. WHO 2010; WHO/ DGO/ 2010. 2: 16 Pages.
19. Ezechi OC, Loto OM, Ndububa VI, Okogbo FO, Ezeobi PM, Nwokoro CA. Caesarean section and perinatal mortality in South Western Nigeria. NJOG 2009, 4 (1): 46 – 48.
20. Jaiyesimi RAK, Ojo OE. Caesarean section in the Tropics. In: Okonofua F and Odunusi K. (Eds.) Contemporary Obstrics for developing countries. Benin city – Nigeria. Women Health and Action Research centre 2003; 592 -642.
21. Igberase GO, Ebeigbe PN, Andrew BO. High caesarean section rate: a ten-year experience in a tertiary hospital in the Niger Delta, Nigeria. Niger J Clin pract 2009; 12 (3): 294 – 297.
22. Adekanle DA, Adeyemi AS, Fasanu AO. Caesarean section at a tertiary institution in Southwestern Nigeria – A 6-year audit. Open Journal of Obstetrics and Gynaecology 2013; 3:357-361.

23 Bukar M, Audu BM, Massa AA. Caesarean delivery at the Federal Medical Centre Gombe: a 3-years experience. Niger J Med. 2009; 18(2): 179 – 183.

24. Ugwu EOV, Obioha KC, Okezie OA, Ugwu AO. A five year survey of caesarean delivery at a Nigerian tertiary hospital. Ann Med Health Sci Res. 2011;1(1) : 77 – 83.
25. Oladapo OT, Sotunsa JO, Sule – Odu A O. The rise in Caesarean Birth rate in Sagamu, Nigeria: reflection of changes in obstetric practice. J Obstet Gynaecol 2004; 24 (4): 377 – 381.
26. Onwudiegwu U, Makinde ON, Ezechi OC, Adeyemi A. Decision Caesarean delivery interval in a Nigerian University Hospital:

implications for maternal morbidity and mortality. J Obstet Gynaecol. 1999; 19 (1): 30 -33.

27. Kolas T, Hofos D, Olan P. Prediction for the decision – to – delivery interval for emergency caesarean section in Norway. Acta Obstetricia et Gynecologica. 2006; 85: 561 – 566.

28. Singh R, Deo S, Pradeep Y. The decision – to - delivery interval in emergency caesarean sections and its correlation with perinatal outcome: evidence from 204 deliveries in a developing country. Trop Doct 2012; 42 (2): 67 – 69.