

Time-Motion Study of Obstetric Emergencies in a Teaching Hospital

Ernest Okechukwu **ORJI**¹, Ebenezer Olanbani **OJOFEITIMI**², Adebajo Babalola **ADEYEMI**¹, Adepeju O **ESIMAI**³,
Ebun **ADEJUJIGBE**⁴, Olabimpe O **OWOLABI**⁵

¹Department of Obstetrics and Gynecology, Obafemi Awolowo University, Ile-Ife, Nigeria

²Institute of Public Health, Obafemi Awolowo University, Ile-Ife, Nigeria

³Department of Community Medicine, Obafemi Awolowo University, Ile-Ife, Nigeria

⁴Department of Paediatrics, Obafemi Awolowo University, Ile-Ife, Nigeria

⁵Department of Nursing, Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria

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Abstract

Objective: A time motion study to check the efficiency of the workload, the facilities, and the providers and the reasons for identified delays in women with obstetric emergencies with the aim of making motherhood safer for developing countries.

Materials and Methods: A client flow chart was used to collect time records of arrival of respondents at labour ward and the time of the various activities were noted. Structured questionnaires were also used. Data analysis was done using statistical package for social sciences (SPSS) Software. Using EPI-INFO Statcalc Feature, further analysis was employed using Yates Correction of Continuity χ^2 to measure association between demographic characteristics and fetomaternal outcome.

Results: Ninety-six women with obstetric emergencies at the labour wards of the Obafemi Awolowo University Teaching Hospitals Complex were studied. Delays in delivery care occurred mostly in subjects requiring emergency caesarean section. There were theatre related and care givers related factors. The major cause of delays was inadequate operating theatre space and/or inconsistent labour ward theatre power supply. Delays between decision and commencement of caesarean section had a significant relationship with perinatal and maternal mortality (p -value=0.001). Demographic characteristics of the women did not have any significance impact with maternal outcome but low level of education and religious persuasions impacted negatively on perinatal outcome (p <0.05).

Discussion: Phase 3 delays occurred in this hospital with a resultant increase in maternal and perinatal mortality in developing countries.

Keywords: time motion study, maternal and perinatal mortality, delay factors, safe motherhood

Özet

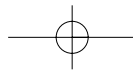
Bir Eğitim Hastanesinde Acil Obstetrik Durumlarda Zaman-Devinim Çalışması

Amaç: Gelişmekte olan ülkelerde anneliği daha güvenli bir hale getirmek için yapılan ve obstetrik aciliyeti olan kadınlarda belirlenmiş gecikmelerde, iş yükünün, imkânların, tetikleyicilerin ve sebeplerin etkisini belirlemek amacıyla bir zaman-devinim çalışmasının yapılmasıdır.

Materyal ve Metot: Kadınların doğumhaneye geliş ve farklı işlemlerin yapıldığı zamanlarının kaydedildiği bir hasta takip çizelgesi ve sistematik anketler kullanılmıştır. Veri analizi, Sosyal Bilimler İstatistiksel Yazılım (SPSS) paketi kullanılarak yapılmıştır. Demografik özellikler ve fetomaternal sonuçlar arasındaki bağlantıyı ölçmek için EPI-INFO Statcalc programı ve ileri seviye analiz için Yates düzeltmeli χ^2 testi kullanılmıştır.

Sonuçlar: Obafemi Awolowo Üniversitesi'nin doğumhanesi Eğitim Hastanesi Kompleksi'nde obstetrik aciliyeti bulunan 96 kadın incelenmiştir. Doğum bakımındaki gecikmeler, çoğunlukla acil sezaryen endikasyonu bulunan kadınlarda ortaya çıkmıştır. Burada doğumhane ve hastane odaklı faktörler söz konusuydu. Gecikmelerin başlıca sebepleri elverişsiz ameliyathane koşulları ve/veya doğumhanedeki yetersiz bakım arzıdır. Sezaryene karar verme ve başlama arasındaki gecik-

Corresponding Author: Dr. Ernest Okechukwu Orji
Department of Obstetrics and Gynecology,
Obafemi Awolowo University, 220005 Ile-Ife, Nigeria
Phone : +23 4803 356 74 51
E-mail : eorji11@yahoo.com



melerin perinatal ve maternal ölümlerle ($p=0.001$) önemli bir bağlantısı vardır. Kadınların demografik özelliklerinin maternal sonuç üzerinde önemli bir etkisi yoktur. Ancak düşük eğitim seviyesinin ve dini öğretilerin perinatal sonuçlarda önemli etkileri bulunmaktadır ($p<0.05$).

Tartışma: Bu hastanede saptanan 3. evre gecikmeleri, gelişmekte olan ülkelerdeki maternal ve perinatal ölümlerin artmasına sebep olan durumlardır.

Anahtar sözcükler: zaman-devinim çalışması, maternal ve perinatal ölümler, gecikme faktörleri, güvenli annelik

Introduction

Pregnancy and child birth are conditions that put women at risk of morbidity and mortality (1-3). About fifteen percent of all pregnancies will result in complications (3-5). Untreated, most of these complications will be fatal. What makes maternal mortality such a challenge is the fact that these complications are extremely difficult to predict. Despite years of research, we still have no reliable method of predicting the vast majority of cases of haemorrhage, obstructed labour and eclampsia (4). This is the case even in the developed areas where the latest medical technology is readily available (4-6). Prediction is generally limited to identifying only the high-risk groups of women. In reality the overwhelming majority of pregnancies and births take place among women who are considered to be of low-risk. Consequently, while the percentage of deaths may be higher among high risk women, the greatest numbers of deaths take place among women considered to be of low-risk (4).

For this reason, the focus for addressing maternal mortality has shifted from predicting complications during pregnancy to preparing for efficient emergency interventions. Most of these complications occur at the time of labour and delivery. It therefore takes a skilled professional to swiftly recognize life threatening complications on time to save the mothers life (3,4). Despite the launch of Safe Motherhood Initiative (SMI) in 1987 in Nairobi, Kenya, the maternal mortality ratio in Nigeria and other developing countries has been rising (1,2). This is despite the huge amount of funds allegedly spent by the government in training skilled professionals and providing emergency obstetric care (EmOC) facilities.

This situation calls for evaluation of the various activities at the tertiary hospital levels to analyze the time spent in carrying out the signal functions performed in health facilities that can prevent the death of a woman experiencing complications of pregnancy. This is because deficiencies in healthcare services at the tertiary level impacts negatively on safe motherhood and it represent a failure on the part of health services to seize the last chance to save a woman (3).

The objective of this study is to perform a time motion study to check the efficiency of the workload, the facilities, and the providers using a client flow chart (7). The study will also attempt to identify the reasons for delays in institution of timely treatment to women with obstetric emergencies with the aim of making motherhood safer for developing countries. The findings from this study will hopefully assist in overhauling the health care delivery system with the aim of reducing maternal and perinatal morbidity and mortality.

Materials and Methods

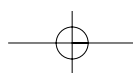
The study was conducted at the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Nigeria between November 2004 and February 2005. The inhabitants are mainly farmers, traders and artisans, though there is an increasing population of highly educated middle class made up of civil servants and professionals.

The study group was made up of 96 pregnant women admitted with obstetric emergencies at the labour wards. This is a descriptive cross sectional study. The study population was selected by purposive sampling, in view of the restriction of the study to pregnant women admitted in labour with obstetric emergencies. Data were collected using a combination of a client flow chart and a structured questionnaire, which consist of biodata and observational sections. The sociodemographic characteristics of the respondents were obtained and the time each mother arrived, was noted as well as time she was seen by a doctor, the time of diagnosis, the time of decision for caesarean delivery and the time it was commenced in relevant cases, intervals of time between arrival and interaction with doctor, between arrival and diagnosis, between decision for caesarean delivery and commencement were calculated and factors causing any delays were noted.

The collected data were analyzed using statistical package for social sciences (SPSS). Frequency tables of the distribution of respondents according to sociodemographic data, time intervals in labour ward, causes of delay, and mode of delivery, maternal and fetal outcomes were drawn. Cross tabulations were employed to study the relationship between the time intervals and maternal/fetal outcomes. χ^2 and p-value were calculated to assess the statistical significance of these relationships. Using EPI-INFO Statcalc Feature, further analysis was employed using Yates Correction of Continuity χ^2 to measure association between demographic characteristics and fetomaternal outcome.

Results

The age of the respondents ranges from 18 to 49-years. Majority 56 (58.4%) were 30-39-years, followed by 33 (34.4%) were 20-29-years, 4 (4.2%) were 18-19-years and only 3 (3.1%) were 40-49-years. Eighty-four (85.4%) of the respondents were Christians and the rest were Muslims. Forty-five (46.9%) had secondary level education, 38 (39.6%) had tertiary education, 8 (8.3%) had primary education and 5 (5.2%) had no formal education. Thirty-four (35.4%) were primigravidae, 46 (47.9%) were multipara and 16



(16.7%) were grandmultipara. Forty-two (43.8%) were traders, 20 (20.8%) were civil servants, 11 (11.5%) were students, 10 (10.4%) were artisans, 10 (10.4%) were housewives and only 3 (3.1%) were professionals.

The dominant ethnic group was Yoruba (85.4%), followed by Igbo 11 (11.5%), Hausa 1 (1.0%), and others 2 (2.1%). Most of the respondents 75 (78.1%) live at a distance of more than 5 kilometres from the hospital while 21 (21.9%) live within a distance of <5 km. Eighty-nine (92.7%) were married while 7 (7.3%) were single. Seventy (72.9%) were booked while 26 (27.1%) were unbooked.

Caesarean section was done in 50 (52.1%), while 45 (46.9%) had vaginal delivery and only 1 (1.0%) refused admission due to fear aversion for caesarean section. The indications for caesarean section was mostly for obstructed labours, followed by antepartum haemorrhage, failure to progress in labour, eclampsia and breech presentation. Ninety (93.8%) of the respondents were interviewed by the doctor within one hour of arrival at the labour ward, whereas 6 (6.2%) was interviewed after more than 2 hours of arrival. In 71 (77.1%) of the respondents, the diagnosis was made within an hour of arrival at the labour ward while 22 (22.9%) the diagnosis was made after one hour of arrival.

Of the 50 cases of caesarean section, 44 (88%) were commenced within six hours of the decision for operation (of these, 6% had their caesarean deliveries commenced within 30 minutes and 16% had theirs commenced within 1 hour of decision for surgery), while in the remaining 6 (12%), the surgery was commenced after 12 hours. There were phase III delays in 46 cases of the respondents. The causes for these delays include theatre related factors 20 (43.5%), awaiting doctors review 12 (26.1%), blood not available 10 (21.7%), delay in signing consent 2 (4.3%) and delay in opening case notes 2 (4.3%). Of the 96 respondents, there was one maternal death and one mother discharged against medical advice (1.0%). There were 10 (10.5%) perinatal deaths out of all 96 respondents.

Eighty nine respondents were interviewed by the doctor within an hour of arrival at labour ward, 98.9% of which were alive

Table 1. Waiting time between arrival of pregnant women to interview by doctor and fetal outcome

Interval (hrs)	Fetal outcome		
	Alive (%)	Dead (%)	Total (%)
<1	80 (89.9)	9 (10.1)	89 (100)
>1	5 (83.3)	1 (16.7)	6 (100)
Total	85	10	95

Pearson $\chi^2=31.520$, $df=1$, p -value=0.001

Table 2. Fetal outcome and time interval between arrival of pregnant women at the labour ward and diagnosis by doctor

Interval (hrs)	Fetal outcome		
	Alive (%)	Dead (%)	Total (%)
< 1	68 (91.9)	6 (8.1)	74 (100)
>1	17 (81.0)	4 (19.0)	20 (100)
Total	85	10	95

Pearson $\chi^2=36.269$, $df=1$, p -value=0.001.

at the end of delivery and 1 (1.1%) died ($p=0.995$). There is no association between arrival of pregnant women at the labour ward and diagnosis by doctor because the only case of maternal mortality was in a woman whose diagnosis was made within an hour ($p=0.928$). Table 1 shows that out of the 89 respondents who were interviewed by the doctor within one hour of arrival in the labour ward there were 10 (10.1%) ($p=0.001$) perinatal deaths. There was only one respondent interviewed after more than three hours and the outcome was also perinatal mortality.

Table 2 shows that out of the total of 74 respondents whose diagnosis were made within an hour of arrival in the labour ward, 6 (8.1%) were cases of perinatal mortality. Of the 20 respondents whose diagnosis were made after more than an hour of arrival 4 (19%) were cases of perinatal mortality ($p=0.001$).

Table 3 showed that the only case of maternal mortality was a woman whose caesarean section was commenced after more than twelve hours following decision for operation ($p=0.001$). About 44% of the caesarean sections carried out after more than twelve hours following decision resulted in perinatal mortality while 9.8% who had their caesarean section commenced in less than 6 hours after decision resulted in perinatal mortality (Table 4).

On exit questionnaire there were ten cases of perinatal mortality. Sixty percent of respondents still perceived fetal

Table 3. Maternal outcome and time interval between decision and commencement of caesarean section

Interval (hours)	Maternal outcome		
	Alive (%)	Dead (%)	Total (%)
<6	44 (100)	0 (0.0)	44 (100)
6-12	0 (0.0)	0 (0.0)	0 (0.0)
>12	5 (83.3)	1 (6.7)	6 (100)
Total	49	1	50

Pearson $\chi^2=23.105$, $df=2$, p -value=0.001.

Table 4. Fetal outcome and time interval between decision and commencement of caesarean section

Interval (hours)	Fetal outcome		
	Alive (%)	Dead (%)	Total (%)
<6	37 (90.2)	4 (9.8)	41 (100)
6-12	0 (0.0)	0 (0.0)	0 (0.0)
>12	5 (55.6)	4 (44.4)	9 (100)
Total	42	8	50

Pearson $\chi^2=20.879$, $df=2$, $p\text{-value}=0.005$

movement after arrival at the hospital and 20% were not aware of fetal movement before or after arrival at the hospital. While 20%, felt it was their fault, 80% were not sure. About 90% did not know danger signs in pregnancy and 77% of them did not book for antenatal care. In all 60% were satisfied with care given to them while 20% were indifferent.

Table 5 shows that demographic characteristics of the women did not have any significant impact on maternal outcome but low level of education and religious persuasions impacted negatively on perinatal outcome ($p<0.05$).

Discussion

This study reveals that there are delays in delivery care at a typical teaching hospital in Nigeria and these delays have significant influence on the maternal and perinatal outcomes of delivery care (3,8,9). There were more caesarean sections

than vaginal deliveries and delays occurred more in relation to caesarean deliveries. The delays that occurred in women that had vaginal deliveries were between arrival and the initial interview/diagnosis. These delays did not result in maternal or perinatal mortality.

It is obvious from this study that theatre related factors (due to inconsistent power supply to the labour ward theatre, on-going emergency surgery, cleaning up of the theatre etc.) were the most common causes of delay in commencing caesarean section soon after decision. In addition caregiver related factors (unavailability of anaesthetist to review patient prior to surgery, paediatrician for resuscitation, shortage of doctors in the labour ward and time lag in seeking the opinion of a consultant obstetrician) were important contributors to delay. This was generally due to insufficient staff on call in the paediatric and anaesthetic teams and poor communication facilities and in some cases poor individual attitude to work (9). Unavailability of blood was another impediment to the delivery of care. This was common in women who were of rhesus negative blood group. A minority of delays were due to opening of case notes for unbooked patients. There were also cases of late consent to surgery. The above are similar to the findings of a related study conducted at the same centre seven years previously (9).

Any period of time during which nothing is being done for the patient is generally considered a delay in obstetric care. In this study there were delays in 47.9% of the cases. The various intervals calculated from our observations revealed that the arrival-interview intervals could sometimes be as high as 4 hours although this was so in one case and did not

Table 5. Impact of demographic characteristics on maternal and fetal outcome

Characteristics	Number (%)	Maternal Outcome			χ^2	$p\text{-value}$	Fetal Outcome			χ^2	$p\text{-value}$
		Alive	Dead				Alive	Dead			
Age (years)											
18-29	47 (37.5)	37	-	0.72	0.81	33	4	0.06	0.81		
30-39	59 (62.5)	58	1			53	6				
Education											
<Secondary	13 (13.5)	12	1	1.15	0.28	9	4	16.6	0.04		
Secondary +	83 (86.5)	83	-			72	6		(sig)		
Religion											
Christianity	84 (85.4)	83	1	1.30	0.25	78	6	5.17	0.02		
Islam	12 (14.6)	12	-			8	4		(sig)		
Parity											
Nullipara	34 (35.4)	34	-	0.09	0.76	32	2	0.53	0.47		
Para 1&above	62 (64.6)	61	1			54	8				
Employment status											
Employed	85 (78.1)	75	-	0.09	0.76	32	2	0.53	0.47		
Not employed	21 (21.9)	21	1			54	8				
Ethnic group											
Yoruba	82 (85.4)	81	1	1.02	0.31	76	6	0.00	0.95		
Others	14 (14.6)	14				10	4				

χ^2 used here is Yates Corrected.
Sig=significant.

have an adverse effect on the mother but the infant was a stillbirth. In most cases arrival-diagnosis intervals were less than 2 hours, though, on the average it were about 57 minutes except for a case where there was an interval of 4 1/2 hours preceding diagnosis and this was the case of perinatal mortality as mentioned earlier.

The mean decision-caesarean delivery interval of 4.48 hours in this study is intolerably high compared with the standard decision-delivery interval of 30 minutes reported in a similar study conducted for British District Hospital care (8) and a mean decision-delivery interval of 1.6 hours reported in a study in Northern Nigeria (10). It is pertinent to comment that the mean decision delivery-interval of 1.6 hrs reported in a study in Northern Nigeria occurred following audit of their services and correction of observed deficiencies. It is hoped that similar reduction in mean decision delivery interval would be achieved in our health facilities following correction of observed deficiencies. Only 6 percent of caesarean sections in our study were carried out within 30 minutes and 16% within 1 hour of decision, as against 66.3% and 96% respectively in the British study quoted above (8). The delays that occur in the tertiary hospital setting are usually highly preventable if each member of staff and the hospital management play their roles diligently and effectively. In the case of the maternal mortality that occurred during the period of the study, the decision delivery interval was 15 hours, owing to electrical power failure and late anaesthetic review. About 45% of infants born after a decision-delivery interval longer than 12 hours were stillbirths.

The demographic characteristics of the women did not have any significant impact with maternal outcome but lower level of education and religious persuasions impacted negatively on perinatal outcome ($p < 0.05$). Previous studies (2,3,8,9,11,12) showed that less educated women often delay seeking health care compared to their educated counterpart. This delay may impact negatively on both the mother and the fetus, but in most circumstances the fetus is severely affected compared to the mother as was observed in this study. Although a significant proportion of perinatal deaths occurred among women of Islamic religion, it can not be inferred perinatal deaths are associated with the Islamic community. With a larger sample size this association may not be found.

The conclusion from this study is that delays in delivery care still occur in this centre mostly in patients requiring emergency caesarean sections. The major factor, causing delays is

theatre related. Perinatal mortality is more frequent than maternal mortality as an outcome of delays in delivery care.

It is recommended that periodic review of activities in the maternity care be done routinely to identify bottle necks and over haul services to meet the intended objective of reducing maternal mortality and morbidity. What is needed is not invention of new technology but better access to functional affordable services. As a result of the interrelated nature of the various phases of delay, it is important to promote measures that help women and their families to decide to seek delivery care promptly and to reach health care facilities on time (10-13). However the main challenge is how to get the tertiary centre like ours functional 24 hours a day, 7 days in a week.

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