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Original Research Article

Impact of day of delivery on obstetric and perinatal outcome: a 10 years retrospective descriptive and analytical study at the Phillipe Maguilen Senghor Health Centre, Dakar, Senegal

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ABSTRACT

Background: For a lot of women, childbirth is still a feared moment. Despite considerable progress in the management of childbirth and its complications, maternal and neonatal morbidity and mortality are still a major problem even in developed countries. To evaluate the influence of day of delivery on obstetrical and perinatal outcome.
Methods: Retrospective cohort study conducted at the Philippe Maguilen SENGHOR health center maternity ward from January 1, 2011 to June 30, 2019, on patients with a pregnancy of more than 22 weeks of amenorrhea who were received for delivery management. The deliveries periods were divided according to whether they occurred on a working day (deliveries from Monday to Friday, excluding public holidays) or on weekends and public holidays (deliveries on Saturdays, Sundays and days declared as public holidays according to the Gregorian and Senegalese event calendars). The data were extracted from our E-perinatal database and analysed in the Statistical Package for Social Science (SPSS 24, Mac version).
Results: Over 102 months, we recorded 42 870 deliveries. The average age of the patients was 27 years with extremes of 13 and 50 years. Nearly one in three deliveries took place on a holiday or weekend (n=13566-31.6%). The rate of caesarean delivery on weekends/holidays (18.8%) was lower than that on weekdays (21%). The odds ratio of having/benefiting from a weekend/holiday caesarean section was 0.87 (CI 0.83-0.92, p<0.0001). Our results suggest that patients who deliver on weekdays are more likely to receive a caesarean section than those who deliver on weekends or holidays. Perineal injury, World Health Organization obstetric complications, and neonatal outcome showed no significant difference by day of delivery.
Conclusions: Our results contradict the idea that deliveries on weekends and holidays are more risky for patients and their children.

Keywords: Obstetrical prognosis, Weekend, Working day

INTRODUCTION

For a lot of women, childbirth is still a feared moment. Despite considerable progress in the management of childbirth and its complications, maternal and neonatal morbidity and mortality are still a major problem even in developed countries. Weekends and holiday periods are often suspected to be periods during which medical care is

poor. This can be explained by the absence of a large number of medical and paramedical staff, while the numbers of patients requiring emergency care remain the same. Few studies have been carried out on this subject and most are Anglo-Saxon. A retrospective study of a sample of 32,078 deliveries over a 6-year period focusing on weekend labour in a large maternity hospital in the UK concluded that weekend delivery had no effect on maternal or neonatal morbidity.[1] Another retrospective study conducted in California between 2009 and 2010 reported conflicting results.[2] Finally, an observational study carried out between 1st April 2010 and 31st March 2012 and concerning 1,332,835 deliveries in the United Kingdom shows an influence of the weekend on 4 of the 7 complications investigated (perinatal mortality, puerperal infection, new born injuries and readmission after 3 days).[3]

These different studies show a variation in the rate of maternal and neonatal complications on weekdays and weekends in obstetric care units, although the causes of this variation remain unknown.[2] In the absence of systematic reviews and meta-analyses on the subject, we decided to evaluate the impact of the day of delivery on some of the obstetrical outcomes and complications in African settings.

METHODS

Setting and type of study

This was a cross-sectional, descriptive and analytical study conducted at the Philippe Maguilen SENGHOR health centre maternity ward. This study was spread over a period of 102 months, from 1 January 2011 to 30 June 2019. The Philippe Maguilen SENGHOR health centre is a level 2 unit where surgical activities are regularly performed. Emergency obstetrical, neonatal and gynaecological care is provided 24 hours a day by teams of doctors undergoing specialisation, midwives and nurses. On-call duty is carried out under the supervision of a senior specialist in gynaecology and obstetrics. Gynaecology, pre- and post-natal care, family planning and ultrasound consultations are provided on a daily basis. Scheduled surgery is performed every day and different procedures are used (abdominal, vaginal and endoscopic). In 2020, the structure performed 8172 deliveries, including 1500 caesarean sections.

Operational definitions

Delivery by time period

The deliveries were divided by whether they occurred on a working day or during the weekend and the holidays.

Deliveries on working days

Deliveries from Monday to Friday excluding holidays.

Weekend and holidays deliveries (*WE-FERIE*)

Deliveries on Saturdays, Sundays and days declared public holidays in Senegal. We used the Gregorian and Senegalese event calendars to determine the official public holidays and those which were specific to Senegal, including religious celebrations for example.

Episiotomy

This is a surgical section of the perineum performed during a vaginal delivery.

Perineal tear

A non-surgical break in continuity in the vaginal wall, vulva or perineum.

Direct obstetric complications

Women with a clear diagnosis of any of the following World Health Organization obstetric complications. Only those likely to occur during or after delivery were included in this study.

Postpartum haemorrhage

Postpartum haemorrhage (PPH) is defined as blood loss of more than 500 ml (or 1000 ml in the case of caesarean section) from the maternal genital tract occurring after childbirth. This definition includes delivery haemorrhage and genital tract haemorrhage, including those due to uterine rupture.

Postpartum sepsis

Temperature of 38°C or higher more than 24 hours after delivery and any of the following signs or symptoms: lower abdominal pain, purulent and foul lochia, tender uterus, poorly contracted uterus, history of heavy vaginal bleeding.

Uterine rupture

Non-surgical termination of the pregnant or parturient uterus (pregnancy, delivery or postpartum), complete or incomplete, spontaneous or induced.

Apgar score

This is a rating of the child's well-being using a scale from 0 to 10. For this study, neonates were classified into 2 categories. Apgar score ≥7, Apgar score <7.

Neonatal outcome

Neonatal outcome refers to the mode of discharge of the new born. Transfer: transfer to a neonatal unit outside the CSPMS, Death: death of the new-born at the CSPMS, Home: return of the new born to the mother's home. Data collection and analysis.

Inclusion criteria

Were included in the study all patients with a pregnancy over 22 weeks of amenorrhea who were received for the management of their delivery in the structure.

Parameters studied

The following parameters were studied: Frequency of deliveries, socio-demographic characteristics and history of patients, pregnancy and delivery data (term of pregnancy on admission, mode of admission, type of pregnancy, mode of delivery), neonatal data (fetal status at birth, Apgar score, neonatal outcome), day of delivery (weekdays or weekends and holidays), traumatic complications related to delivery (episiotomies, perineal tears), direct obstetrical complications.

The data were entered into our computer database E-Perinatal. They were then extracted and analysed first in Microsoft Excel 2016 and then using the Statistical Package for Social Science (SPSS 24, Mac version).

In the analytical part of the results, the outcomes are summarised in a minimum of information: the odds ratio with its confidence interval (CI). The confidence interval gives the "margin of uncertainty" around the established risk. We present it here at "95%". This means that there is a 95% chance that the "true" value lies within the limits of this interval. The value of the odds ratio presented in this document is used to assess the significance of the effect studied (e.g., episiotomy - occurrence of perineal tear). If the confidence interval contains the value 1, the effect is "negative", which means that the value of "p" is greater than 5% ($p < 0.05$). This value of 1 means that the effect studied is similar in the groups concerned. This value 1 being in the confidence interval, nothing can be concluded, the effect studied is perhaps identical in the groups or there is a difference in favour/detriment of one or the other. On the other hand, when the bound (lower or upper, depending on the situation) is far from the value 1, the result is "positive" and the "p" is less than 5%. The width of the confidence interval represents the "precision" of the relative risk estimate. In a high-power study, the confidence interval is narrow, in a low power study the confidence interval is wide.

RESULTS

During the study period, the Philippe Maguilen SENGHOR health centre recorded 42,870 deliveries. Nearly one in three deliveries took place on a public holiday or at the weekend. The characteristics of the patients are summarised in Table 1. The characteristics of the patients were similar between the working day and weekend/public holiday groups, as shown in Table 2.

Analysis of the different outcomes according to the day of delivery shows that the rate of Caesarean section on weekends/holidays (18.8%) was lower than that on weekdays (21%): the odds ratio of having/benefiting a Caesarean section on a weekend or holiday was 0.87 (CI 0.83-0.92, $p<0.0001$). Episiotomy was more common at weekends and on public holidays. However, the occurrence of a perineal tear was not correlated with the day of delivery. Direct obstetric complications were less likely to occur on weekends and holidays than on weekdays.

Regarding neonatal outcome, the rate of Apgar score <7 at 5 minutes was 10.8% on weekdays compared to 10.7% on weekends and holidays (p=0.437). Deliveries on weekends and holidays had a higher risk of neonatal death compared to those on weekdays; the risk was lower for transfers as shown in the following table.

Table 1: Patient characteristics by day of delivery.

Patient characteristics	Working day	WE-Holiday	p value
Continuous variables	Mean ±SD - [CI95%]	Mean ±SD - [I95%]	
Maternal age	27.41±6.26	27.16±6.24	<0.001*
Gestational age	[27.34-27.48]	[27.06- 27.27]	0.511
Fetal weight	39.3±2.21	39.32±2.26	0.454
Categorical variables	[39.26-39.34]	[39.26- 39.39]	
Nulliparity	3027.25±568.82	3022.8±581.3	<0.001*
Transfer admission	[3020.74-3033.77]	[3013.02-3032.58]	1.4
Dystocic presentation			0.025*

CI: Confidence interval

Table 2: Patient characteristics.

	Value	Percentage
Parity		
Nulliparous	16417	38.3

Continued.

	Value	Percentage
Multiparous	26453	61.7
Term of pregnancy		
Pre-term	2674	6.3
Term	38509	89.8
Post-term	1687	3.9
Mode of admission		
Home	35525	82.9
Transfer	7345	17.1
Type of pregnancy		
Single	41620	97.1
Multiple	1250	2.9
Mode of delivery		
Vaginal delivery	32681	76.2
Caesarean section	10189	23.8
Day of delivery		
Working day	29304	68.4
WE-holidays	13566	31.6
Fœtal status at birth		
Alive	41493	96.8
Fresh stillbirth	677	1.6
Stillborn macerated	700	1.6
Apgar score at birth		
≥7	37040	86.4
<7	5830	13.6
Neonatal outcome		
Home	42532	13.6
Transfer	191	0.4
Death	147	0.3
Episiotomiy		
Yes	7906	18.4
Non	34964	81.6
Perineal tear		
Yes	2602	6.1
No	40268	93.9
Direct obstetrical complications	Complication obstet	Complication
Yes	4987	11.6
No	37883	88.4

Table 3: Relationship between the parameters studied and day of delivery.

	Working day	WE-holiday	P value
Caesarean section	5825 (21%)	2482 (18.8%)	
N = 8307	1	0.871	
OR	-	0.827 - 0.918	<0.0001*
CI (95%)			
Episiotomy	5231 (23.8%)	2638 (24.6%)	
N=7869	1	1.043	
OR	-	0.988 - 1.100	0.125
CI (95%)			
Perineal tears	1734 (7.9%)	852 (7.9%)	
N=2586	1	1.006	
OR	-	0.924 - 1.096	0.883
CI (95%)			
Directes obstétricales complications	3466 (11.8%)	1521 (11.2%)	
	1	0.941	

Continued.

	Working day	WE-holiday	P value
N=4987	-	0.88 - 1.03	
OR			0.064*
CI (95%)			
Postpartum haemorrhage	91 (0.3%)	41 (0.3%)	
N = 132	1	0.973	
OR	-	0.672 - 1.407	0.885
CI (95%)			
Uterine rupture	63 (0.2%)	20 (0.1%)	
N = 83	1	0.685	
OR	-	0.414 - 1.133	0.141
CI (95%)			
Transfer	138 (0.5%)	53 (0.4%)	
N = 191	1	0.829	
OR	-	0.603 - 1.138	0.247
CI (95%)			
Deaths	99 (0.3%)	48 (0.4%)	
N = 147	1	1.047	
OR	-	0.741 - 1.479	0.792
CI (95%)			

OR: Odds ratio - CI: Confidence interval - The reference category is working days. Its odds ratio is 1.

DISCUSSION

Obstetrical prognosis

The main risks to which the parturient is exposed during delivery are related to caesarean sections, perineal lesions (episiotomy or tearing) and direct obstetrical complications.

In our study, there was no increase in risk of caesarean section on weekends and public holidays with a rate of 18.8% compared to 21% on weekdays (p<0.0001); scheduled caesareans were excluded from this analysis. These results differ from those reported by other authors such as Bendavid and Palmer who note an increase in the caesarean rate on weekends.[4,3]

However, our results are in line with those of Aiken who reports caesarean section rates around 17% on weekdays and weekends (17%; p=0.37).[1]

There are several possible explanations for our results. Indeed, obstetric shifts are under the supervision of a senior obstetrician 24 hours a day. Residents and midwives on duty report regularly to the senior physician and most decisions are made conjointly. The continued presence of the senior reduces the potential effects of tiredness, sleep privation or weekend stress. In addition, the organisation of morning debriefing meetings in which any decisions made are justified is a possible explanation for our results.

Regarding perineal injuries, our study showed that during weekends and holidays there was an increasing rate of episiotomies compared to weekdays. However, the rate of perineal tears remained the same, regardless of the day of the week. However, the episiotomy rates in the unit (23.8% on weekdays and 24.6% on weekends and public holidays) remain in agreement with clinical practice guidelines which suggest a desirable episiotomy rate less than 30% of vaginal deliveries. Nevertheless, in the current context where the trend is towards a progressive reduction of episiotomies in maternity hospitals, the influence of weekends and public holidays should be better studied.[5]

The rates of obstetric complications such as postpartum haemorrhage and uterine rupture were statistically superposable according to the day of delivery: 0.3%/0.3% for postpartum haemorrhage and 0.2%/0.1% for uterine rupture. The British weekend labour study by Aiken reported similar results and showed no significant difference in the incidence of postpartum haemorrhage; 1.7% (326/19,298) on weekdays compared to 1.6% (123/7678) on weekends, p=0.70.[1]

However, Bendavid reports a higher rate of obstetric and neonatal complications on weekends than on weekdays, particularly for those related to caesarean section.[4] This is important to note as this was a large study involving 4,967,114 patients from 3 major US states. He attributes this trend to hospital staffing procedures and resource utilisation. However, although changes to these underlying problems are occurring slowly as Bendavid notes, hospitals and health care providers should be aware of the increased rates of weekend complications and take appropriate measures to improve patient safety.[4]

The Snowden study also shows a higher rate of postpartum haemorrhage on weekends than on weekdays (3.9% vs. 3.7%; p<0.001).[2]

Our results are surprising insofar as weekends and holidays have always been perceived as factors increasing the risk of direct obstetrical complications, due to the reduction in medical staff and the difficulty of having certain paraclinical examinations available in our facilities.

Fetal and neonatal prognosis

One of the main findings of our study was the higher rate of neonatal deaths during weekends and holidays.
Our results corroborate those from other studies.

Einerson found that perinatal mortality was lower on weekdays than at night or at weekends (0.77% vs. 1.03%, p<0.001) for all modes of delivery.[6] Hamilton found that neonatal mortality was higher in new borns born at weekends than in those born on weekdays.[7] The weekday neonatal mortality rate during the two years of his study was 3.91 per 1,000 live births, compared with a rate of 5.60 per 1,000 live births at weekends. The increased risk of death could be attributed to the reduction in the number of people working at weekends and holidays, which is a common situation faced by all human resource managers. In addition, there are individual parameters (lack of concentration, tiredness) whose influence is not to be neglected.

However, our statistical analysis did not take into account the shift of births by time of birth. The deaths analysed do not take into account the fact that most weekend births also take place outside normal working hours, i.e. during the night shift. Therefore, weekend births include a considerable proportion of births where the same problems of reduced clinical care provision apply. It would be desirable to continue this investigation to better identify where the risk lies: being born on the weekend or during off-peak hours.

It is also important to highlight that intrapartum death does not mean that death occurred at the time of birth. The death may have occurred during the day, with labour taking its course, ending in an evening or night-time delivery. Deeper collaboration and especially the extension of computerised records to the Neonatology Unit could help to better identify the causes of neonatal death and the reasons for new born transfers.

One of the limitations of the Philippe Maguilen SENGHOR health centre is the absence of a neonatology department. Instead, it has a neonatology unit with 4 beds and 2 incubators as well as a team composed of a paediatrician and nurses trained in neonatal care. Although the delegation of skills is to be welcomed, these nurses are very quickly limited in recognising and dealing adequately with situations such as neonatal distress or the recognition of certain emergency situations that require immediate transfer.

Indeed, only three hospitals in Senegal are equipped to deal with newborns in Dakar. One of them does not have a maternity ward and is limited by the number of beds/incubators. Access to the other facilities is limited by the daily cost of hospitalisation, which varies between 35,000 FCFA and 50,000 FCFA.

No clear law with supporting measures governs the management of perinatal care in Senegal.

In a previous document, we recommended an extension of the maternity unit to allow the chair of paediatrics to take over the neonatology unit of PMSHC.[8]

Limitations

This was a retrospective, descriptive and analytical study. The data were extracted from our E-Perinatal database. The main limitation was the existence of incomplete records. Some parameters were not correctly recorded, which could lead to a bias in the recording of some obstetric complications, as was the case for postpartum sepsis.

CONCLUSION

Weekends and public holidays have always been suspected of increasing the risk of maternal or fetal complications during childbirth. Patients who give birth on weekdays are more likely to have a caesarean section than those who give birth on a weekend or public holiday. Perineal injury, World Health Organization obstetric complications and neonatal outcome showed no significant difference according to the day of delivery. Thus, these results contradict the idea that deliveries on weekends and holidays carry a higher risk for patients.

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