

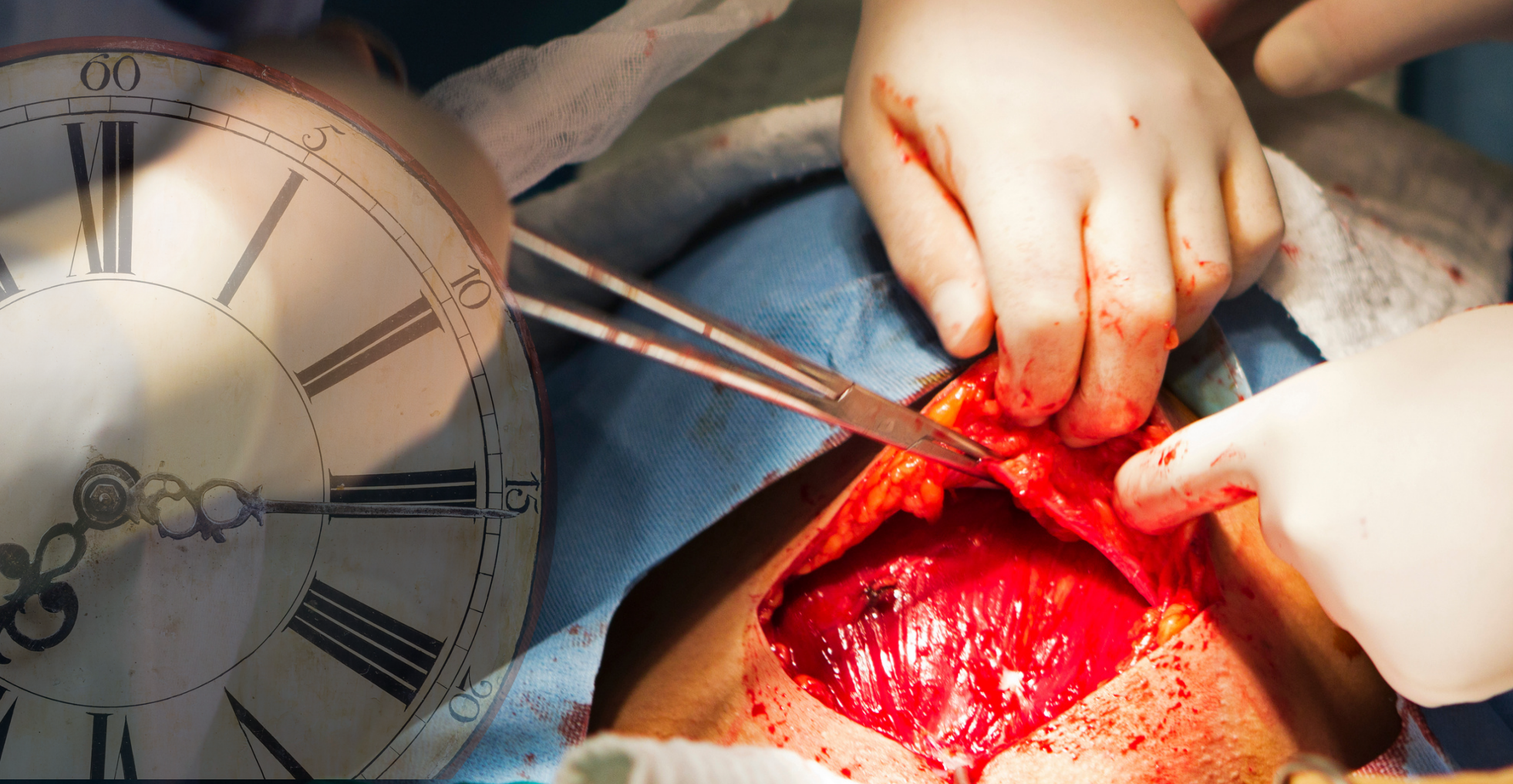


FAOPS 2022 [A-0089]

A Cross-Sectional Study On The Maternal Outcome Of An Emergency Caesarean Section At Different Time Intervals In A Tertiary Hospital

Dr. Noor Azrinawati Binti Mohd Roslan, SASMEC @ IIUM





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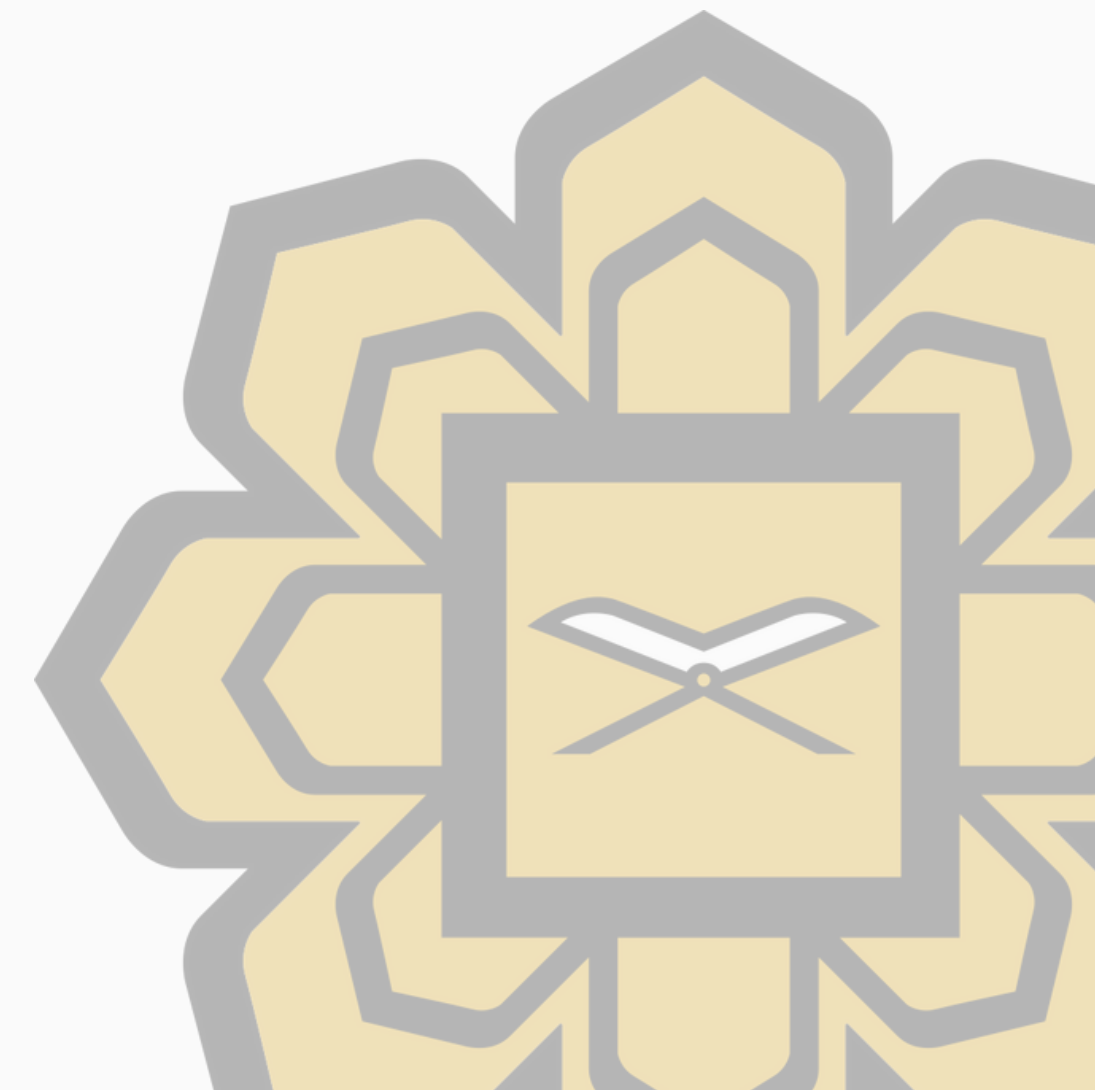
Assoc. Prof. Dato' Dr. Hamizah Binti Ismail, SASMEC @ IIUM

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Dato' Dr. Noraihan Binti Nordin, Hosp. Tunku Azizah KL

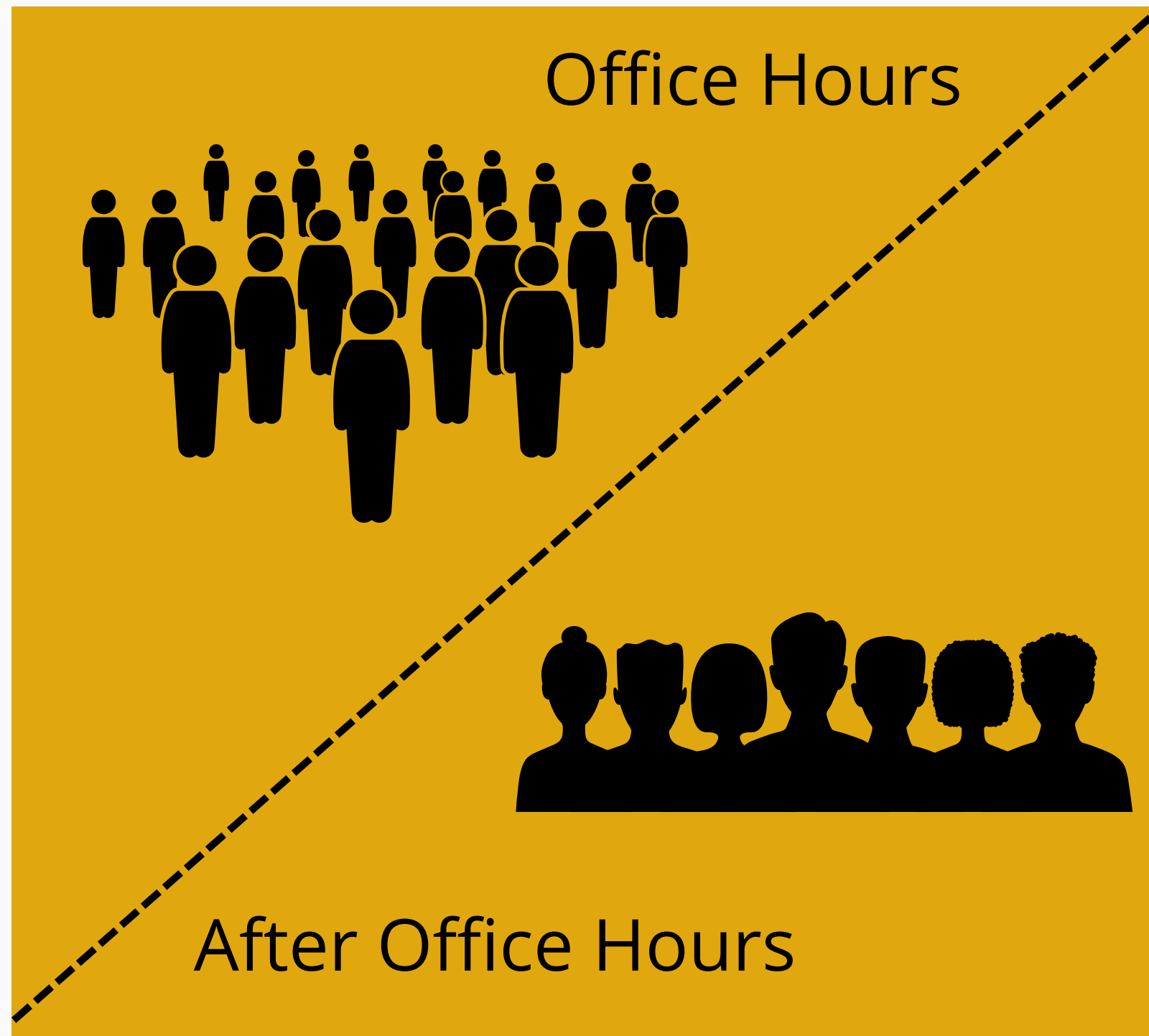
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Background



Generally more staff available during office hours including the senior trained staff especially consultants, senior doctors of related specialties.

Unanticipated high rates of deliveries, physical and mental fatigue, and limited manpower during after office hours compared to office hours are observed in few studies but not statistically significant.

The discrepancy between the demand and supply of obstetric care theoretically may affects pregnancy outcomes.

Numerous studies have suggested that there is a higher risk of adverse perinatal outcome during off-hours deliveries compared to office hours.

However, only limited studies observing the maternal outcome and its relation to delivery time sessions of the day.

RESEARCH ARTICLE

Open Access

Effects of hospital delivery during off-hours on perinatal outcome in several subgroups: a retrospective cohort study

Ronald Gijssen^{1*}, Chantal WPM Hukkelhoven², C Maarten A Schipper³, Uzor C Ogbu^{4,5}, Mienieke de Bruin-Kooistra⁶ and Gert P Westert⁷

- Retrospective cohort study based on data from Netherland Perinatal Registry between 2003-2007
- Outcome measures were intrapartum and early neonatal mortality, a low Apgar score (5 minute score of 0–6), and a composite adverse perinatal outcome measure (mortality, low Apgar score, severe birth trauma, admission to a neonatal intensive care unit).
- 3 different categorizations
 - weekday vs weekend
 - Day(8am-5.59pm), evening(6pm-10.59pm) and night(11pm-7.59pm)
 - Office hours(daytime during weekday) vs off-hours(evening,night,weekend)
- Further divided into subgroup
 - Induction and/or augmentation of labour
 - mode of delivery (spontaneous,instrumental or emergency CS)

Table 2 Adjusted odds ratios (95% confidence intervals) for the effect of time of birth by referral status (intrapartum and antepartum) and outcome

Subgroups					Odds ratio (95% CI)		
					Time of the day (reference group is day)	Part of the week (reference group is weekday)	
					Evening	Night	Weekend
Referral	Induction / augmentation	Mode of delivery	Covariates in model (see notes)	Number of infants			
Intrapartum and early neonatal mortality							
antepartum	no	spont. / instr.	c	116884	0.86 (0.56-1.33)	0.97 (0.71-1.33)	1.10 (0.81-1.48)
antepartum	no	emergency CS	d	16850	1.15 (0.61-2.17)	1.86 (1.16-2.99)	1.41 (0.92-2.18)
antepartum	yes	all modes	e	174310	1.44 (1.08-1.91)	1.75 (1.32-2.33) *	1.05 (0.81-1.37)
intrapartum	no	spont. / instr.	e	68325	1.17 (0.70-1.96)	1.07 (0.70-1.63)	0.95 (0.64-1.42)
intrapartum	no	emergency CS	f	6806	1.54 (0.73-3.21)	1.70 (0.91-3.18)	1.07 (0.61-1.89)
intrapartum	yes	all modes	f	62913	0.99 (0.58-1.66)	0.84 (0.50-1.44)	1.05 (0.66-1.66)
Apgar score 0-6							
antepartum	no	all modes	b	133797	1.06 (0.92-1.23)	1.02 (0.91-1.15)	1.06 (0.95-1.18)
antepartum	yes	spontaneous	b	116571	1.53 (1.31-1.78) *	1.72 (1.47-2.02) *	0.93 (0.80-1.08)
antepartum	yes	instrumental	b	28913	1.44 (1.20-1.73) *	1.43 (1.19-1.73) *	1.06 (0.89-1.26)
antepartum	yes	emergency CS	b	28602	1.02 (0.86-1.21)	1.19 (0.99-1.43)	1.04 (0.88-1.22)
intrapartum	no	spont. / instr.	b	68320	1.22 (1.00-1.50)	1.06 (0.89-1.26)	0.83 (0.71-0.98)
intrapartum	no	emergency CS	a	6805	1.20 (0.84-1.71)	1.40 (1.04-1.87)	1.08 (0.82-1.42)
intrapartum	yes	all modes	a	62908	1.14 (0.95-1.36)	1.38 (1.17-1.63) *	1.00 (0.86-1.16)
Adverse perinatal outcome (composite measure)							
antepartum	no	all modes	b	133887	1.01 (0.94-1.10)	0.98 (0.92-1.05)	1.03 (0.97-1.10)
antepartum	yes	spontaneous	b	116593	1.26 (1.15-1.39) *	1.51 (1.37-1.66) *	0.95 (0.86-1.04)
antepartum	yes	instrumental	b	28920	1.16 (1.01-1.33)	1.30 (1.13-1.49) *	1.04 (0.92-1.18)
antepartum	yes	emergency CS	b	28638	1.02 (0.90-1.15)	1.03 (0.90-1.18)	1.05 (0.93-1.18)
intrapartum	no	spont. / instr.	b	68325	1.16 (1.01-1.32)	1.01 (0.90-1.12)	0.97 (0.87-1.08)
intrapartum	no	emergency CS	a	6806	0.97 (0.72-1.32)	1.29 (1.02-1.63)	1.06 (0.85-1.33)
intrapartum	yes	all modes	b	62913	1.05 (0.92-1.20)	1.26 (1.11-1.42) *	0.99 (0.89-1.11)

Models fitted with both time of the day and day of the week, and socio-biological factors.
*significant association (< 0.05) after using the Holm correction method for adjusting for multiple comparisons.
^abirth weight, gestational age at delivery, congenital anomalies, foetal head position, general medical or obstetric problems of the mother, maternal age, parity, sex, ethnicity of the mother, socioeconomic status, degree of urbanization of the maternal place of residence.
^b(a) + single/multiple pregnancies.
^cbirth weight, gestational age at delivery, congenital anomalies, foetal head position, ethnicity of the mother, sex.
^dbirth weight, single/multiple pregnancies.
^ebirth weight, congenital anomalies, foetal head position, parity.
^fbirth weight, gestational age at delivery, congenital anomalies, foetal head position.

- Evening and night-time deliveries that involved **induction or augmentation of labour**, or an **emergency caesarean section**, were associated with an increased risk of an **adverse perinatal outcome** when compared to similar daytime deliveries.
- **Weekend deliveries were not associated** with an increased risk when compared to weekday deliveries.

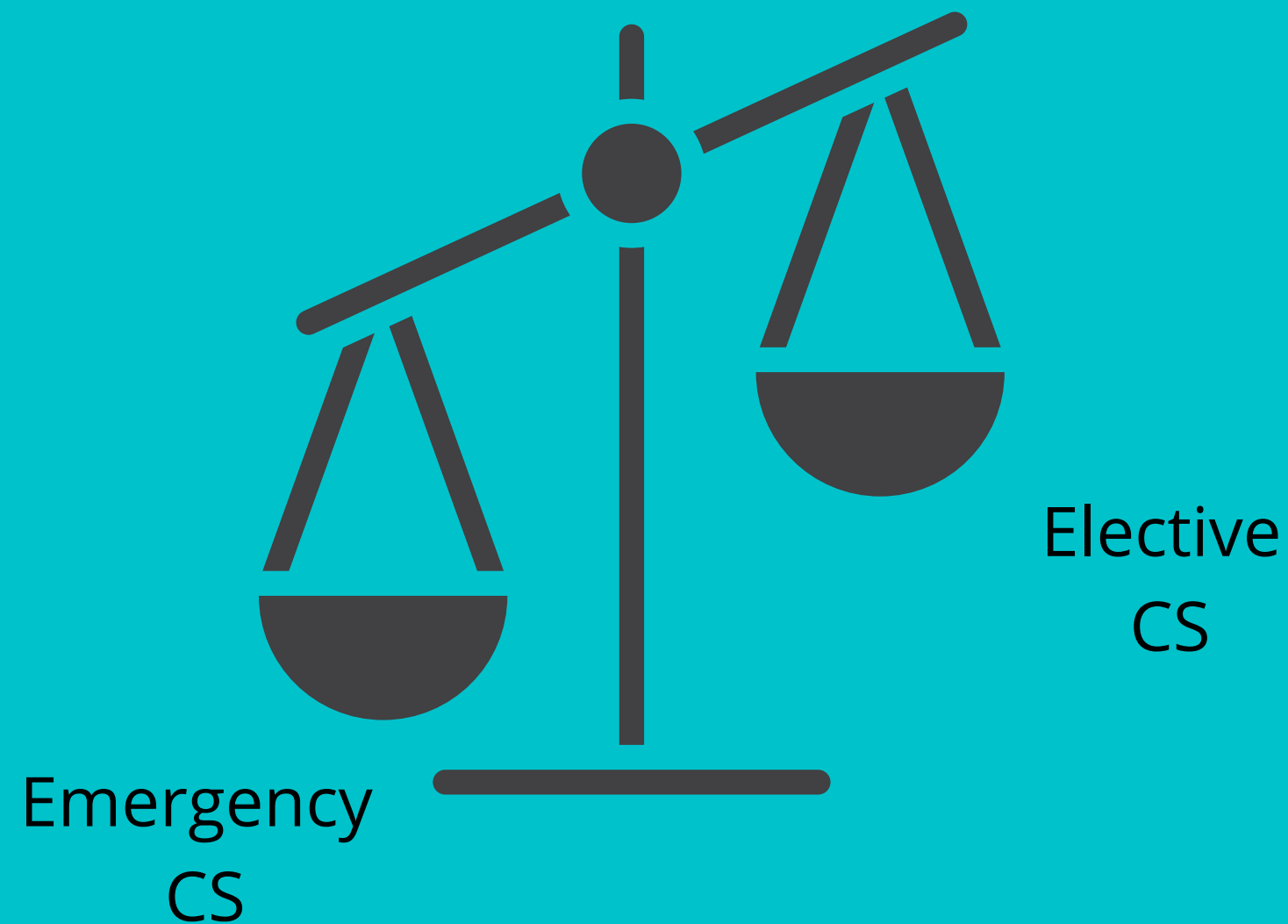
Possible explanations of the associations

The off-hours effect convincingly demonstrated in our study may be caused by a delayed recognition of perinatal risks in the evening or at night, and an inappropriate response to hazardous situations. This may be the result of a multiple factors, like diminished numbers of and expertise of staff available, reduced access to diagnostic tests and procedures, a lower degree of supervision of residents, long-duration shifts and tiredness of personnel, no in-house obstetricians, anaesthesiologists and paediatricians, delays in availability of necessary personnel in case of emergency. In the Netherlands, the round-the-clock in-house presence of an obstetrician, anaesthesiologists, and the operating room team, is not warranted in the majority of the hospitals. Despite

Mgaya et al,2017	Night shift, were significantly associated with higher proportions of adverse perinatal outcomes, including low Apgar score, early neonatal death and fresh stillbirth, compared to morning and evening shifts
P.Rief et al,2018	<p>The odds ratio for severely adverse events during the night-time (22:01–07:29 hours) compared with the daytime (07:30–15:00 hours) was 1.35 (95% confidence interval, 95% CI 1.13–1.61).</p> <p>There were no significant differences in neonatal outcome comparing weekdays and weekends, and comparing office hours and shifts.</p>
Bailit et al, 2008	No difference in maternal and neonatal outcomes between the shifts in their study
Peled et al,2011	Women underwent unscheduled caesarean section during night shift had a higher rate of endometritis and wound infection,postpartum hemorrhage requiring transfusion and prolonged postoperative hospitalization
Wagner et al. 2020	composite maternal adverse outcome is similar among the three different time shifts

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Adverse Maternal Outcome



Caesarean section(CS) is not without risk as a method for the delivery as it carries inherent risk to both mother and babies



When compared to vaginal delivery, caesarean section (CS) is more likely to result in adverse maternal outcomes (AMO), especially if performed in an emergency manner.

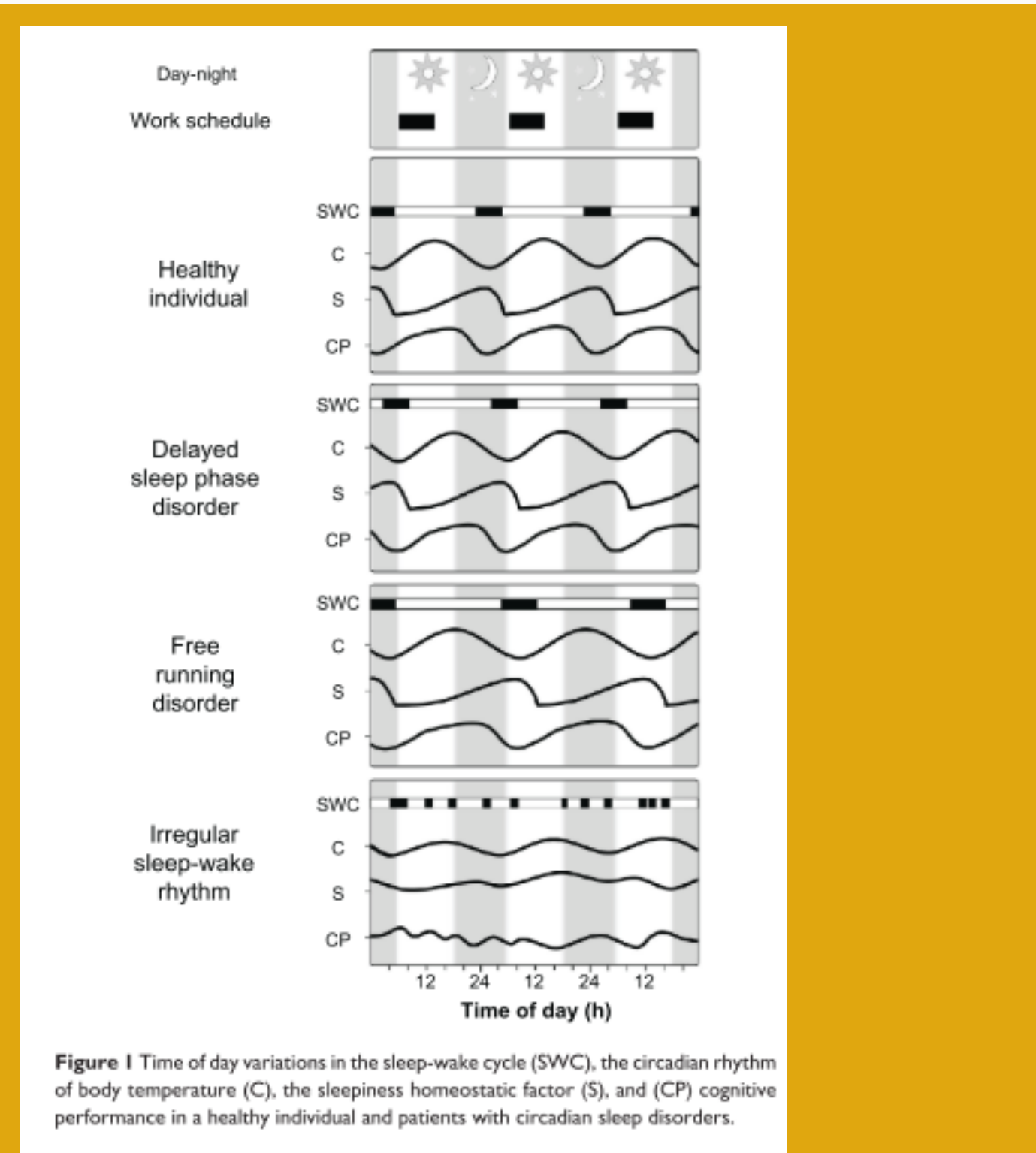


Compared to planned caesarean section, the risk of PPH reported to be higher in emergency caesarean section(6.75% vs 4.74%).(NICE guideline [NG192] 2021)



Rate of wound infection of 97 per 1000 for emergency CS and 68 per 1000 for elective CS.Endometritis also likely to occur post emergency CS compared to elective CS(184 per 1000 versus 39 per 1000) (Cochrane)

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Circadian rhythms in cognitive performance: implications for neuropsychological assessment,Valdez et al (2012)

Surgeon’s fatigue is the point of concern especially whether it may affect their performance during working at night as they required to wake up and do the surgeries and altered the normal circadian rhythm which is supposedly in nadir state at night

Generally, performance at the peak during day time and reduce during night time.

During the daytime, alertness is high and sleepiness is low whereas the opposite occurs at night time. (Valdez, Ramírez, and García 2012)

Chronic sleep deprivation combined with work during the circadian night is known to affect performance during night shift especially for those who have no possibility to compensate for the sleep deprivation by either sleeping in advance before the night shift or after the shift during daytime or both(Amirian 2014)

A close-up photograph of a piece of bright orange paper that has been torn. The tear is irregular and jagged, revealing a white surface underneath. The word "improve" is printed in a simple, black, sans-serif font on the white surface, centered within the opening of the tear. The orange paper has a slightly textured appearance.

improve

**Paradigm shift:Implementation of
shift system??**



- All hospital in Malaysia still practice a traditional oncall system whereby staff distribution during after office hours are lesser as compared to during office hours.
- It is timely to evaluate this oncall system and consider to implementing shift system in the healthcare especially in obstetric and gynaecology which demand around-the-clock intensive care for their patients.
- Implementation of this shift system at least to the level of medical officer and specialist theoretically may help to resolve current issue of excess “contract medical officer” into the permanent post and improve the quality of life of the healthcare worker while providing better service for the patients.



Objective



GENERAL OBJECTIVE: To look for effect of delivery at different time interval of the day to the maternal outcome.



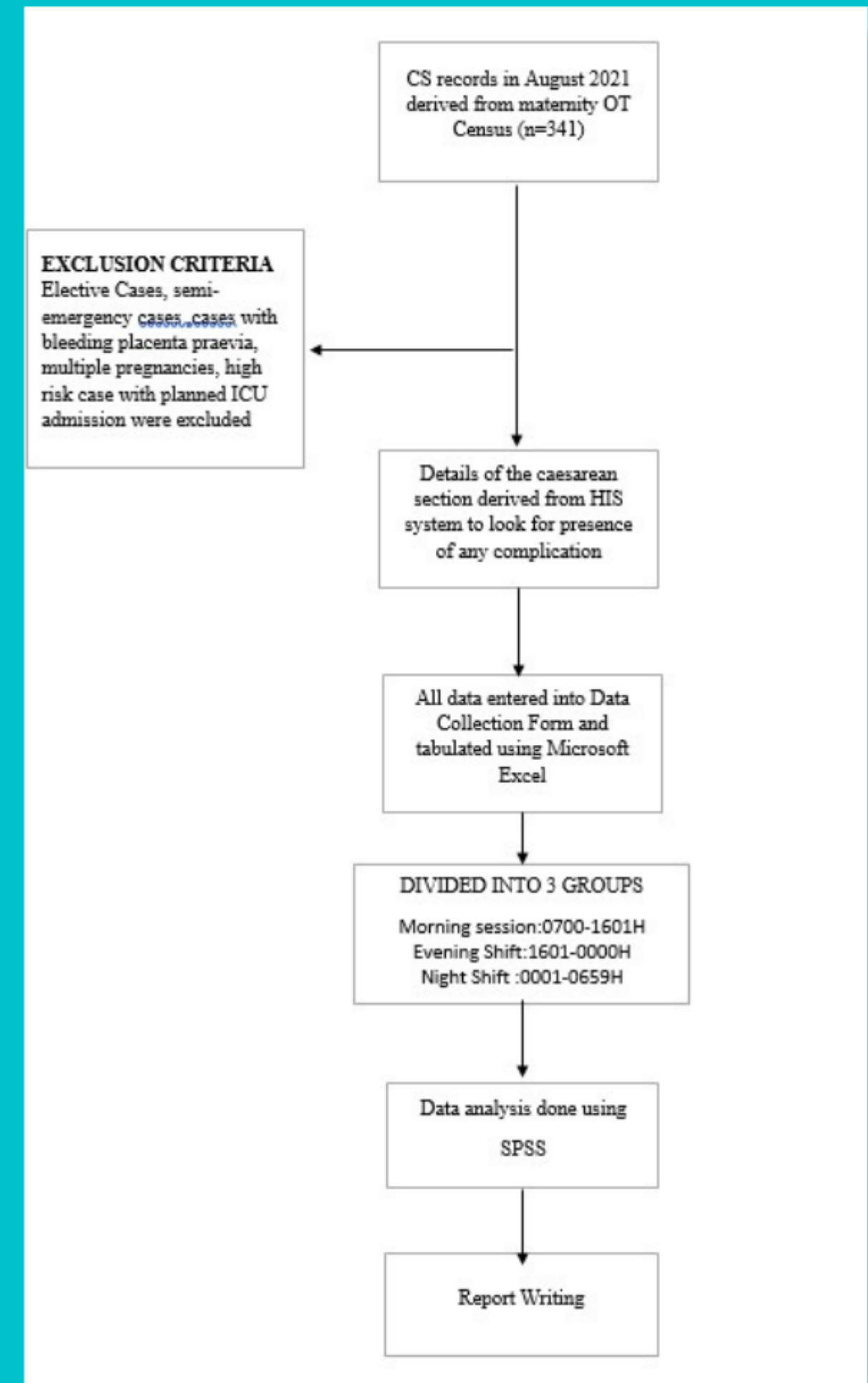
SPECIFIC OBJECTIVES

- To determine prevalence of adverse maternal outcome among woman delivered via emergency caesarean section.
- To determine association between delivery at different time session and adverse maternal outcome.
- To explore other associated factors related to adverse maternal outcome while minimizing the possible confounders



Methodology

- This cross-sectional study included 211 cases of low-risk mothers who delivered via EMLSCS at Hospital Tunku Azizah Kuala Lumpur from 1st to 31st August 2021.
- Those delivered through elective and semi-emergency CS were excluded. All data were gathered from the daily OT census and the HIS.
- They were divided into three groups based on the time the patient arrived at the OT.
 - Daytime hours are 0700-1601,
 - Evening hours are 1601H-0000H
 - Early morning hours are 0001H-0659H
- Maternal outcomes such as PPH, viscous injury, sepsis within 48 hours postpartum, unplanned ICU admission, relaparotomy, and hysterectomy were recorded and analysed using SPSS.



Sample Size



For better data yield ,much larger sample size is needed about **200 patients** where maternal complication was reported in 14% of total EMLSCS(Soren et al. 2016).

Sample size is calculated from single proportion formula calculation based on these 2 previous studies focusing on emergency CS and maternal complication.

a)Elective vs Emergency Caesarean Section: Maternal Complications and Neonatal Outcomes. (Soren et al. 2016)Total EMLSCS: 1436 with Maternal complications. n=206 (14%). Sample size: 164 patients.
Considering 20% drop out rate: **205** patients needed

a)Neonatal and maternal short-term outcome after emergency caesarean section in comparison to elective and second stage caesareans:Results of A Retrospective 10-year survey.(Staboulidou et al. 2018). Total EMLSCS:320.

Maternal outcomes:

PPH. n=4 (1.6%) ,Sample size: 23. Considering 20% drop out rate: 28 pts

Wound breakdown. 4 (1.3%).,Sample size: 19. Considering 20% drop out rate: 23pts

Hysterectomies 3 (0.9%),Sample size: 14. Considering 20% drop out rate: 17pts

Relaparotomies 5(1.6%).Sample size: 23 Considering 20% drop out rate: 28pts

Sepsis. 1 (0.31%),Sample size: 5. Considering 20% drop out rate: 6 pts

Postpartum fever>2d . 7 (2.2%).§ Sample size: 30. Considering 20% drop out rate: 36pts

Based on the above studies, the least sample size needed is **36** patients

Results

Demographic distribution
across different time interval

Demographic	1 st group (Daytime: 0700 -1600)	2 nd group (Evening hours 1601 – 0000H)	3 rd group (early morning hours 0001 – 0659H)	P value ^a
	N (%)	N (%)	N (%)	
Number of Emergency CS	82(38.9%)	73(34.6%)	56(26.5%)	
Age*	30.6 (4.9)	30.6 (5.5)	30.1 (5.3)	0.822 ^b
Weight at delivery*	74.1(13.0)	76.8(14.7)	79.9(18.1)	0.107 ^b
Nationality				0.743
-Malaysian	68 (82.9%)	63 (86.3%)	48 (87.3%)	
-Non-Malaysian	14 (17.1%)	10 (13.7%)	7 (12.7%)	
Parity				0.840
-Nulliparous	31 (37.8%)	31 (42.5%)	22 (40.0%)	
-Multiparous	51 (62.2%)	42 (57.5%)	33 (60.0%)	
Gestation at delivery				0.177
-28 ⁺⁰ – 36 ⁺⁶	11 (13.8%)	8 (11.1%)	10 (18.5%)	
-37 ⁺⁰ – 39 ⁺⁶	55 (68.8%)	55 (76.4%)	30 (55.6%)	
-≥ 40 ⁺⁰	14(17.5%)	9(12.5%)	14 (25.9%)	
Uterine scar				0.008
-no scar	59 (72.0%)	47 (64.4%)	31 (56.4%)	
-1 previous CS	15 (18.3%)	14 (19.2%)	22 (40.0%)	
-2 previous CS and more	8 (9.8%)	12 (16.4%)	2 (3.6%)	
Comorbid(s)				
No Comorbid	42 (51.2%)	30 (41.1%)	28 (50.9%)	0.700
1 Comorbid	30 (36.6%)	35 (47.9%)	23 (41.8%)	
2 Comorbid(s)	8 (9.8%)	7 (9.6%)	4 (7.3%)	
>2 Comorbid(s)	2 (2.4%)	1 (1.4%)	0 (0.0%)	

*mean (SD)

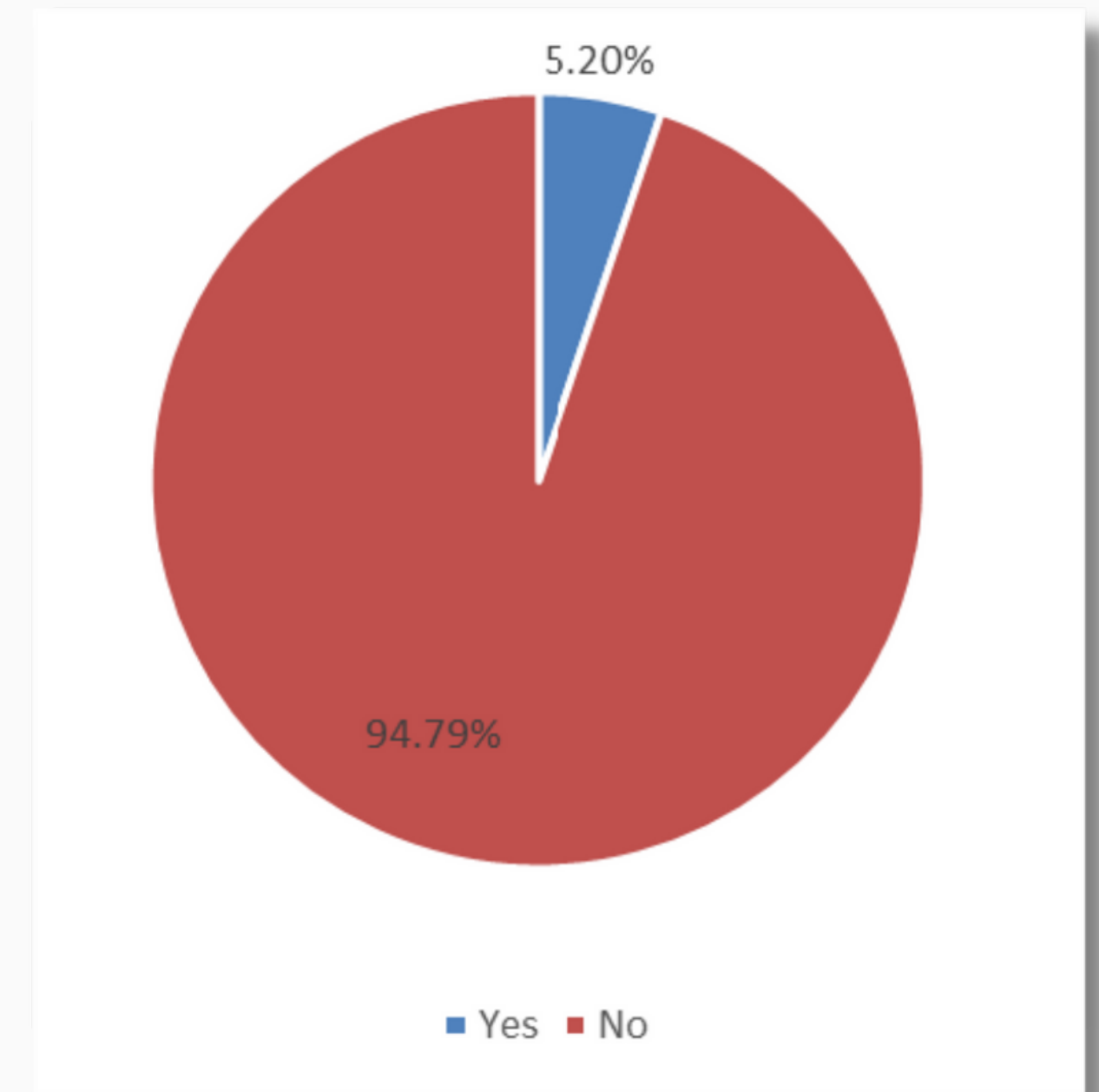
^achi square

^bone way ANOVA

Prevalence of composite adverse maternal outcome among emergency caesarean delivery obtained from this study is about **5.20%**, in line with findings from previous reported literature where complication of caesarean delivery is known to be very low especially in low risk mother.

Among the observed maternal adverse outcome, postpartum hemorrhage is the most common about 11 cases followed by 1 case of ICU admission post caesarean hysterectomy due to massive postpartum hemorrhage secondary to uterine atony.

No reported case of wound breakdown within 48hours postpartum and no case with viscus injury during this study period.



Prevalence of composite adverse maternal outcome among emergency caesarean deliveries

CORRELATION OF THE COMPOSITE ADVERSE MATERNAL OUTCOME TO THE SURGERY TIME AND OTHER CONFOUNDING

Multiple logistic regression has been used to reduce confounding effect as much as possible.

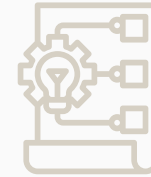
Although not statistically significant,there is slight increase likelihood of composite adverse maternal outcome with adjusted odd ratio 1.12(95% CI 0.25-5.04) compared to emergency caesarean section done at daytime hours.

Interestingly, adjusted odd ratio 0.75(95% CI 0.14-3.96) for the emergency caesarean section done after midnight in contrary with presumption that more adverse outcome occurred at early morning hours.

	Composite adverse maternal outcome		COR	AOR*	CI (95%)	p-value
	Yes n(%)	No n(%)				
Delivery time session						
-Daytime hours	5(6.1)	77(93.9)				
-Evening hours	3(4.1)	70(95.9)	1.12	1.12	0.25-5.04	0.87
-Early morning hours	3(5.5)	52(94.5)	0.74	0.75	0.14-3.96	0.73
Age(years old)						
<20	0(0.0)	3(100)				
20-35	8(4.7)	161(95.3)				0.99
>35	3(7.9)	35(92.1)				
Parity						
Nulliparous	1(1.2)	83(98.8)				
Multiparous	10(7.9)	116(92.1)	0.14		0.18-1.13	0.06
Comorbid						
No comorbid	6(54.5)	83(41.7)				
At least 1 comorbid	5(45.5)	116(58.3)	0.42		0.17-2.07	0.60
Gestational Age(weeks+day)						
28 - 36+6	3(10.3)	26(89.7)				
37 - 39+6	6(4.3)	134(95.7)	3.66		0.34-40.0	0.29
> 40	1(2.7)	36(97.3)	1.47		0.17-13.0	0.73
Previous Uterine Scar						
No scar	8(72.7)	129(64.8)				
1 previous scar	2(18.2)	49(24.6)	2.98		0.34-26.1	0.97
≥ 2 previous scars	1(9.1)	21(10.6)	0.82		0.07-9.70	0.88

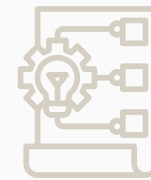


Discussion



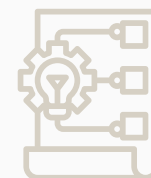
Oncall Team

Larger number of oncall team member/day comparing to other hospitals



Seniority

More than 95% of the medical officers has been working in the field for at least >2 years



Selection of Cases

This research focusing on low risk case only.

Conclusion



Prevalence of adverse maternal outcome among the mother who delivers by emergency CS is low especially in low risk mother

Although not statistically significant, delivery via emCS in the evening slightly has increased risk for adverse maternal outcome compared to daytime.

In this study which focusing more on low risk cases, it can be said that current strategy of increasing number of oncall team member with presence of senior team member is successfully reducing the adverse maternal outcome especially after office hours in low risk population. However, further study is needed to study whether the same effect exist if high risk cases included in the study.