

Surgical Start Time and Complications in Gynaecological Surgery



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INTRODUCTION

Gynaecological surgeries occur at all hours of the day and carry risks of patient morbidity and mortality. Surgical start time (SST) has been identified as a possible influential factor due to time pressures and surgeon fatigue^{1,2}. The aim of this study is to determine if SST in general and in relation to an elective operating list affects the risk of complications.

MATERIALS AND METHODS

We performed a retrospective audit of all morbidity and mortality in patients undergoing gynaecology surgery (elective and emergency) in the Western Sydney Local Health District between 1 June 2016 and 30 June 2020.

RESULTS

Time of surgery and risk of complications I

	Time Categories	Case No	Case Yes	RR (95% CI)	P Value	P Value	
All patients	Early AM	4335/4460 (97.2%)	125/4460 (2.8%)	1		<.001	
	Late AM	2785/2856 (97.5%)	71/2856 (2.5%)	0.89 (0.67, 1.18)	0.41		
	Early PM	3698/3807 (97.1%)	109/3807 (2.9%)	1.02 (0.79, 1.32)	0.87		
	Late PM	1418/1449 (97.9%)	31/1449 (2.1%)	0.76 (0.52, 1.13)	0.17		
	After-hours	314/334 (94.0%)	20/334 (6.0%)	2.14 (1.35, 3.38)	0.001		
	Weekend	235/250 (94.0%)	15/250 (6.0%)	2.14 (1.27, 3.60)	0.004		
	Night	253/272 (93.0%)	19/272 (7.0%)	2.49 (1.56, 3.98)	0.000		
	Between Hours	12236/12572 (97.3%)	336/12572 (2.7%)	1		<.001	
	Rest	802/856 (93.7%)	54/856 (6.3%)	2.36 (1.79, 3.12)			
	Emergency	Early AM	927/955 (97.1%)	28/955 (2.9%)	1		0.002
Late AM	654/673 (97.2%)	19/673 (2.8%)	0.96 (0.54, 1.71)	0.90			
Early PM	550/565 (97.3%)	15/565 (2.7%)	0.91 (0.49, 1.68)	0.75			
Late PM	312/323 (96.6%)	11/323 (3.4%)	1.16 (0.58, 2.31)	0.67			
	After-hours (1700-2100)	314/334 (94.0%)	20/334 (6.0%)	2.04 (1.17, 3.58)	0.013		
	Weekend	235/250 (94.0%)	15/250 (6.0%)	2.05 (1.11, 3.77)	0.022		
	Night	253/272 (93.0%)	19/272 (7.0%)	2.38 (1.35, 4.20)	0.003		
	Between Hours	2448/2516 (97.1%)	73/2516 (2.9%)	1		<.001	
	Rest	802/856 (93.7%)	54/856 (6.3%)	2.17 (1.54, 3.06)			
Elective	Early AM	2429/2515 (96.6%)	86/2515 (3.4%)	1		0.14	
	Late AM	1520/1559 (97.5%)	39/1559 (2.5%)	0.73 (0.50, 1.06)	0.10		
	Early PM	2330/2402 (97.0%)	72/2402 (3.0%)	0.88 (0.64, 1.19)	0.40		
	Late PM	783/798 (98.0%)	15/798 (2.0%)	0.59 (0.35, 0.99)	0.05		
	Half AM	3298/3392 (97.2%)	94/3392 (2.8%)	1		0.002	
	Half PM	2714/2783 (97.5%)	69/2783 (2.5%)	0.89 (0.66, 1.22)	0.48		
	Full	1050/1100 (95.5%)	50/1100 (4.5%)	1.64 (1.17, 2.30)	0.004		
	Elective half day	Early AM	2079/2145 (96.9%)	66/2145 (3.1%)	1		0.17
	Late AM	1219/1247 (97.8%)	28/1247 (2.2%)	0.73 (0.47, 1.13)	0.16		
	Early PM	2047/2105 (97.2%)	58/2105 (2.8%)	0.90 (0.63, 1.27)	0.53		
Late PM	667/678 (98.4%)	11/678 (1.6%)	0.53 (0.28, 0.99)	0.05			
Elective full day	Early AM	350/370 (94.6%)	20/370 (5.4%)	1		0.70	
Late AM	301/312 (96.5%)	11/312 (3.5%)	0.65 (0.32, 1.34)	0.25			
Early PM	283/297 (95.3%)	14/297 (4.7%)	0.87 (0.45, 1.70)	0.69			
Late PM	116/121 (95.9%)	5/121 (4.1%)	0.76 (0.29, 1.99)	0.59			

Of the 13,248 operations performed in the study period, 390 cases had complications (2.9%). There were no cases of mortality attributed to the surgery or occurring within 28 days of surgery.

Overall there was no difference in the risk of complications between the 4 business hours periods but the risk in any out-of-hours period was higher **RR 2.36 (95% CI: 1.79, 3.12, P<0.001)** [Table I] with the highest risk at night (2100-0830), **RR: 2.49 (95% CI: 1.56, 3.98, P<0.001)** [Table II].

For elective operations there was no difference in the risk of complications between the 4 business periods (P=0.14) [Table I]. Having surgery on morning vs afternoon half-day operating lists had no impact on complication rates. However, complications were more likely to occur on full-day operating lists **RR 1.64 (95% CI: 1.17, 2.30, P=0.004)** [Table I] compared to morning half-day lists, but no different from afternoon half-day lists (P=0.5) [Table I]. Emergency surgeries performed during the 4 business hours periods did not have an increased risk of complications. Emergency surgeries performed in any out-of-hours period had an increased risk, **RR 2.17 (95% CI: 1.54, 3.06, P<0.001)** [Table I].

Time of surgery and risk of complications II

	Time category	No	Yes	RR (95% CI)	P Value	Overall P Value
Study time	Between (0830-1700)	12236/12572 (97.3%)	336/12572 (2.7%)	1		<.001
	After Hours (1700-2100)	314/334 (94.0%)	20/334 (6.0%)	2.24 (1.45, 3.47)	<.001	
	Weekend (2100-0830)	235/250 (94.0%)	15/250 (6.0%)	2.24 (1.36, 3.71)	0.002	
	Night	253/272 (93.0%)	19/272 (7.0%)	2.61 (1.67, 4.08)	<.001	
Session	Early AM	4335/4460 (97.2%)	125/4460 (2.8%)	1		<.001
	Late AM	2785/2856 (97.5%)	71/2856 (2.5%)	0.89 (0.67, 1.18)	0.41	
	Early PM	3698/3807 (97.1%)	109/3807 (2.9%)	1.02 (0.79, 1.32)	0.89	
	Late PM	1418/1449 (97.9%)	31/1449 (2.1%)	0.76 (0.52, 1.13)	0.17	
	After-hours	314/334 (94.0%)	20/334 (6.0%)	2.14 (1.35, 3.38)	0.001	
	Weekend	235/250 (94.0%)	15/250 (6.0%)	2.14 (1.27, 3.60)	0.004	
	Night	253/272 (93.0%)	19/272 (7.0%)	2.49 (1.56, 3.98)	<.001	

The morbidity risk was higher in any 'after hours' case **RR: 2.17 (95% CI: 1.54, 3.06, P<0.001)** or weekends **RR: 2.04 (95% CI: 1.17, 3.58, P=0.01)** [Table I].

The highest risk of morbidity was having an emergency operation at night **RR: 2.38 (95% CI: 1.35, 4.2, P=0.003)** [Table I] when compared to emergency operations at any other time.

DISCUSSION

This study shows that gynaecological surgeries performed out-of-hours are at increased risk of complications, especially if emergency procedures. This is consistent with results of studies in other specialties^{1,2}. This study also suggests that surgical start time during elective operating lists is not associated with any significant perioperative adverse events. However full-day operating lists carry an increased risk of morbidity for patients when compared to half-day morning lists, but not compared to afternoon half-day lists. It is plausible that surgical team fatigue and time pressures may contribute to this finding. Overall this study adds further to the body of evidence that operating out-of-hours can be riskier for patients and surgery should be deferred where possible to business hours. Consideration could be given to increase a location of staff overnight or during any out-of-hours period to mitigate this increased risk.

REFERENCES

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