



Centro di Riferimento per l'Epidemiologia  
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# Impact of different admission units within the Sant'Anna Hospital of Obstetrics and Gynecology on the risk of Postpartum hemorrhage (PPH)

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# The impact of PPH

- Most common cause of maternal mortality worldwide
- Maternal mortality-indicator of the quality and functioning of health systems
- PPH occurrence varies worldwide and affects 2-6% of pregnancies
- Incidence is increasing in developed countries



# PPH definition

- No universally accepted definition
- WHO defines PPH as blood loss of :
  - >500 ml in the first 24 hours after vaginal delivery
  - >1000ml after Caesarean section delivery



# Blood loss estimation methods

- Visual blood loss estimation-subjective
- Direct measuring
  - Collection of blood in special pans
  - Weighting of used swabs
- $\Delta$  Hemoglobin (pre and postpartum levels)
- $\Delta$  Hematocrit (pre and postpartum levels)



# PPH



## Principal causes

### 4 T's acronym

- Tone (Uterine atony)

↓  
Most common cause

- Tissue (Retained placenta)
- Trauma (Genital tract injury)
- Thrombin (Coagulation disorders)

## PPH Consequences

- Hysterectomy
- Disseminated intravascular coagulopathy
- Renal failure
- Hepatic failure
- Adult Respiratory Distress Syndrome

# Objectives



## Clinical audit-quality improvement process

### ❖ Objectives of the clinical audit

- To assess the incidence of PPH
- To evaluate the risk factors related to PPH
- To identify potential gaps in the quality of care and management of the PPH

### ❖ Main objective of the present study

- Evaluate the impact of different obstetrical assistance units within the Sant'Anna Hospital of Obstetrics and Gynecology on the risk of PPH.



# Methods



- Retrospective, hospital-based case-control study
- 7613 deliveries during 2011 in Sant'Anna Hospital in Torino
- 6 obstetrical assistance units divided into 3 Intensity of care Levels

Low intensity of Care Level (1A)	Medium Intensity of Care Level (1B,2A,2B ,2C)	High Intensity of Care Level (2D)
<ul style="list-style-type: none"><li>• Physiological and in-term pregnancies</li><li>• No greater risk factors related to the delivery</li><li>• Epidural anesthesia preference</li></ul>	<ul style="list-style-type: none"><li>• All the pregnancies that does not meet the criteria for the high and low intensity of care level</li></ul>	<ul style="list-style-type: none"><li>• High risk pregnancies</li><li>• Medical history of a serious illnesses of the mother</li><li>• Complications in pregnancy (pregnancy induced hypertension,fetal diseases)</li></ul>

# Data collection

## ➤ Clinical records

- Information on the demographic characteristics
- Medical and obstetric history of patients
- Delivery outcomes (information on blood loss not always available)

## ➤ Transfusion center report

- Data on red blood cell transfusion



Most common treatment for PPH





# Definition of cases and controls

## ➤ Case definition

- All women that gave birth during 2011 in the Sant'Anna Hospital that were transfused with at least one bag of RBC during the delivery or in the puerperium

**No. 110 cases**

## ➤ Control definition

- A random sample (controls: cases 2:1) of all women that gave birth during 2011 in the Sant'Anna Hospital but were not transfused for reasons related to the delivery

**No. 228 controls**



# Risk factor identification

Potential risk factors were a priori identified through a review of the published literature



## Antenatal risk factors

- anaemia at admission
- advanced maternal age
- multiple pregnancy
- gestational hypertension
- intrauterine fetal death
- multiparity
- body mass index
- placenta praevia
- scarred uterus
- placental abruption
- macrosomia
- thrombocytopenia
- chorioamnionitis.

## Intrapartum risk factors

- placenta accreta
- prolonged duration of the 1<sup>st</sup> stage of labour (>6 hours vs.  $\leq 6$  hours)
- prolonged duration of the 2<sup>nd</sup> stage of labour (>1 hour vs.  $\leq 1$  hour)
- labour induction (Oxytocin)
- labour augmentation
- retained products (retained placenta)
- type of delivery
  - vaginal delivery without complications
  - vaginal delivery with episiotomy
  - assisted vaginal delivery(forceps or vacuum)
  - planned caesarean section
  - emergency caesarean section).

# Statistical analysis

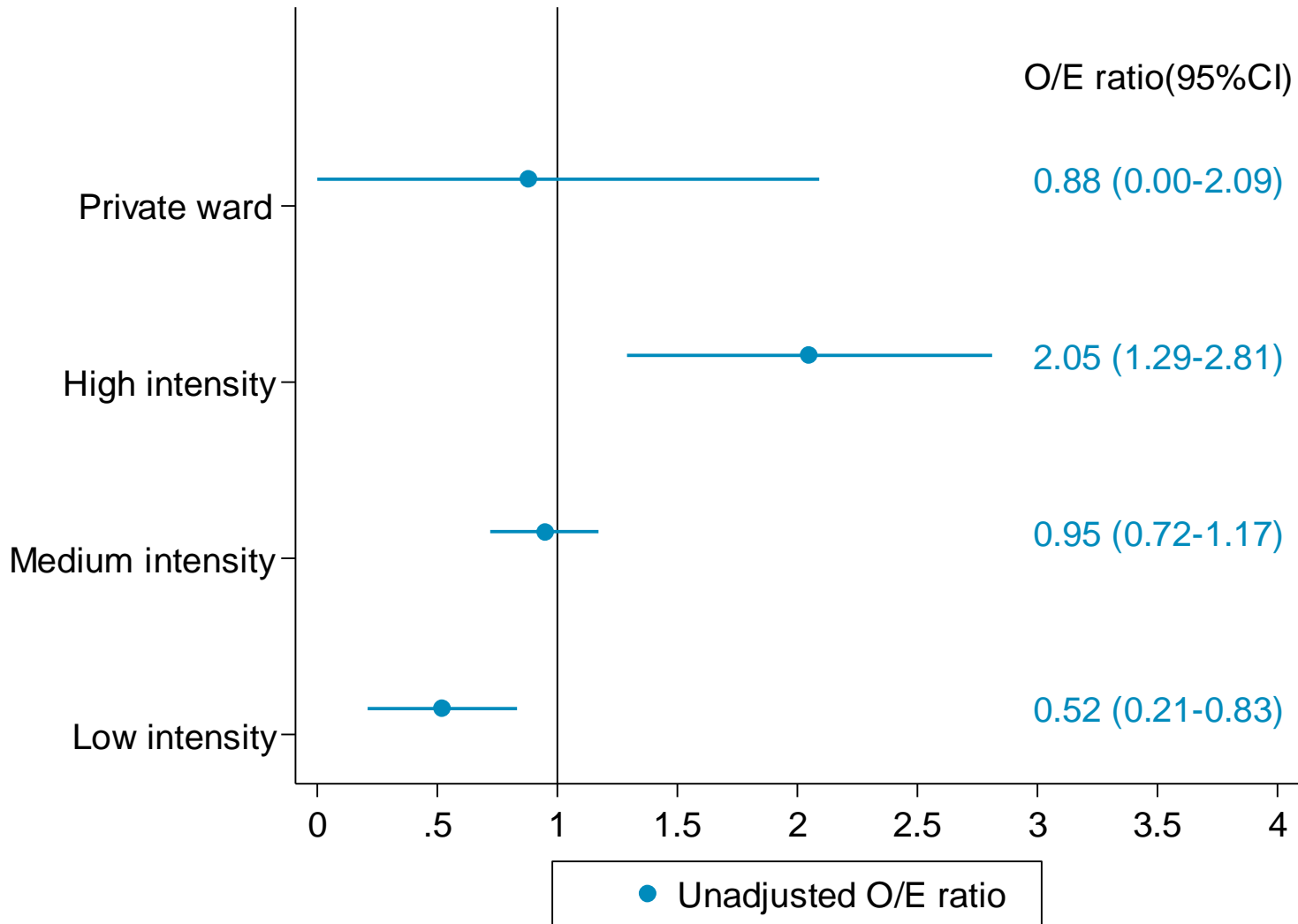
- Multivariable logistic regression analysis

Expected No. of PPH cases

$O/E \text{ ratio}_{\text{adjusted}} = \text{No. observed PPH cases} / \text{No. expected PPH cases}$

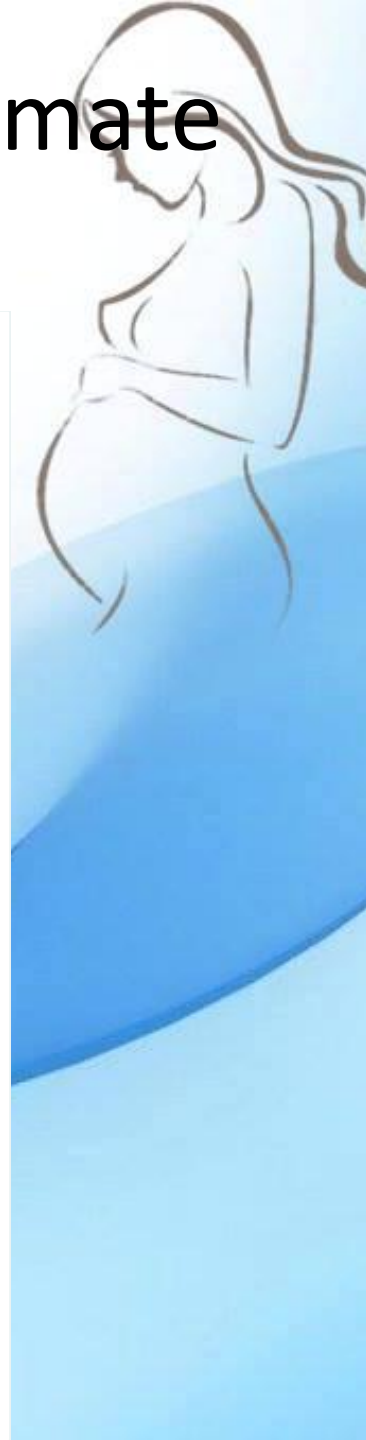
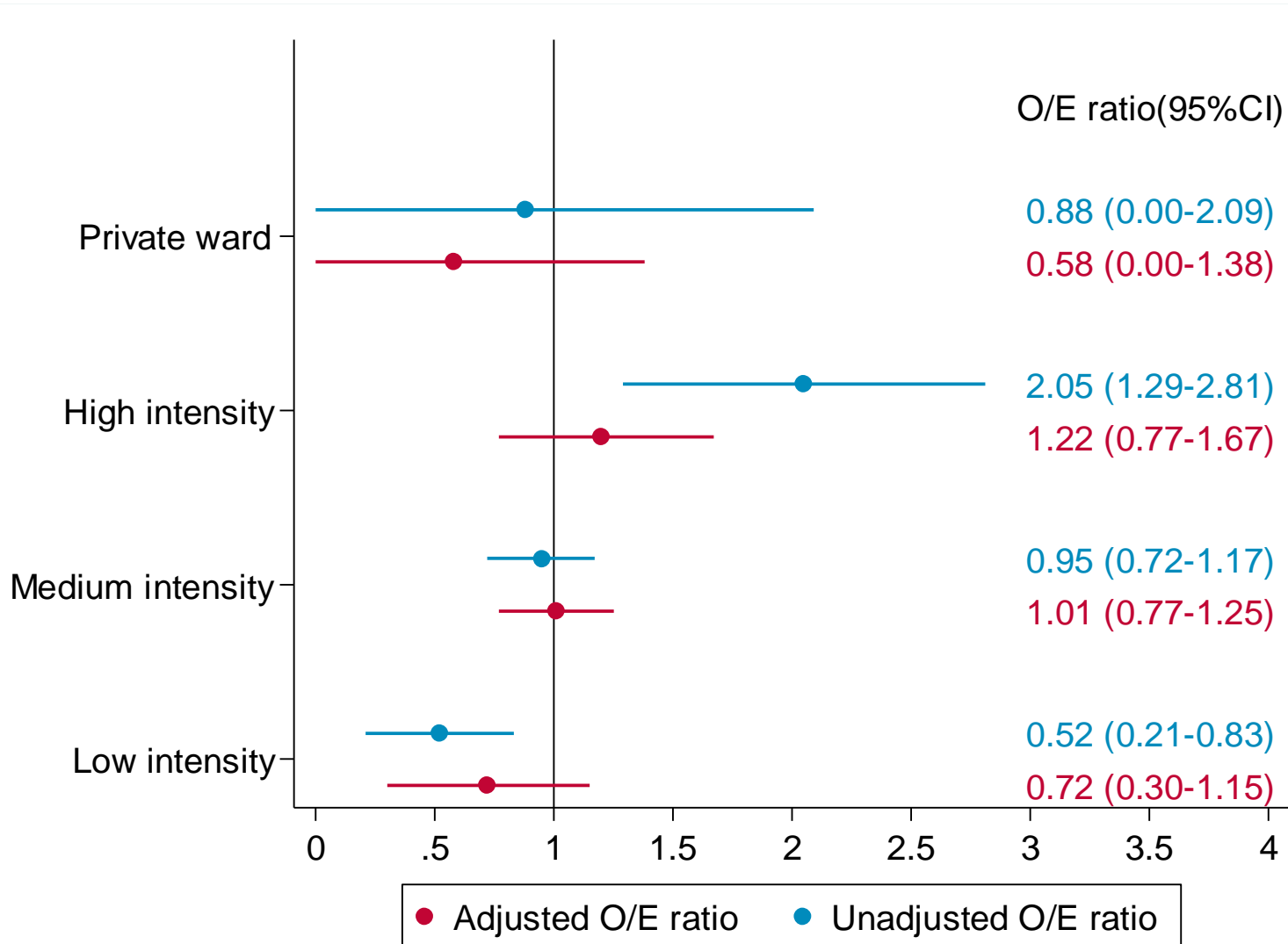


# Results

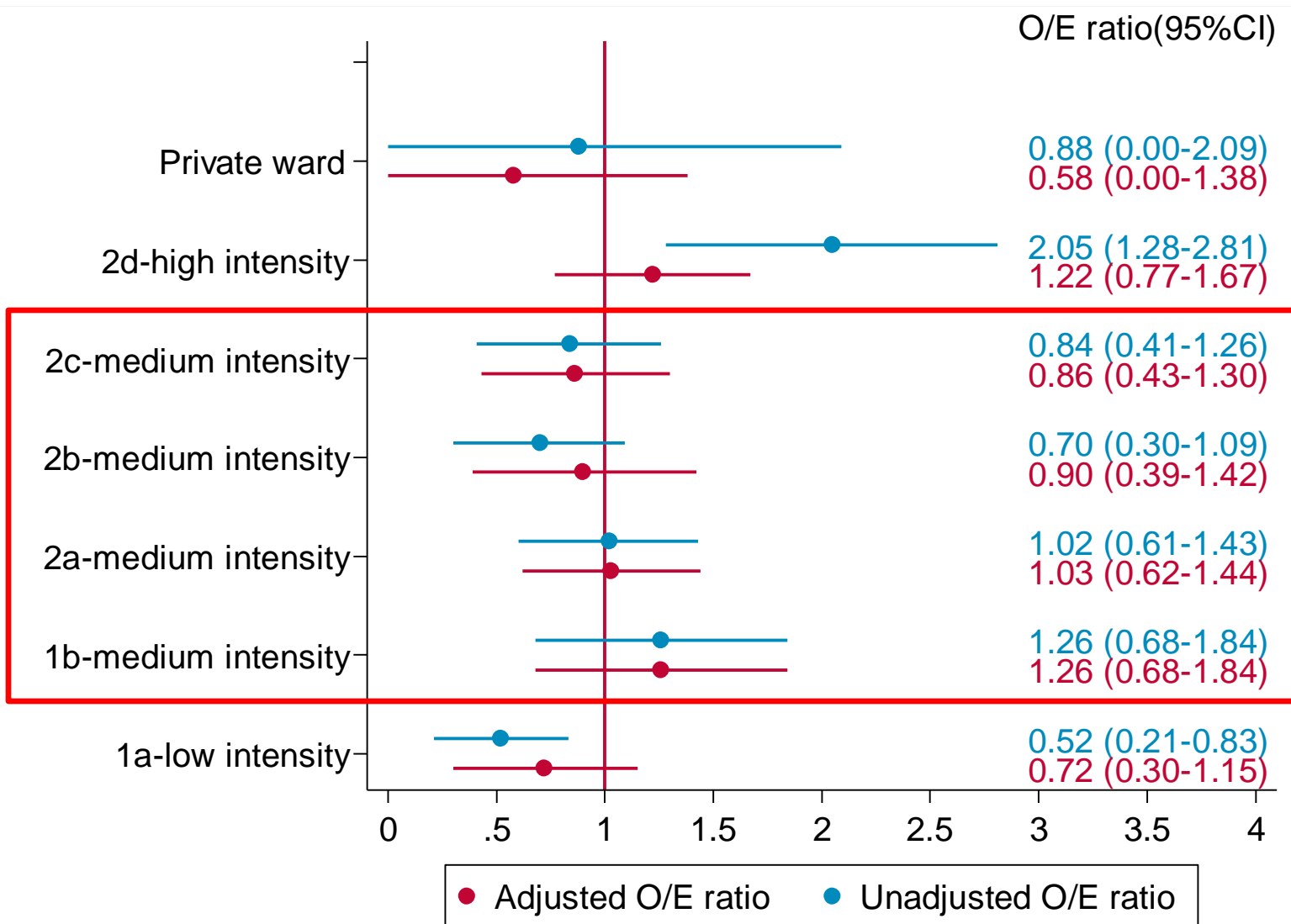
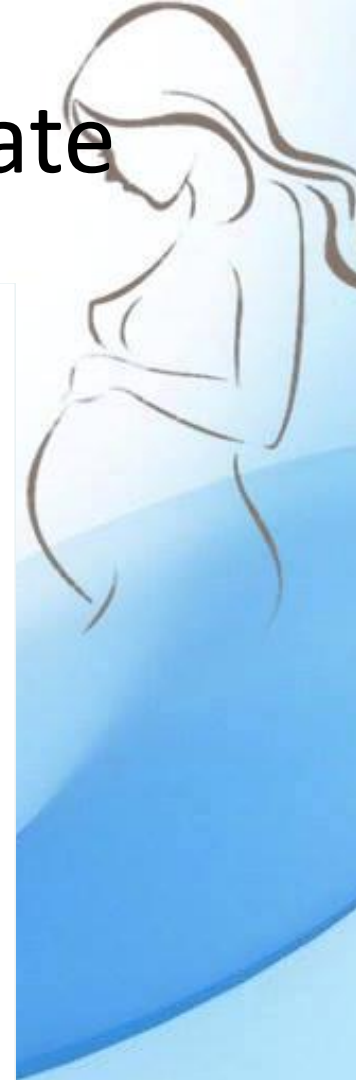


# Adjusted vs. Unadjusted O/E estimate

## Intensity of care level



# Adjusted vs. Unadjusted O/E estimate



# Conclusions

- Although the study was underpowered to detect small excesses ( $<1.4$ ), we did not find significant difference after the adjustment of the O/E ratio of PPH among the six obstetrical assistance units
- Future aspects
  - To evaluate the trend of the PPH incidence during the years before and after the set up of the clinical audit





**We've come a long way...**

**THANK YOU**

**...but we've still a way to go**



# Conflict of interest declaration

- All the authors declare no conflicts of interest: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work, no other relationships or activities that could appear to have influenced the submitted work.



# Results



## Cases and controls by units

UNITS	CASES (%)	CONTROLS (%)
Low Intensity of care 1a	11 (10.00)	54 (23.68)
Medium Intensity of care 1b	18 (16.36)	26 (11.40)
Medium Intensity of care 2a	24 (21.82)	48 (21.05)
Medium Intensity of care 2b	12 (10.91)	41 (17.98)
Medium Intensity of care 2c	15 (13.64)	40 (17.54)
High Intensity of care 2d	28 (25.45)	14 (6.14)
Private ward	2 (1.82)	5 (2.19)
Total	110 (100)	228 (100)

# Results

Incidence of PPH 1.44% (95%CI 1.20-1.74)



## Risk factors associated with PPH

PPH maternal risk factors	OR <sub>adjusted</sub>	95% Confidence Interval
Anemia at admission	16.77	1.32-212.29
Multiple pregnancy	8.26	2.79-24.40
Gestational hypertension	4.90	1.24-19.37
Placental abruption	10.33	1.82-58.60
Macrosomia	4.99	2.24-11.13
Retained products	19.32	4.51-82.84
Duration of 1 <sup>st</sup> stage of labour >6 h	4.51	1.20-17.00
Assisted vaginal delivery	6.84	1.93-24.31

# Multivariable logistic regression

PPH maternal risk factors	OR <sub>adjusted</sub>	95% Confidence Interval	P-Value
Anemia at admission	16.77	1.32-212.29	0.029
Multiple pregnancy	8.26	2.79-24.40	0.000
Gestational hypertension	4.90	1.24-19.37	0.032
Intrauterine fetal death	12.69	0.85-190.12	0.066
Previous labors $\geq 1$	1.18	0.60-2.34	0.626
BMI $>30$	0.97	0.33-2.89	0.963
Thrombocytopenia( $<150000\text{mm}^3$ )	0.64	0.36-1.15	0.134
Age $\geq 35$	1.18	0.62-2.22	0.618
Placental abruption	10.33	1.82-58.60	0.008
Macrosomia	4.99	2.24-11.13	0.000
Chorioamnionitis	0.40	0.10-1.60	0.196
Scarred uterus (myomectomy or previous cesarean section)	1.56	0.62-3.94	0.343
Retained products (placenta,cotyledons,membranes,clots)	19.32	4.51-82.84	0.000
Duration of 1 <sup>st</sup> stage of labour $>6$ h	4.51	1.20-17.00	0.026
Duration of 2 <sup>nd</sup> stage of labour $>1$ h	1.69	0.54-5.31	0.368
Induction of labour with Oxytocin	0.50	0.15-1.59	0.236
Labour augmentation	0.77	0.20-3.04	0.709
Vaginal delivery without complications	1.00		
Vaginal delivery with episiotomy	2.42	0.83-7.07	0.107
Assisted (operative) vaginal delivery	6.84	1.93-24.31	0.003
Planned Cesarean section	0.59	0.15-2.28	0.445
Emergency Cesarean section	1.77	0.49-6.41	0.384

# O/E ratios adjusted vs. unadjusted



Sector	No.	No. cases		SMR	95% CI
		Observed	Expected		
1a	65	11	15.20	0.72	0.30-1.15
1b	44	18	14.33	1.26	0.68-1.84
2a	72	24	23.40	1.03	0.62-1.44
2b	53	12	13.27	0.90	0.39-1.42
2c	55	15	17.37	0.86	0.43-1.30
2d	42	28	22.96	1.22	0.77-1.67
Private ward	7	2	3.47	0.58	0.00-1.38

Sector	No.	No. cases		SMR	95% CI
		Observed	Expected		
1a	65	11	21.15	0.52	0.21-0.83
1b	44	18	14.32	1.26	0.68-1.84
2a	72	24	23.43	1.02	0.61-1.43
2b	53	12	17.25	0.70	0.30-1.09
2c	55	15	17.90	0.84	0.41-1.26
2d	42	28	13.67	2.05	1.28-2.81
Private ward	7	2	2.28	0.88	0.00-2.09