
Lifts to ALL Floors
Colposcopy
Antenatal Clinic
Gynaecology Clinic


Symons
Gallery


General Enquiries


Royal Free Hampstead NHS
Royal Free Hospital


THE ROYAL FREE HOSPITAL
IN
IN

Obstetric High Dependency – who needs it?

Roshan Fernando, University College Hospital, London, UK


NovoSeven®
60


NovoSeven®
60


NovoSeven®
60

6 hours later !

6 hours later !

6 hours later !

6 hours later !

6 hours later !

general anaesthesia

massive blood transfusion

uterine artery embolization

rFVIIa

6 hours later !

arterial / CVP lines

warming blankets

near patient coagulation monitoring

Options

- Stay in operating theatre
- Delivery suite room – trained nurses
- Main intensive care unit
- Obstetric high dependency area

ICU – who needs it?

- Definition / case mix
- Admission criteria / transfer guidelines
- ICU – advantages / disadvantages
- How to avoid ICU
- ICU / HDU outcome
- Controversies

ICU – who needs it?

- **Definition / case mix**
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Intensive care – what is it?

"advanced respiratory support / ventilation"

"2 or more organ support"

"chronic impairment of 1 or more organ + acute support of another organ"

Case mix

Intensive care utilization during hospital admission for delivery

Sumedha Panchal – Anesthesiology 2000

Multicenter study of obstetric admissions to 14 ICUs

Jane Hazelgrove – Critical Care Medicine 2001

Obstetric critical care: a blueprint for improved outcomes

Gerda Zeeman – Critical Care Medicine 2006

Case mix

Obstetric conditions	number (66%)
Eclampsia / severe PET	**207**
Haemorrhage	**85**
Puerperal sepsis	**14**
Non-obstetric conditions	**number (34%)**
Medical disorders	**134**
Surgical disorders	**31**

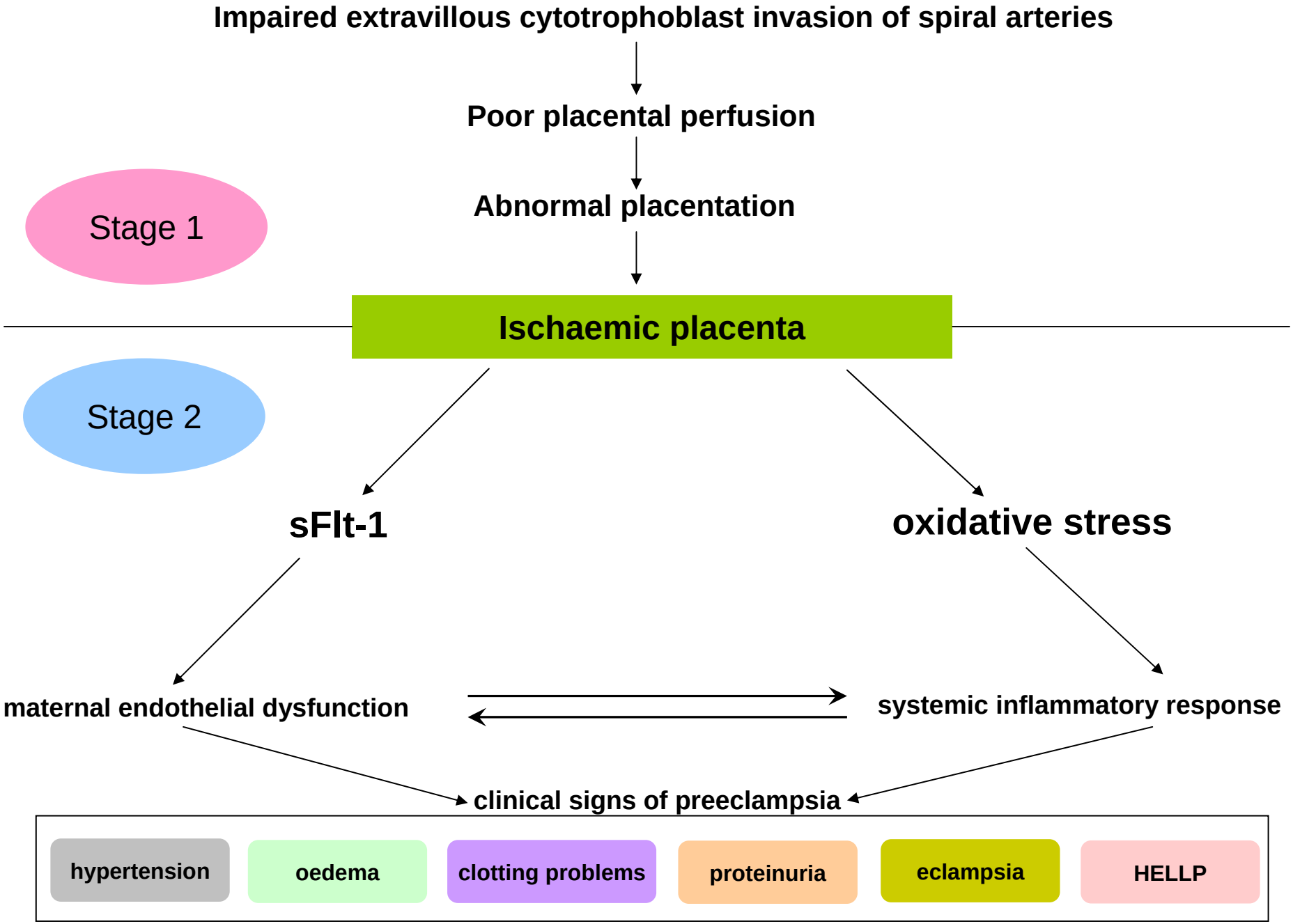
- **Medical:** diabetes / respiratory / cardiac disorders
- **Surgical:** appendicitis / cholecystitis / trauma

Massive obstetric haemorrhage

- Placenta praevia / accreta / ruptured uterus
- Uterine atony / placental abruption / DIC
- Management:
  - blood products / rFVIIa
  - B-Lynch suture / uterine artery embolisation
  - invasive monitoring / near patient testing

Preeclampsia

hypertension | oedema | clotting problems | proteinuria | eclampsia | HELLP


Impaired extravillous cytotrophoblast invasion of spiral arteries
Poor placental perfusion
Abnormal placentation
Stage 1
Ischaemic placenta
Stage 2
sFlt-1
oxidative stress
maternal endothelial dysfunction
systemic inflammatory response
clinical signs of preeclampsia
hypertension
oedema
clotting problems
proteinuria
eclampsia
HELLP

Eclampsia / pre-eclampsia

- Management of:
  - hypertension
  - convulsions
  - oliguria / pulmonary oedema
- Controversies
  - CVP / pulmonary artery catheter
  - direct arterial pressure

ICU admission

Procedures	number (%)
Pulmonary artery catheter	**4 (12)**
Vasopressors	**6 (17)**
Mechanical ventilation	**24 (70)**
Duration of ICU stay (h)	**number**
< 24	**16**
> 24	**18**

- 2 – 3 % of all ICU admissions are obstetric
- → 3% mortality

ICU – who needs it?

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Admission criteria - ITU

- Delivery suite care not possible
  - bed space
  - trained staff
- High level of input
  - invasive monitoring
  - airway management
  - mechanical ventilation / renal support

Transfer guidelines

- 70% risk of adverse events – equipment related (30%)
- Good communication between medical staff
- Accompanying patient:
  - medical personnel - at least 2 + ancillary staff
  - equipment – ECG, BP, SpO_2, $ETCO_2$, defibrillator, drugs.....
- Avoid aortocaval compression
- Inter-hospital transfer $\rightarrow \uparrow$ risk

ICU – who needs it?

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ICU

Advantages	Disadvantages
Safety of invasive monitoring	↑ cost
↑ turnover of high risk cases	↓ obstetric / midwifery input
↑ trained staff	care of baby
Use of inotropes	sepsis risk
	monitoring complications
	distance form obstetric theatre

ICU – who needs it?

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How to avoid ICU

- Early warning scoring systems - triggers
- Outreach teams / MET - UK Dept of Health 2000
- Obstetric high dependency unit (HDU)

Early Warning Scores - Duckitt, BJA 2007

	Score			
	0	1	2	3
Resp. rate	≤ 19	20 - 21	≥ 22	
Pulse	≤ 101	≥ 102		
SBP	≥ 100		≤ 99	
Temp	≥ 35.3			< 35.3
O_2 sat (air)	96 - 100	94 ≤ 96	92 < 94	< 92
AVPU	alert			other

CHAPTER 19 ANNEX A : AN EXAMPLE OF AN OBSTETRIC EARLY WARNING CHART. REPRODUCED WITH THE KIND PERMISSION OF ABERDEEN MATERNITY HOSPITAL

OBSTETRIC EARLY WARNING CHART (FOR MATERNITY USE ONLY)

NHS Grampian

Name: DOB:

Ward:

CONTACT DOCTOR FOR EARLY INTERVENTION IF PATIENT TRIGGERS ONE RED OR TWO YELLOW SCORES AT ANY ONE TIME

		Date:																		
		Time:																		
RRP (write rate in numbers box)	>30																			>30
	21-30																			21-30
	11-20																			11-20
	0-10																			0-10
Saturations	95-100%																			95-100%
	<95%																			<95%
Administered O2 (L/min.)																				%
Temp	39																			39
	38																			38
	37																			37
	36																			36
	35																			35
Systolic BP	170																			170
	160																			160
	150																			150
	140																			140
	130																			130
	120																			120
	110																			110
	100																			100
	90																			90
	80																			80
	70																			70
	60																			60
	50																			50
	40																			40
Diastolic BP	200																			200
	190																			190
	180																			180
	170																			170
	160																			160
	150																			150
	140																			140
	130																			130
	120																			120
	110																			110
	100																			100
	90																			90
	80																			80
	70																			70
	60																			60
	50																			50
Pulse	120																			120
	110																			110
	100																			100
	90																			90
	80																			80
	70																			70
	60																			60
	50																			50
	40																			40
Urine	Normal (0-1+)																			Normal (0-1+)
Proteinuria	protein + + +																			protein + + +
	protein + + + +																			protein + + + +
Ventricular fluid	Clear/Pink																			Clear/Pink
	Brown																			Brown
Neuro Response (V)	Alert																			Alert
	Voice																			Voice
	Pain																			Pain
	Unresponsive																			Unresponsive
Pain Score (PAIN)	0-1																			0-1
	2-3																			2-3
Lochia	Normal																			Normal
	Heavy / Offensive / Clots																			Heavy / Offensive / Clots
Loose stools	NO (-)																			NO (-)
	YES (+)																			YES (+)
Total Yellow Scores																				
Total Red Scores																				

High dependency care

“basic respiratory support”

“single organ support”

Obstetric HDU

- Continuity of care / critical care management
  - obstetricians
  - obstetric anaesthetists
  - midwives / obstetric nurses
- Antenatal care optimum for mother & fetus
- Obstetric medicine specialists / ICU physicians
- ↓ transfer to main ICU

Obstetric HDU experience

A blueprint for obstetric critical care

Gerda G. Zeeman, MD, George D. Wendel, Jr, MD, and F. Gary Cunningham, MD
Dallas, Tex

Am J Obstet Gynecol 2003;188:532-6

- **Single organ support / non-ventilated cases**
- 2 yr audit of admissions to Obstetric Intermediate Care unit
- 14,000 deliveries → 483 critically ill obstetric patients (3.5%)
- 34 HDU cases → ITU (7%)

RFH Obstetric HDU

- Delivery suite HDU → 3 beds
- Invasive monitoring
- Midwifery staffing
- Multidisciplinary care
- No mechanical ventilation

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APACHE II

APACHE II – Acute Physiology & Chronic Health Evaluation

- Risk of death → overestimates mortality in obstetric patients
- Normal pregnancy physiology variables → “abnormal”
- Liver function / platelet count not assessed (preeclampsia / eclampsia)
- Accurately predicts mortality for medical disorders **not** obstetric disorders

ICNARC case mix study

ICNARC case mix study

- 220,000 admissions ('95 – '03)
- Direct obstetric pathologies
  - *vs.* indirect or coincidental pathologies
  - *vs.* non-pregnant controls aged 16-50
- **Ability to predict the risk of hospital death**

ICNARC case mix study

- 1,452 direct obstetric admissions
- 450 indirect or coincidental
- 22,938 non-pregnant control

ICNARC case mix study

- 1,452 direct obstetric admissions **0.7%**
- 450 indirect or coincidental **0.2%**
- 22,938 non-pregnant control **10.5%**

ICNARC case mix study

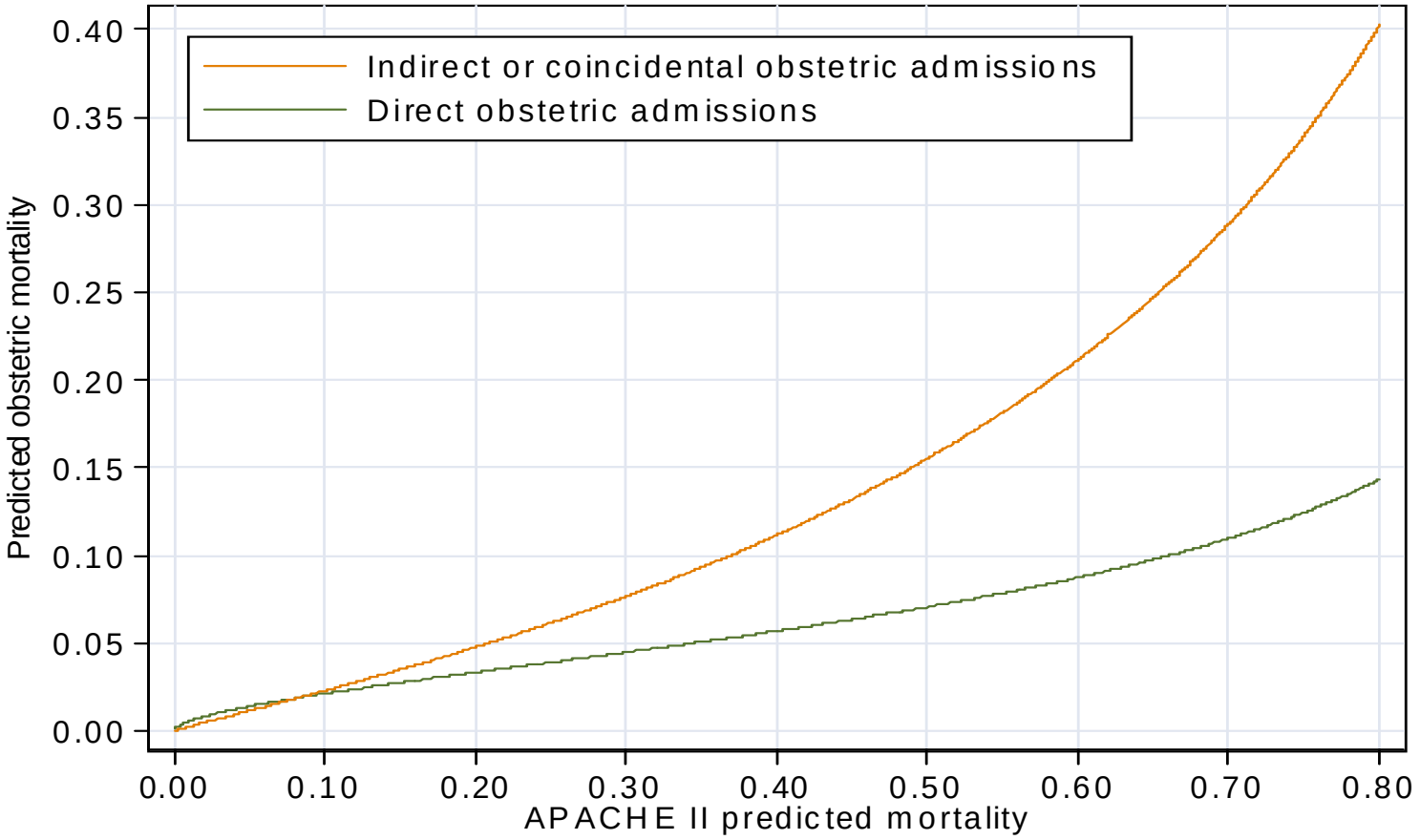
- 1,452 direct obstetric admissions **0.7%**
- 450 indirect or coincidental **0.2%**
- 22,938 non-pregnant control **10.5%**

Hospital mortality rates (%)		
Direct	Indirect	Control
2.2	6.0	19.6

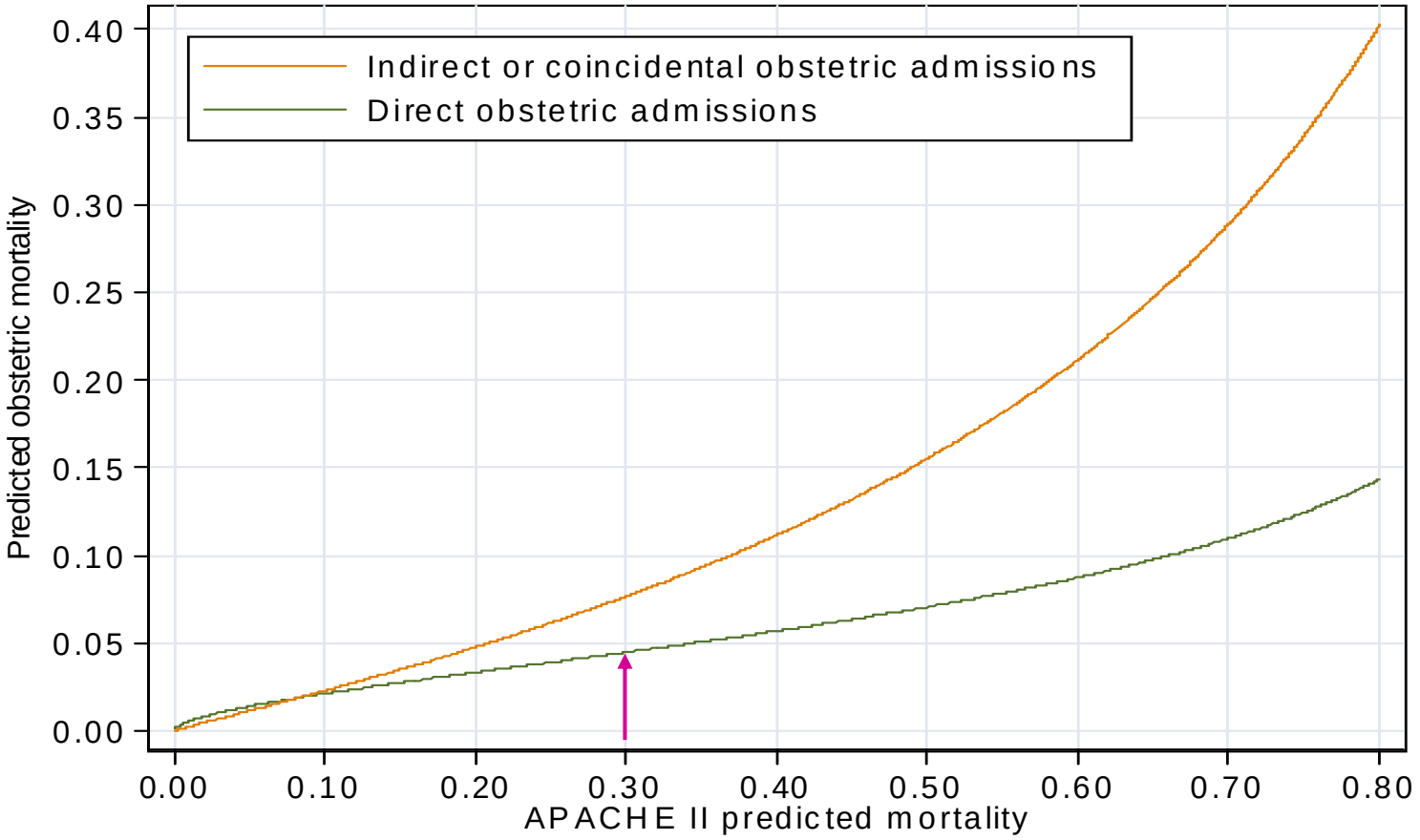
ICNARC case mix study

- 1,452 direct obstetric admissions 1.7%
- 278 indirect or coincidental 4.2%
- 22,938 non-pregnant control 14.7%
- **APACHE II model overestimated mortality for obstetric admissions**
- **Glasgow Coma Scale the best discriminator**

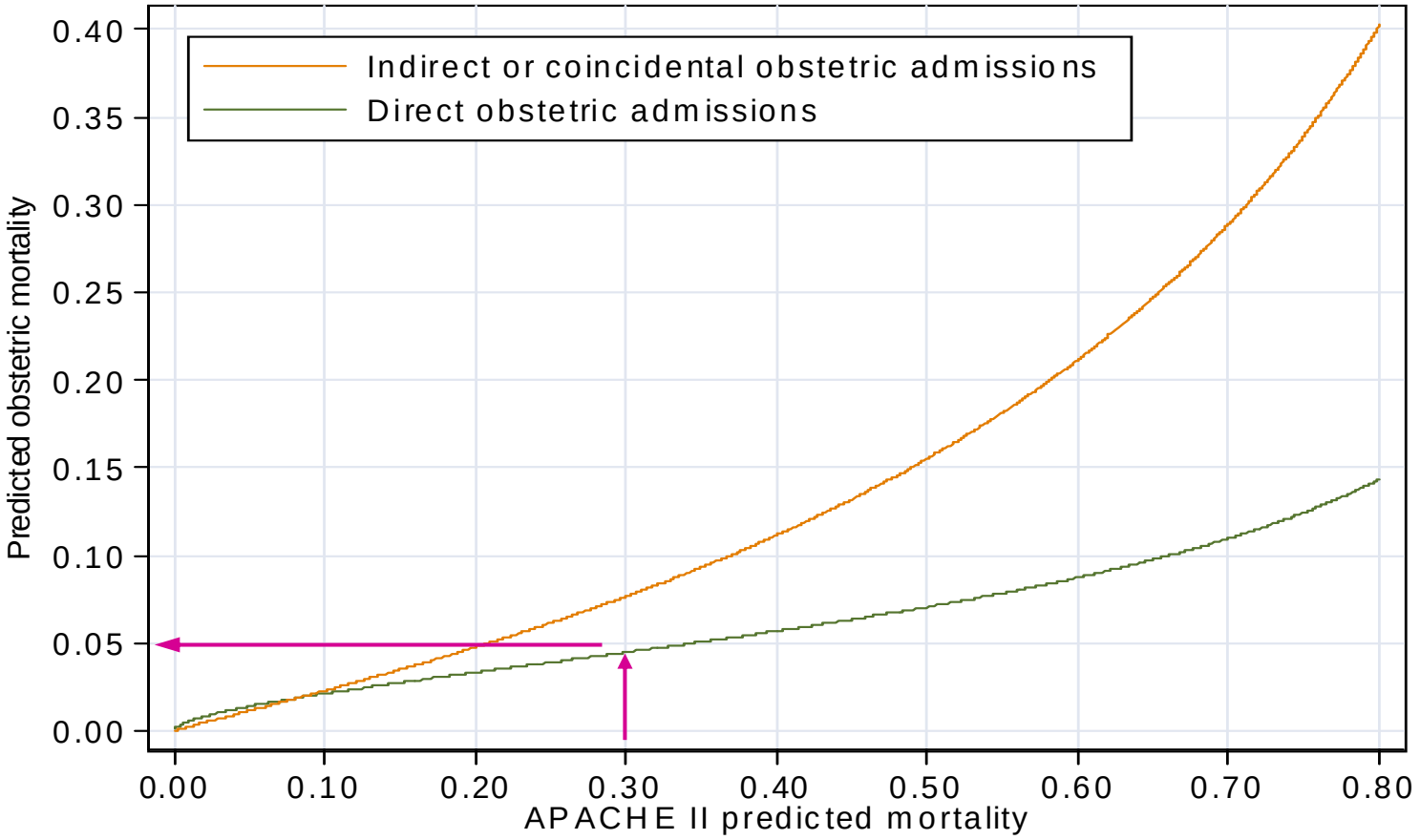
ICNARC case mix study



ICNARC case mix study



ICNARC case mix study



Maternal morbidity – quality of care

- Mortality rates low – developed countries (2.4 / 100,000 del)
- "Near miss" & obstetric critical care admissions → better assessment of quality of care
- **Waterstone / Bewley** – BMJ 2001
- **Scottish confidential audit of severe maternal morbidity** - 2003 to 2005

Waterstone & Bewley, 2001

- 50,000 deliveries in UK district
- Definitions – preeclampsia, HELLP, severe haemorrhage, severe sepsis, uterine rupture
- 588 cases of severe obstetric morbidity - 12 per 1,000 deliveries
- **> 100 near misses for each direct maternal death**
- Risk factors
  - age > 34; social exclusion; non-white
  - hypertension, previous PPH, labour induction, c section

Scottish morbidity audit – 2003 to 2005

3rd Annual Report
2005

Near miss : death ratio = 56:1

- Expanded criteria (14 categories)
  - Renal / liver dysfunction
  - Anaphylactic or septicaemic shock
  - Anaesthetic problem (failed intubation / high spinal)
  - Massive PE / cardiac arrest
  - ITU admission

Scottish morbidity audit - haemorrhage

- 68% cases - senior obstetrician input
- 50% cases – senior anaesthetist / haematologist
- Optimum care – 65% of cases (suboptimal 3%)
  - early senior medical input
  - good iv access – 2 large bore cannulae / CVP
  - blood transfusion
  - ITU / HDU transfer

Scottish morbidity audit

- Morbidity **per 1000 maternities**
  - 4.6 **(2004)**
  - 6.1 **(2005)**

- Haemorrhage rate **per 1000 maternities**
  - 3.2 **(2004)**
  - 4.4 **(2005)**

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Controversies

- The ideal: multidisciplinary care, but .....
- Accredited critical care nurses
- HDU / training midwives / obstetric nurses
  - in-house
  - critical care “Outreach” teams
  - regional / national teaching courses

Controversies

- Invasive monitoring
  - direct arterial vs. non-invasive BP
  - CVP vs. PCWP (Swan Ganz catheter)
  - coagulopathy
- Out of hospital transfer / ITU networks

What about me?

- **No** obstetric HDU, **No** obstetric physicians
- **Intensive therapy does not just begin in intensive care!**
- Stabilise / optimise / transfer
  - main ICU
  - designated delivery rooms for critical care
  - tertiary hospital

Conclusion

- Major haemorrhage & preeclampsia are main reasons for critical care
- Treat & transfer → HDU care or ITU
- If obstetric HDU - ? quality of nursing care
- Early warning scores development for obstetrics
- Improve data collection / develop protocols
- **Critical care starts with you!**

Acknowledgements

Dr. Rachel Hignett

Dr. Steve Yentis

Thank you!