Съезд Congress

5-7 сентября 2018 / Санкт-Петербург
September 5-7, 2018 / St. Petersburg

Pre-eclampsia & HELLP syndrome

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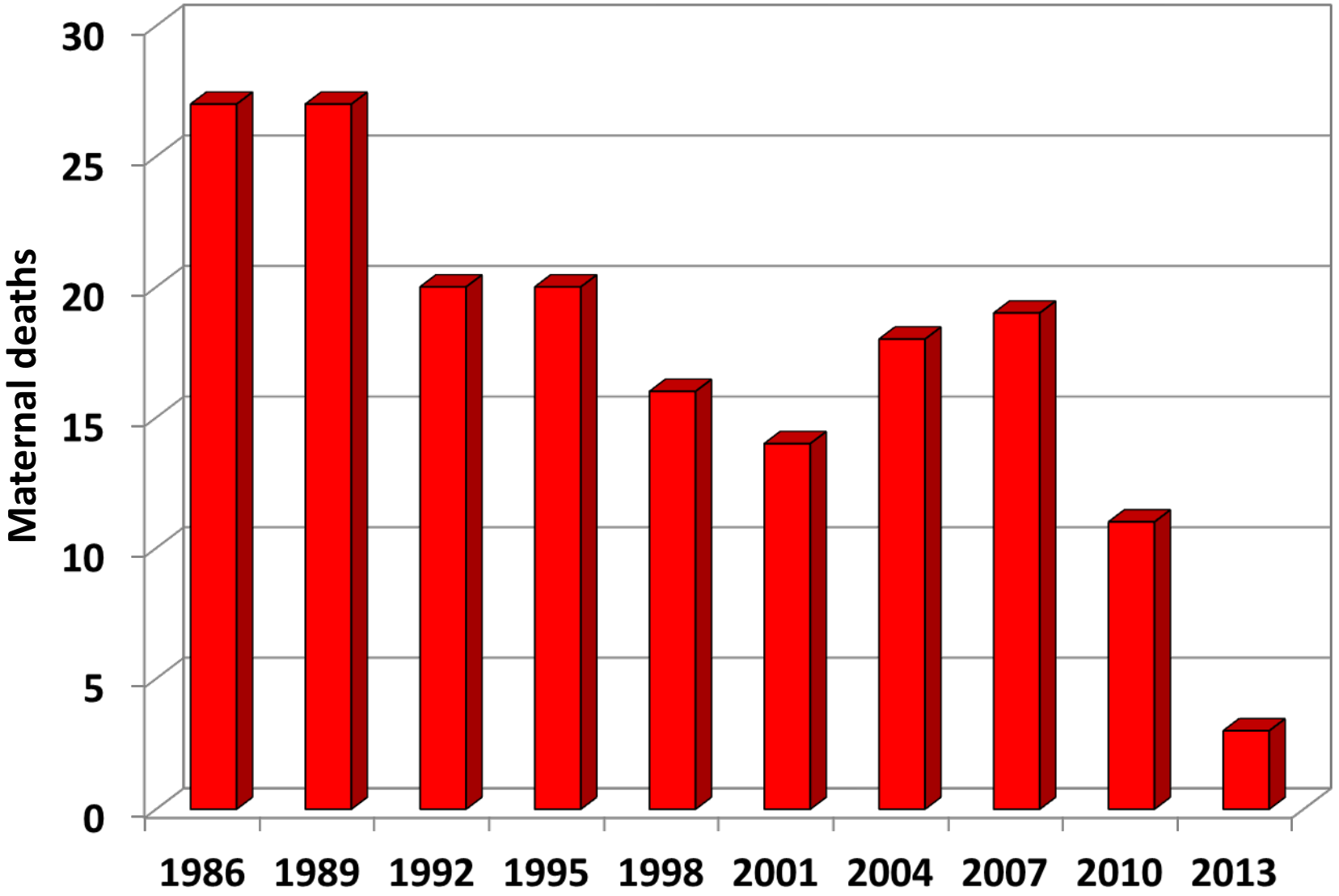
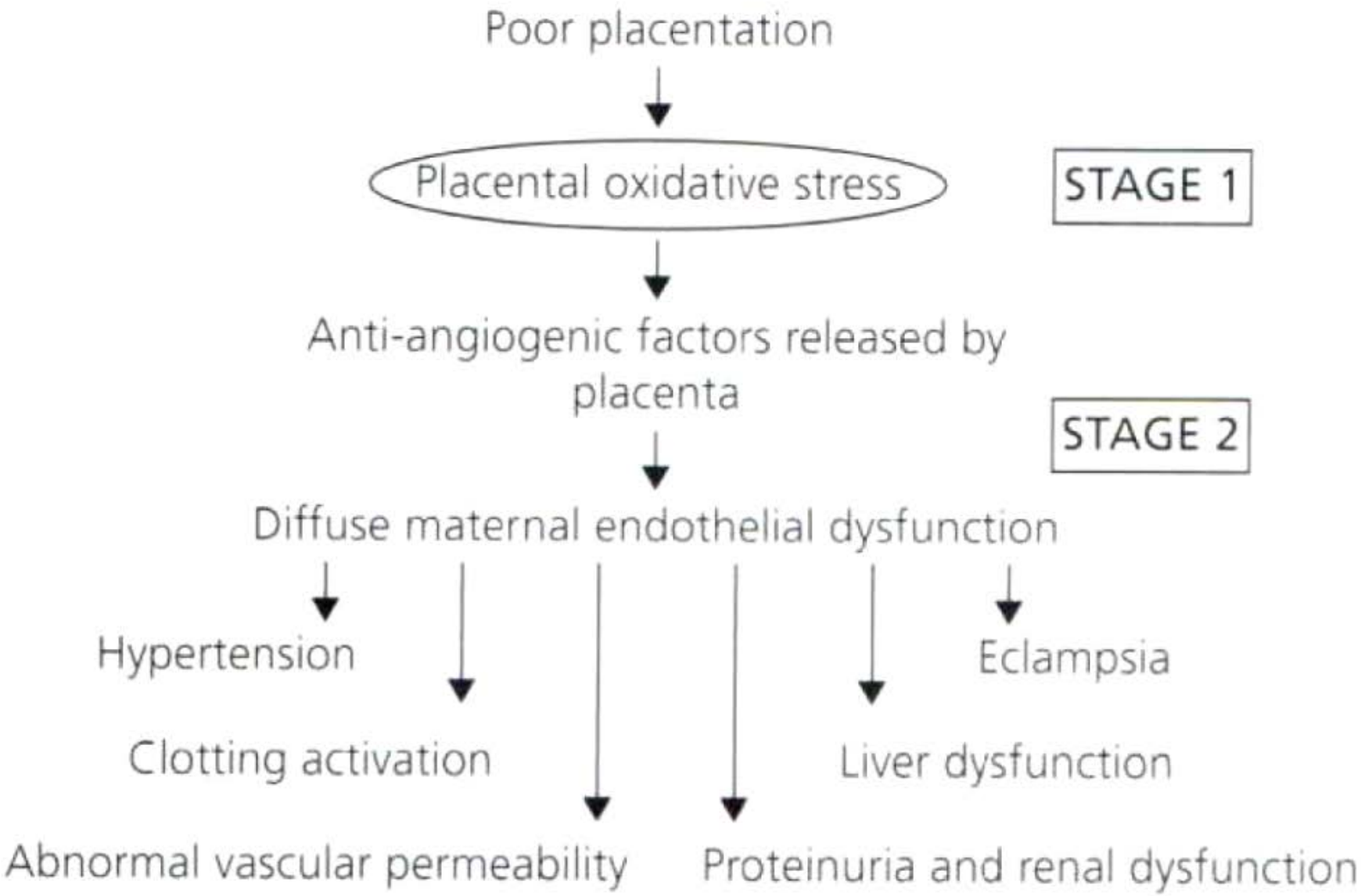
Pre-eclampsia & HELLP syndrome

- Antenatal Issues
- Labour Analgesia
- Anaesthesia for Delivery
- High Dependency Care

- **Hypertension**
  - systolic >140 mmHg or diastolic >90 mmHg
  - severe: systolic >160 mmHg or diastolic >110 mmHg
- **Chronic hypertension**
  - pre-pregnancy or diagnosed before 20 weeks
- **Gestational hypertension**
  - new-onset after 20 weeks
  - no end-organ damage
- **Pre-eclampsia**
  - new onset after 20 weeks (early <34 vs. late >34)
  - end-organ damage
  - (proteinuria >300 mg / 24 h)
  - regression 3/12 post delivery
- **HELLP syndrome**
  - Haemolysis, Elevated Liver enzymes, Low Platelets

UK Maternal Deaths from Pre-eclampsia & Eclampsia




Poor placentation
Placental oxidative stress
STAGE 1
Anti-angiogenic factors released by placenta
STAGE 2
Diffuse maternal endothelial dysfunction
Hypertension
Clotting activation
Abnormal vascular permeability
Proteinuria and renal dysfunction
Liver dysfunction
Eclampsia

Presentation

- cardiovascular
- central nervous
- respiratory
- haematology
- hepatic
- renal
- fetus

Presentation

- cardiovascular
- central nervous
- respiratory
- haematology
- hepatic
- renal
- fetus

- hypertension
- ↑ cardiac output
- ↑ SVR
- loss of autoregulation
- cerebral haemorrhage
- future risk

Presentation

- cardiovascular
- central nervous
- respiratory
- haematology
- hepatic
- renal
- fetus

- headache
- visual disturbance
- nausea & vomiting
- photophobia
- clonus / hyperreflexia
- eclampsia

Presentation

- cardiovascular
- central nervous
- **respiratory**
- haematology
- hepatic
- renal
- fetus

- **breathlessness**
- **pulmonary oedema**
- **fluid management**
- **laryngeal oedema**
- **difficult intubation**

Presentation

- cardiovascular
- central nervous
- respiratory
- **haematology**
- hepatic
- renal
- fetus

- **thrombocytopenia**
- **haemolysis**
- **fibrinolysis**
- **coagulopathy**
- **thrombosis**

Presentation

- cardiovascular
- central nervous
- respiratory
- haematology
- **hepatic**
- renal
- fetus

- **periportal oedema**
- **↑ liver enzymes**
- **epigastric pain**
- **hepatic necrosis**
- **subcapsular haemorrhage**
- **rupture**

Presentation

- cardiovascular
- central nervous
- respiratory
- haematology
- hepatic
- **renal**
- fetus

- **↓ glomerular filtration**
- **proteinuria**
- **↑ creatinine / urea**
- **↑ uric acid**
- **acute renal failure**

Presentation

- cardiovascular
- central nervous
- respiratory
- haematology
- hepatic
- renal
- **fetus**

- **↓ placental perfusion**
- **growth restriction**
- **preterm delivery**
- **abruption**
- **intrauterine death**

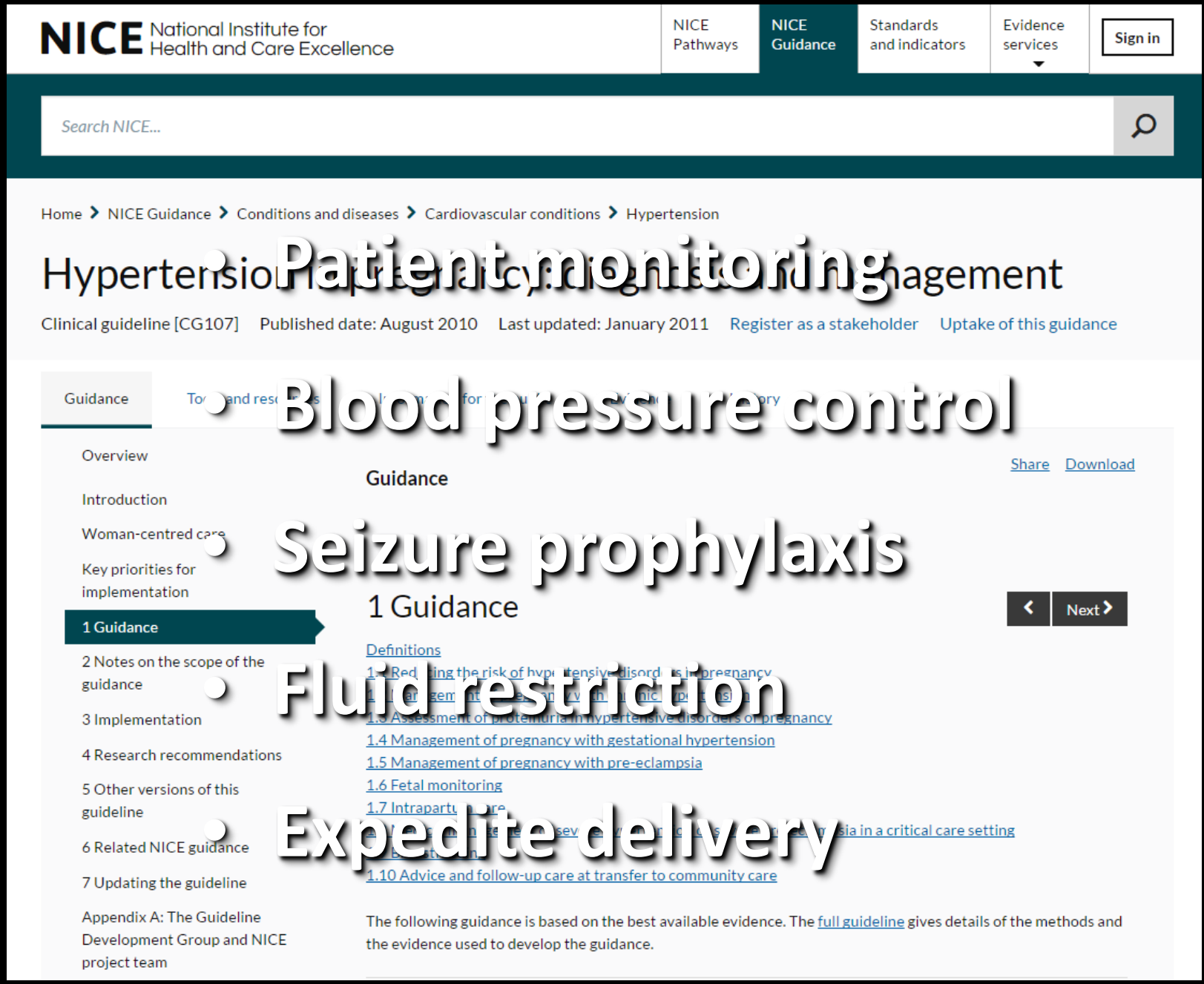
Risk factors

- nulliparity
- age <20 or >40 years
- previous pre-eclampsia
- family history
- multiple pregnancy
- anaemia
- obesity
- hypertension, diabetes, renal disease
- autoimmune disease
- assisted reproduction
- high altitude

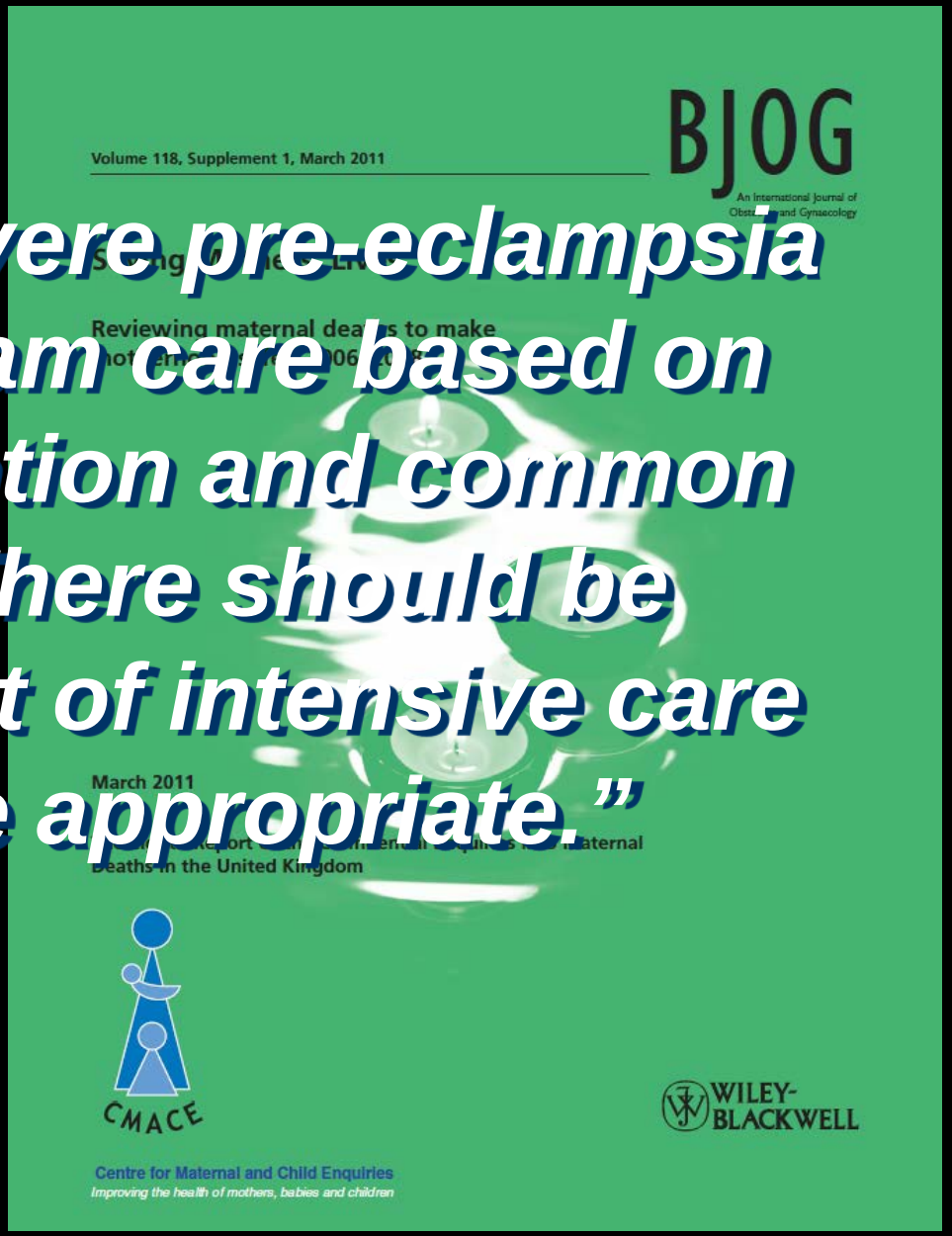
Diagnosis & Prognosis

- blood pressure
- proteinuria
- urinary protein : creatinine ratio
- creatinine / uric acid / liver enzymes
- uterine artery Doppler studies
- SFlt-1 : Placental Growth Factor ratio

https://www.nice.org.uk/guidance/cg107/chapter/1-guidance



- Patient monitoring
- Blood pressure control
- Seizure prophylaxis
- Fluid restriction
- Expedite delivery



"Women with severe pre-eclampsia need effective team care based on clear communication and common understanding. There should be early involvement of intensive care specialists where appropriate."

Pre-eclampsia & HELLP syndrome

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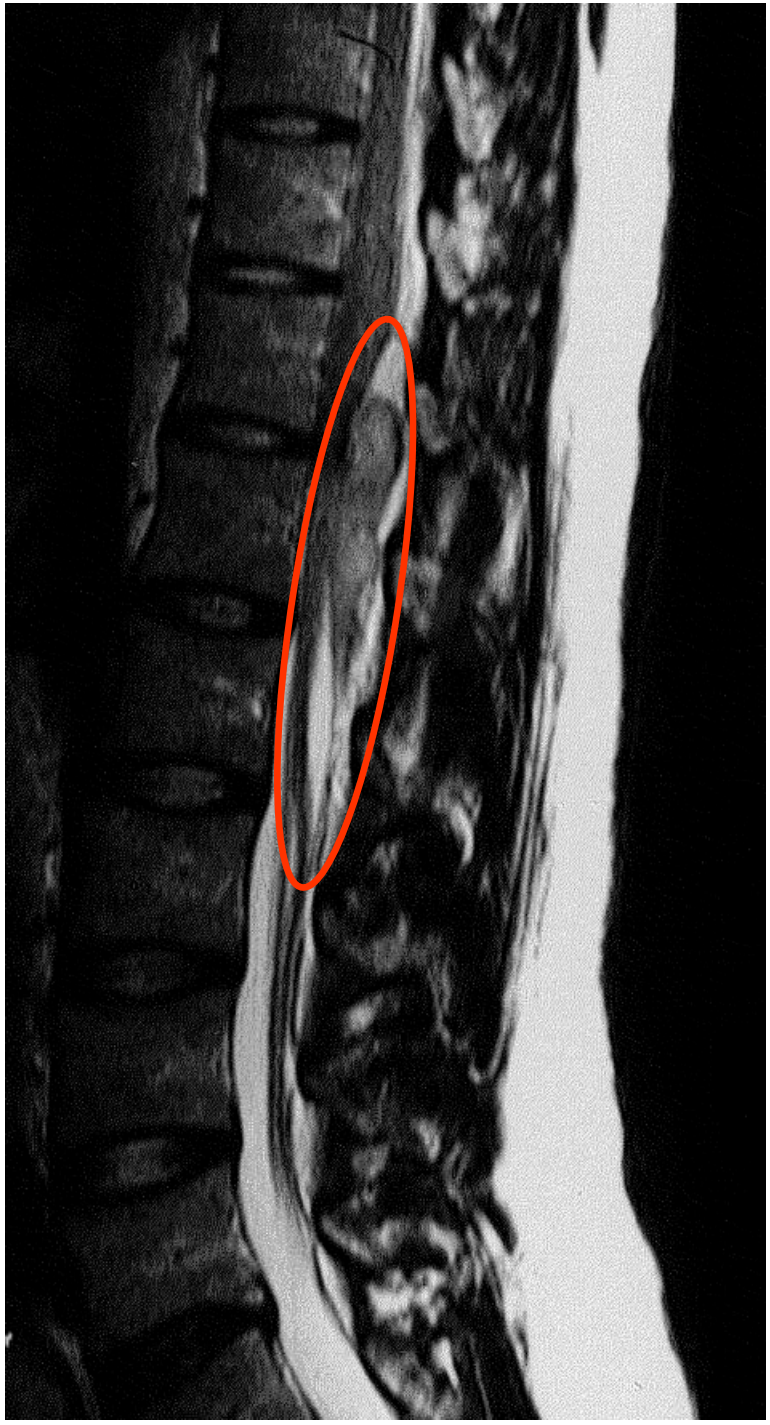
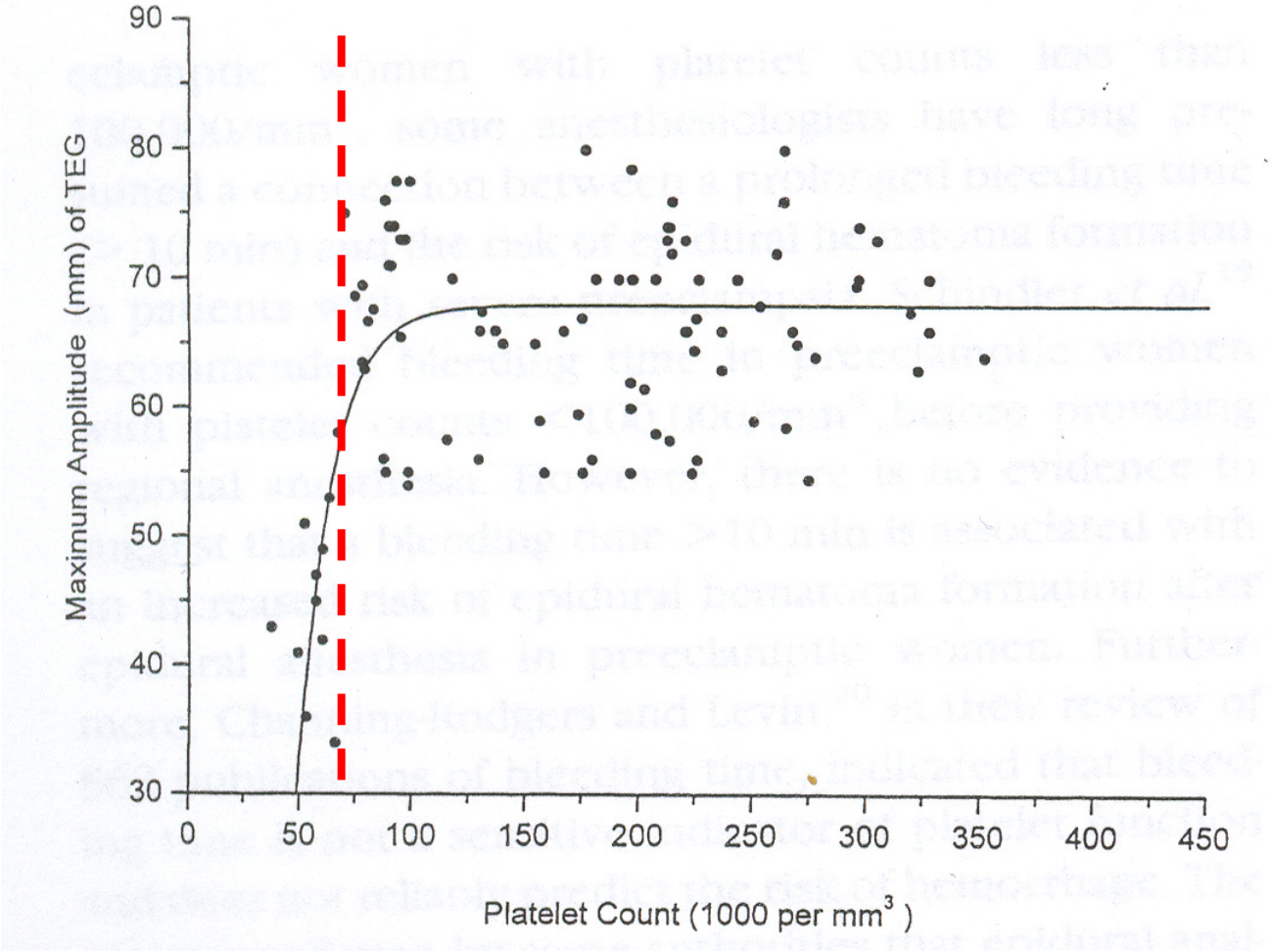


Tests of Coagulation

- bleeding time
- platelet count
- clotting studies
- factor assays
- TEG / ROTEM

Thromboelastography & pre-eclampsia



Sharma *et al. Anesthesiology* 1999

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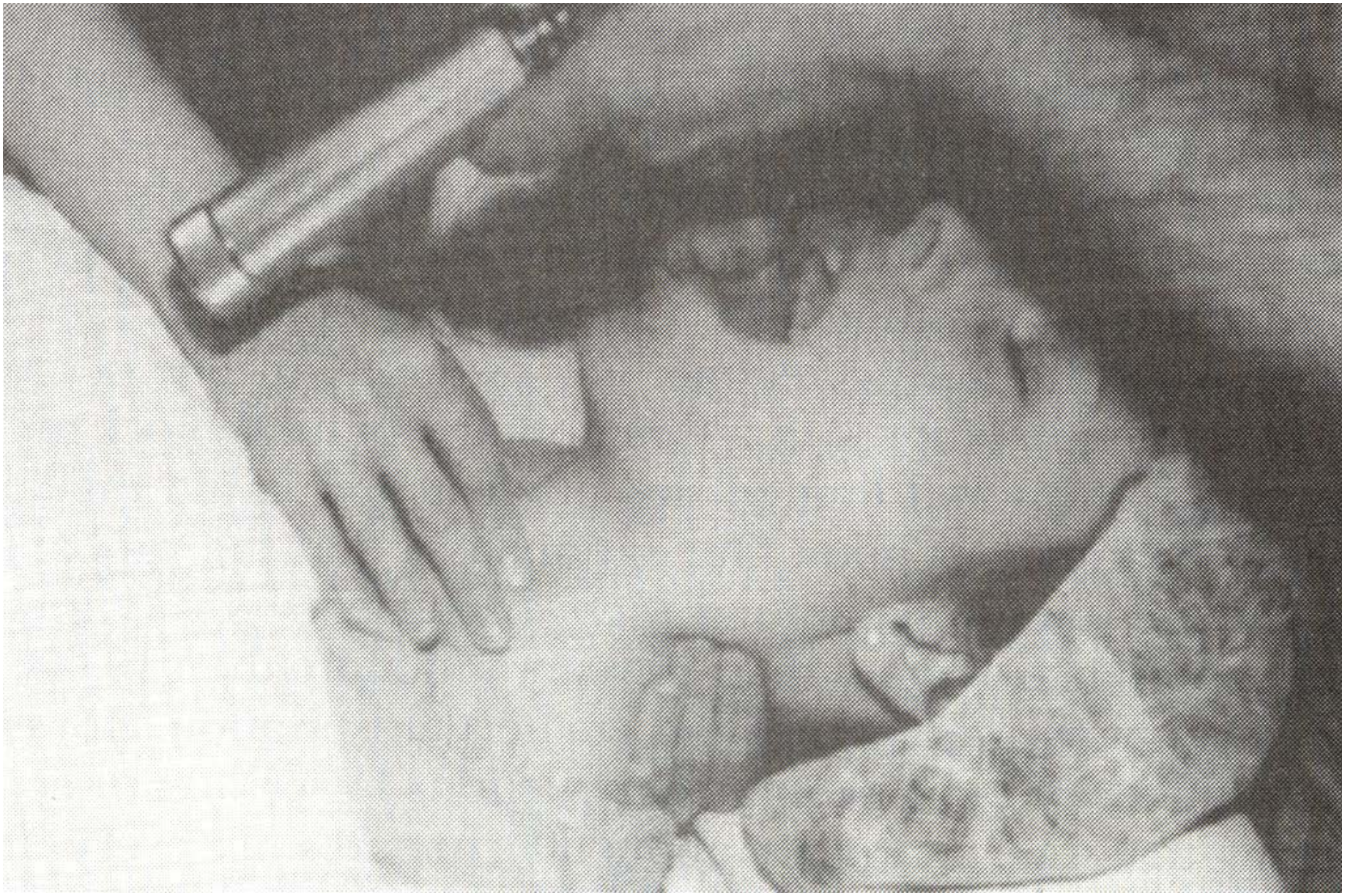
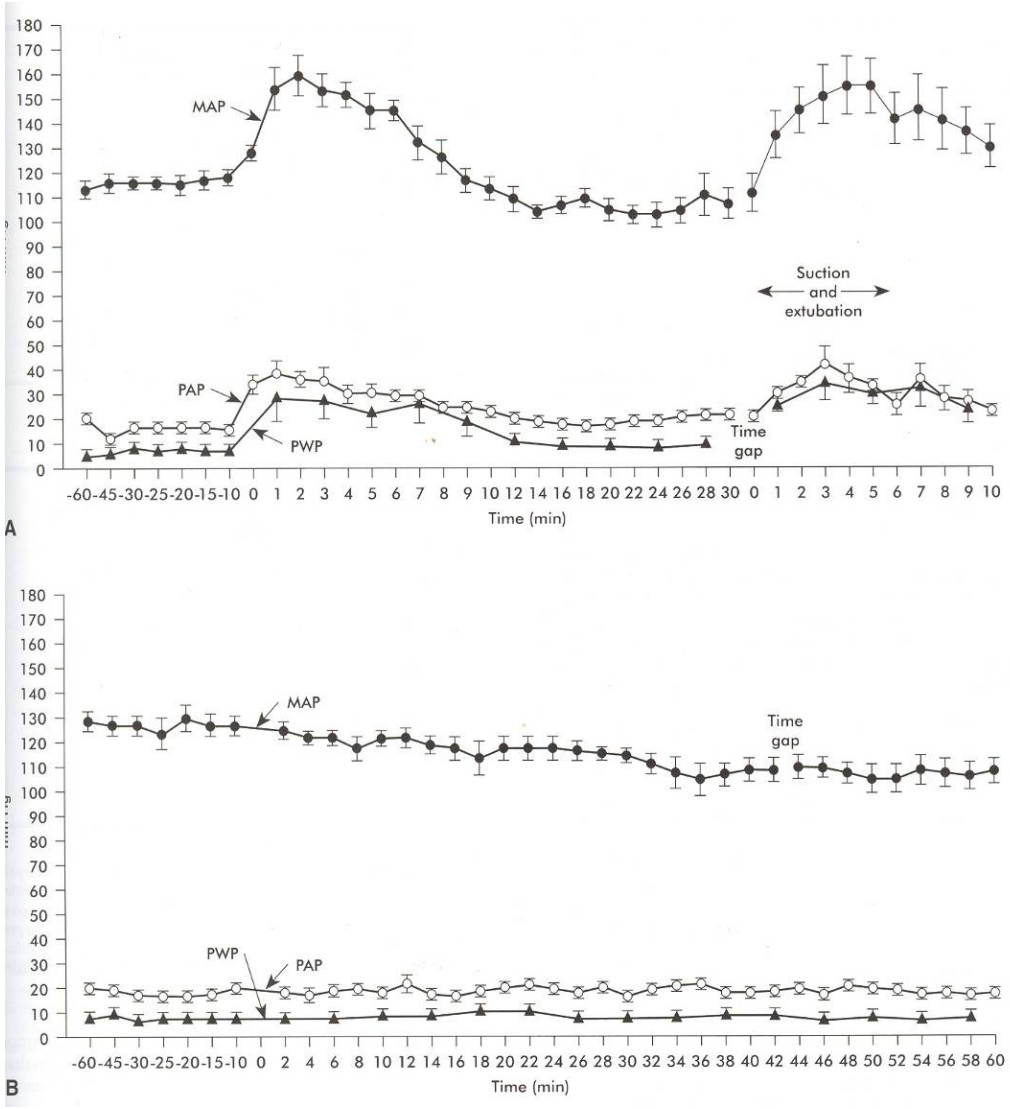
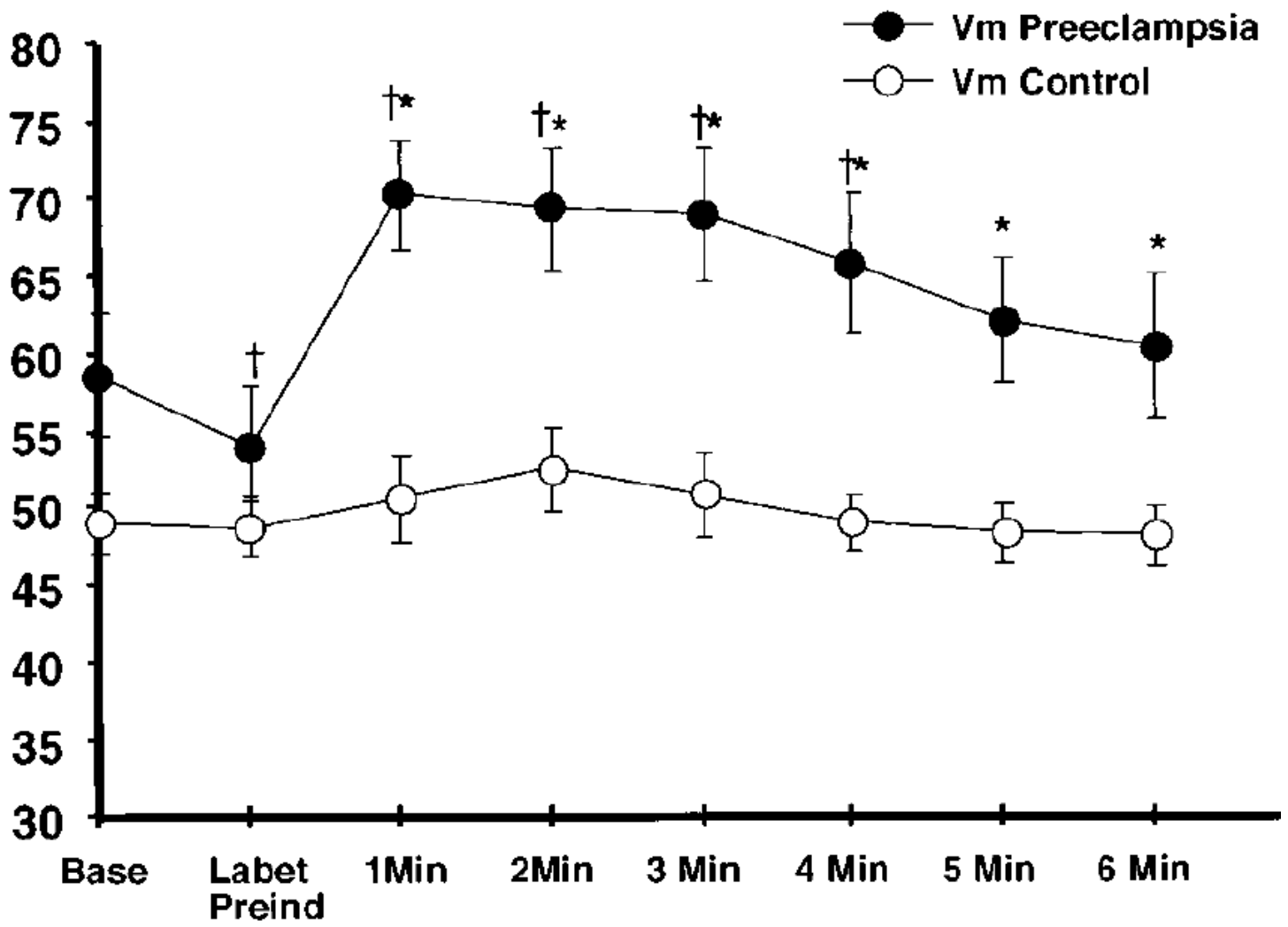


Hypertensive response to laryngoscopy

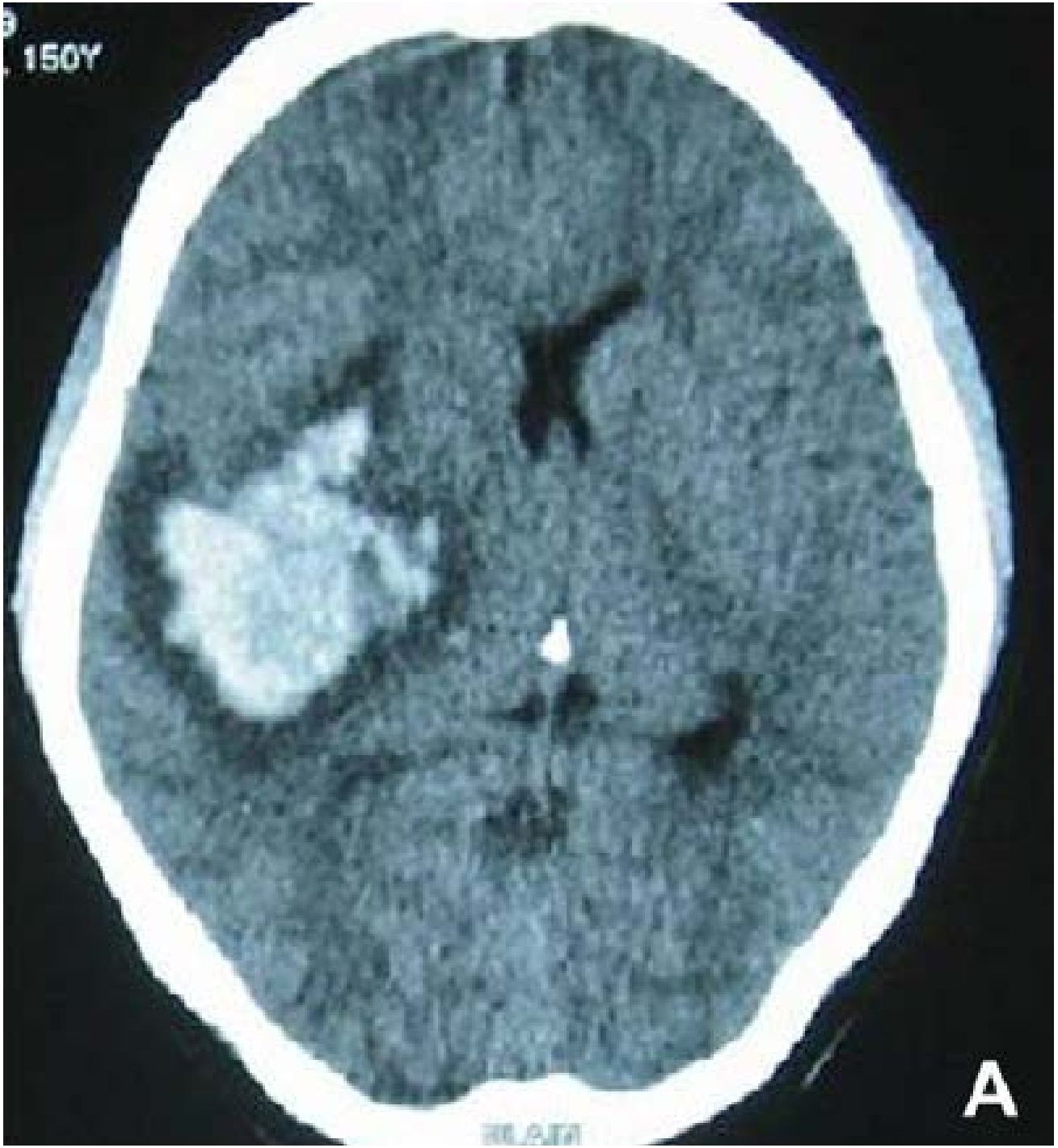


Hodgkinson *et al. Can Anaesth Soc J* 1980

Middle cerebral artery blood flow & pre-eclampsia



Ramanathan *et al. Anesth Analg* 1999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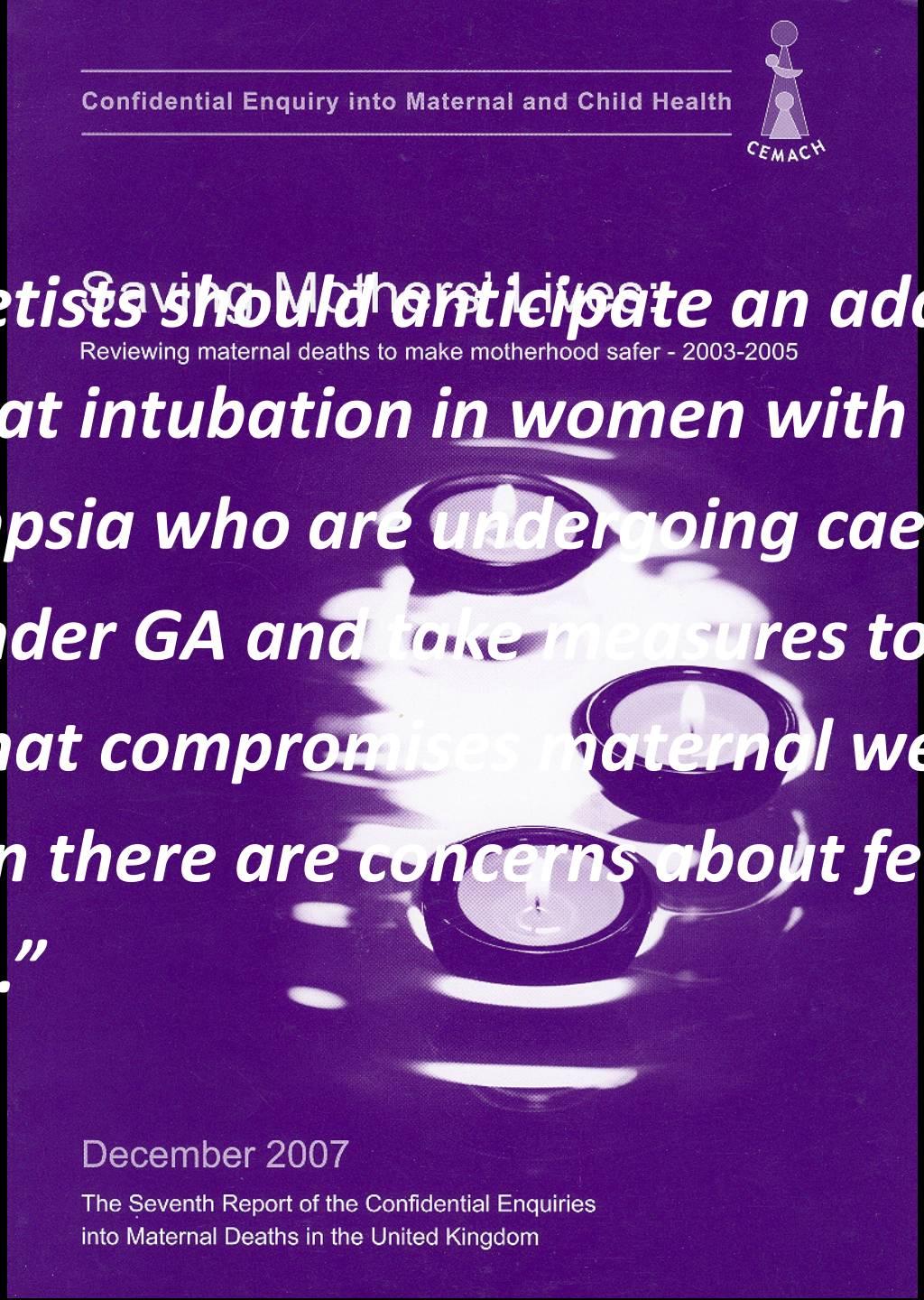


"Anaesthetists should anticipate an additional rise in BP at intubation in women with severe pre-eclampsia who are undergoing caesarean section under GA and take measures to avoid a speed that compromises maternal wellbeing, even when there are concerns about fetal wellbeing."

Maternal, Newborn and Infant Clinical Outcome Review Programme

MBRRACE-UK
Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK

Saving Lives, Improving Mothers' Care

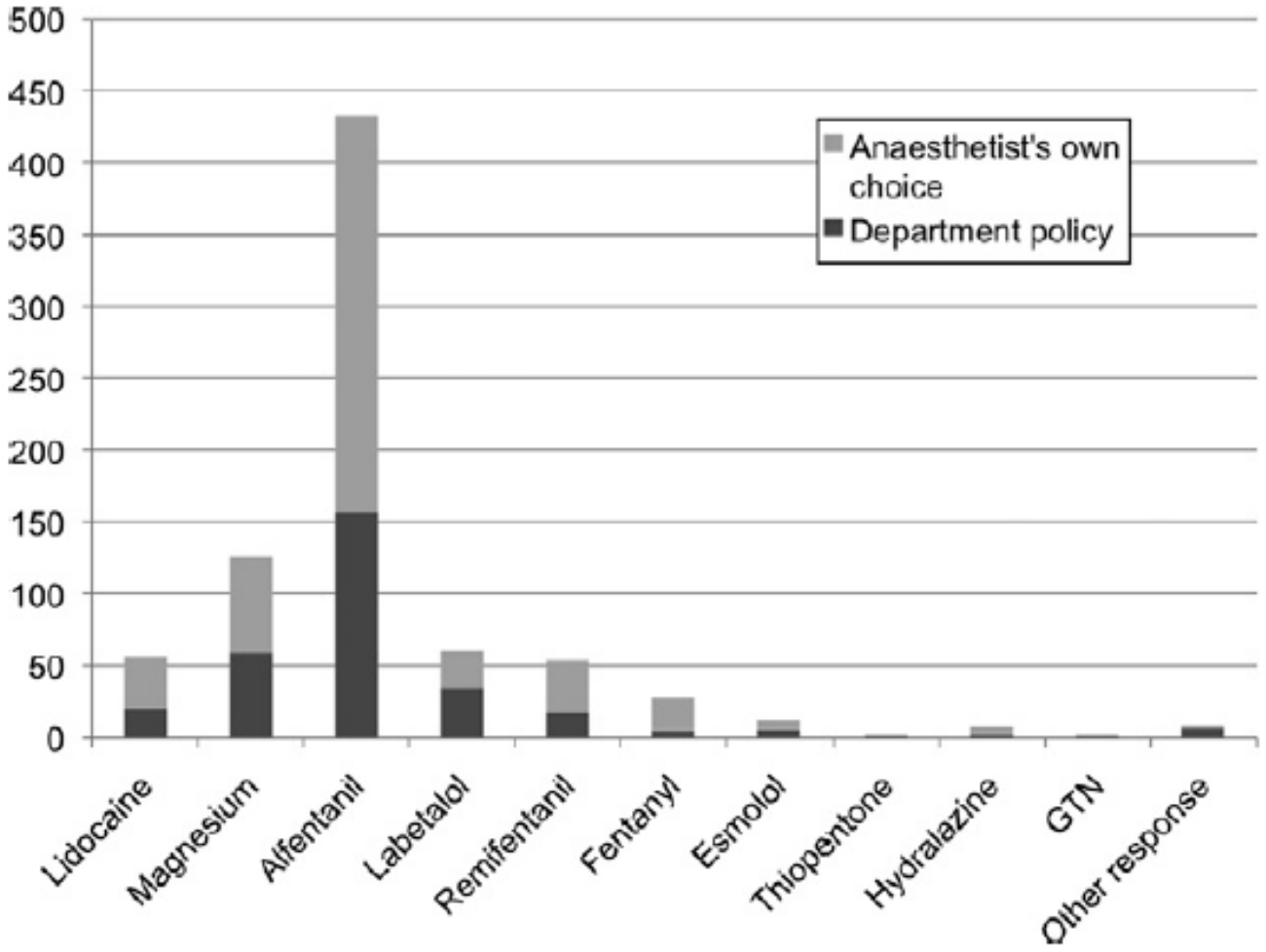
Surveillance of maternal deaths in the UK 2012–14 and lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–14

December 2016

OXFORD · HQIP · UNIVERSITY OF LEICESTER · TIMMS · UNIVERSITY OF BIRMINGHAM · Sands · NHS Bradford Teaching Hospitals · npeu

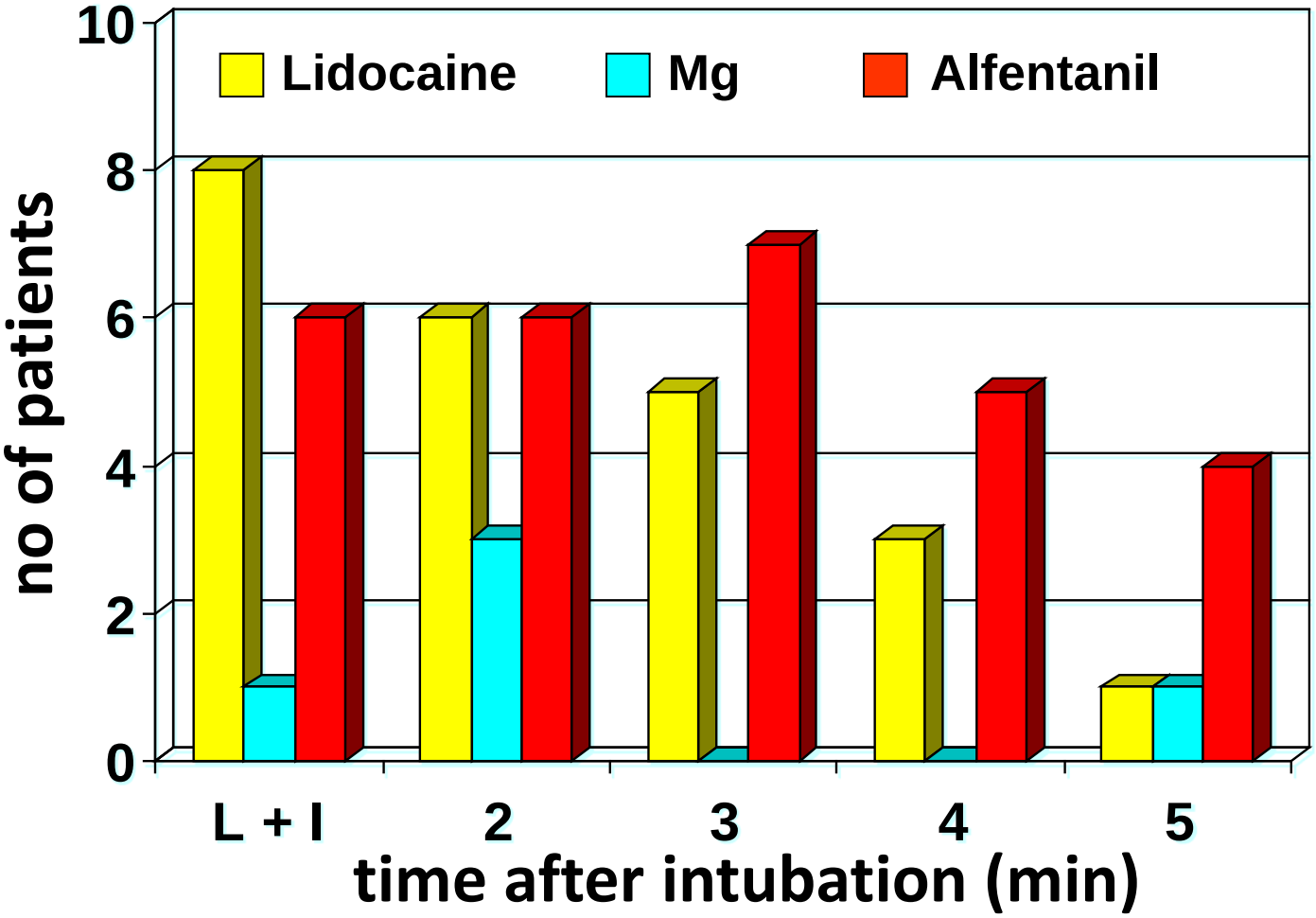
"Whilst intubation may be required for airway control, maternal stabilisation and blood pressure control is vital prior to intubation in order to minimise maternal risk."

Drugs to attenuate pressor response



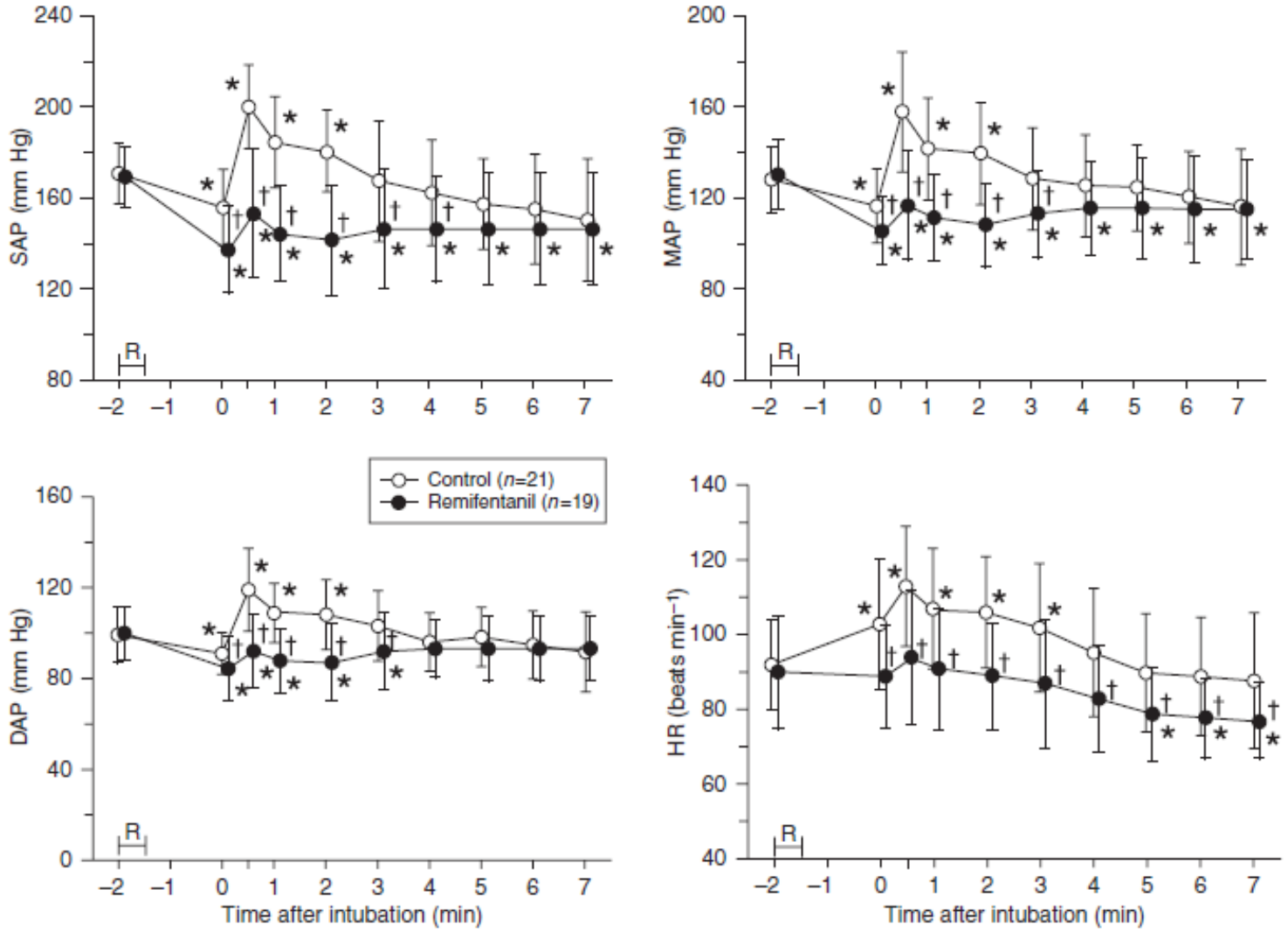
Booth *et al. IJOA* 2010

Attenuation of pressor response
Systolic BP > 180 mmHg



Allen *et al. BJA* 1991

Remifentanil & pressor response



Yoo *et al. BJA* 2009

Remifentanil & pressor response

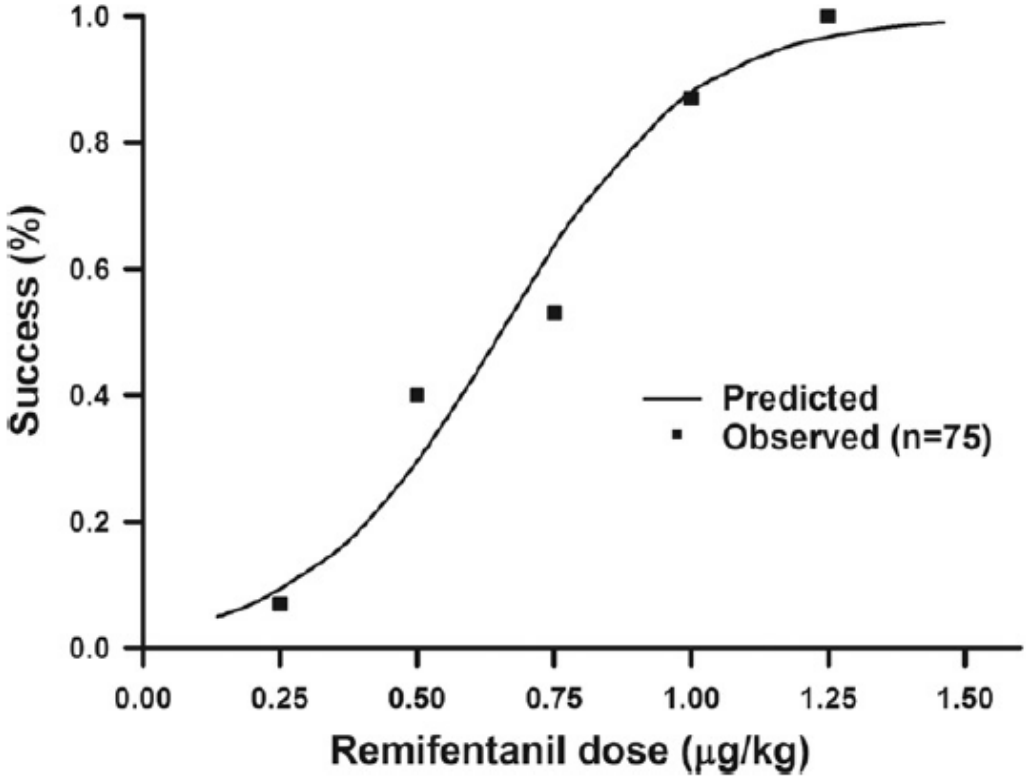
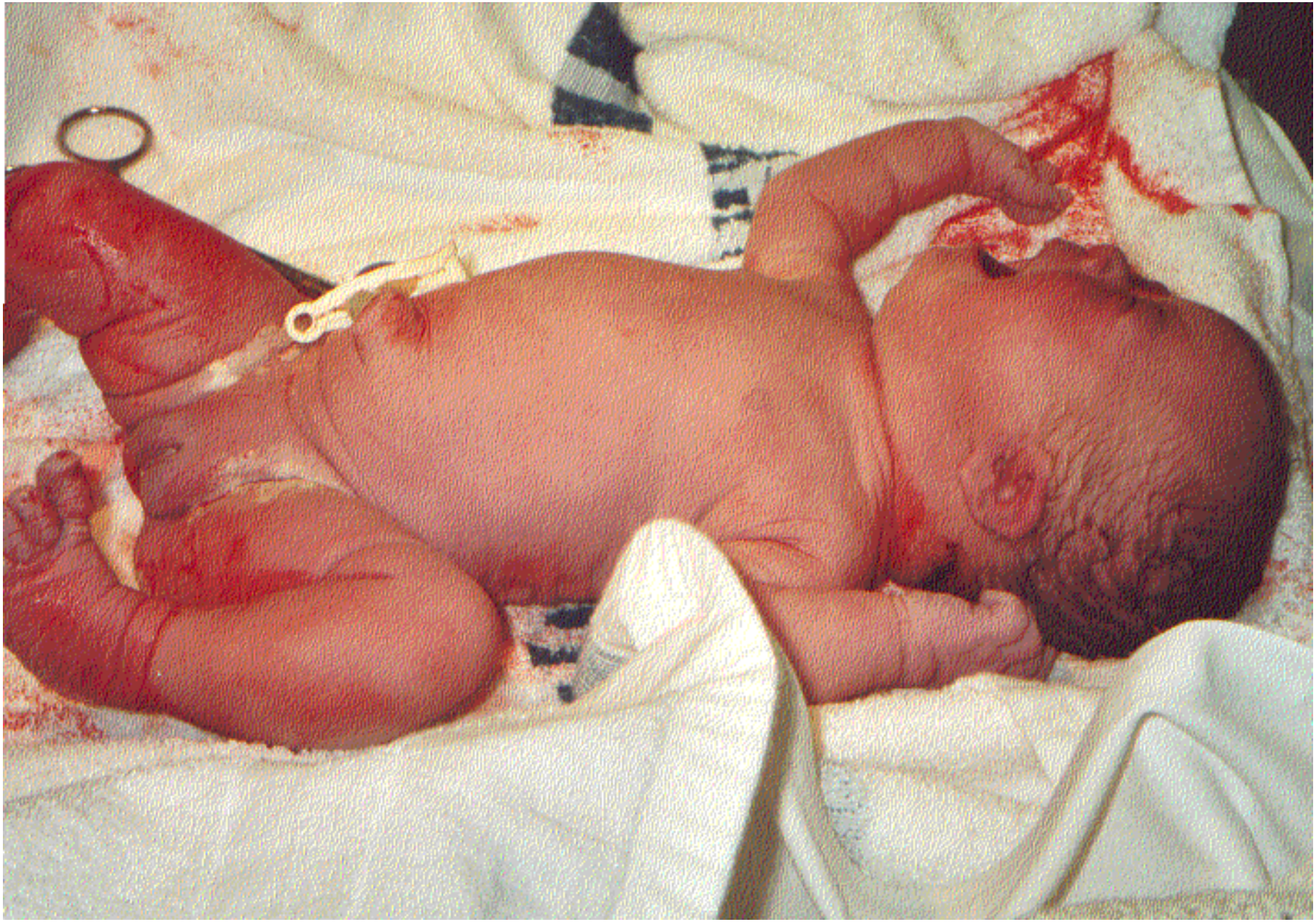
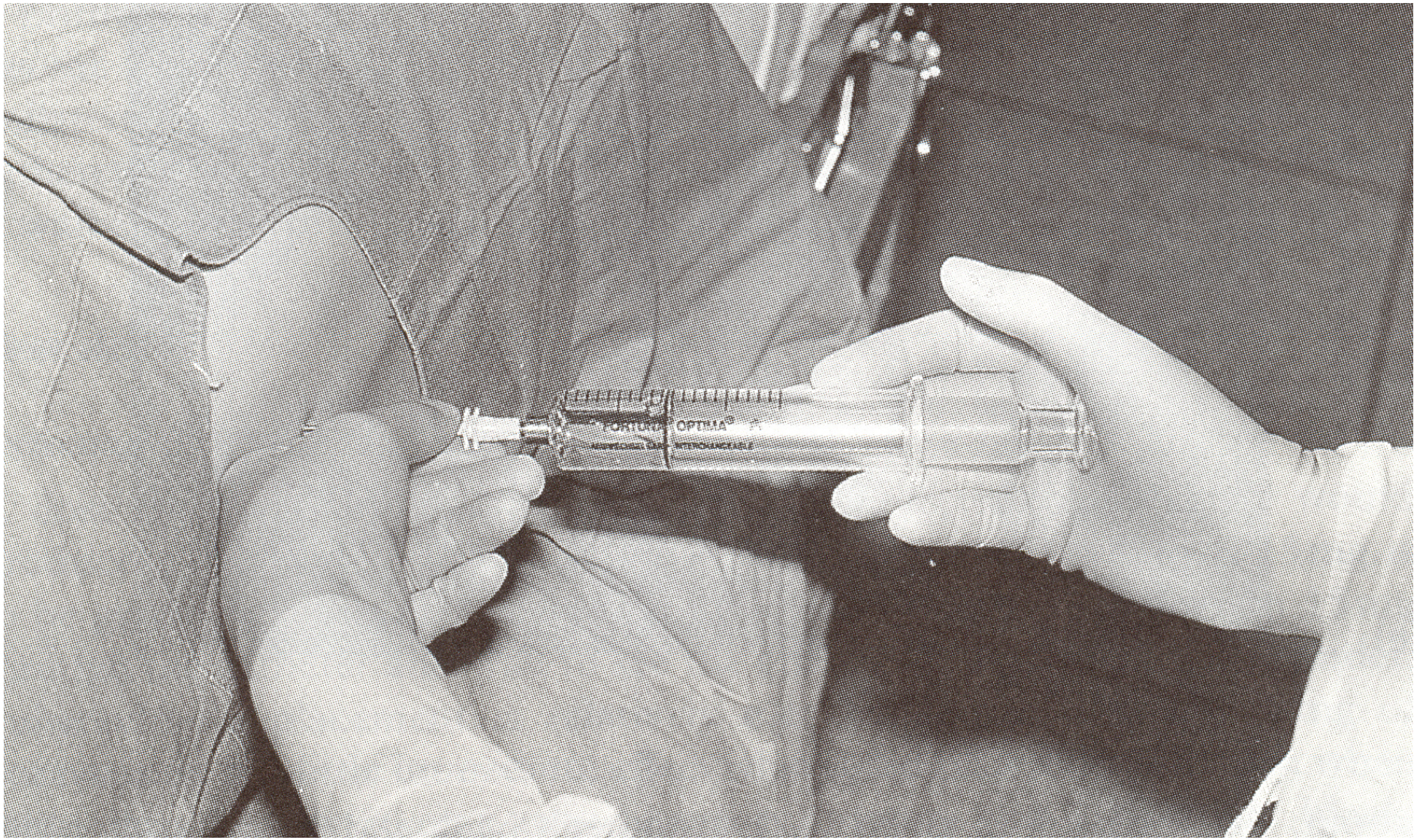


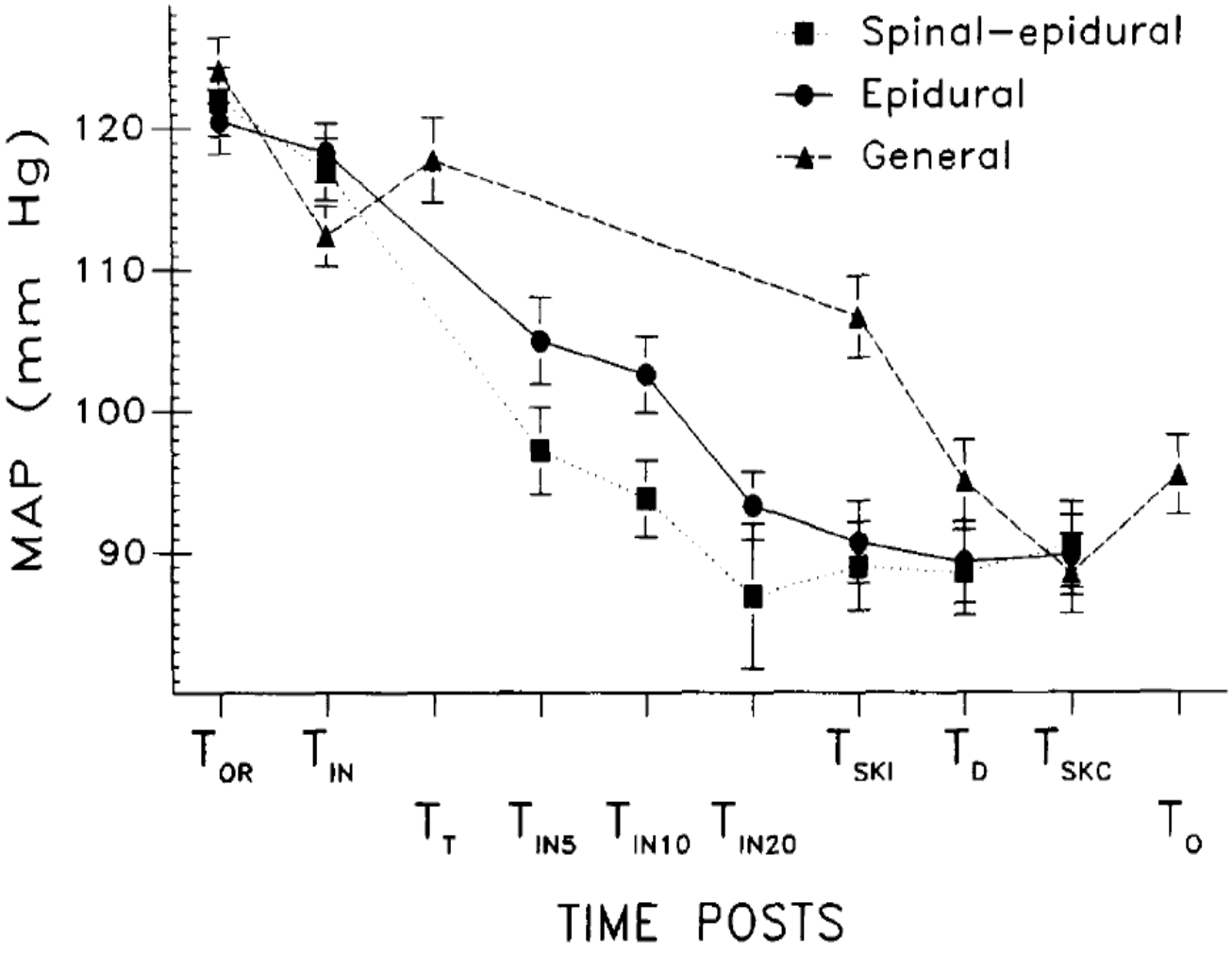
Fig. 3 Dose–response curve for success of intravenous remifentanil in attenuating the pressor response to tracheal intubation.

Yoo *et al. IJOA* 2013




FORTUNA OPTIMA

General vs. regional anaesthesia in pre-eclampsia



Wallace *et al. Obstet Gynecol* 1995

Spinal vs. epidural anaesthesia in pre-eclampsia

47 epidural 18-23 mL 2% lidocaine + adrenaline

53 spinal 11 mg hyperbaric bupivacaine

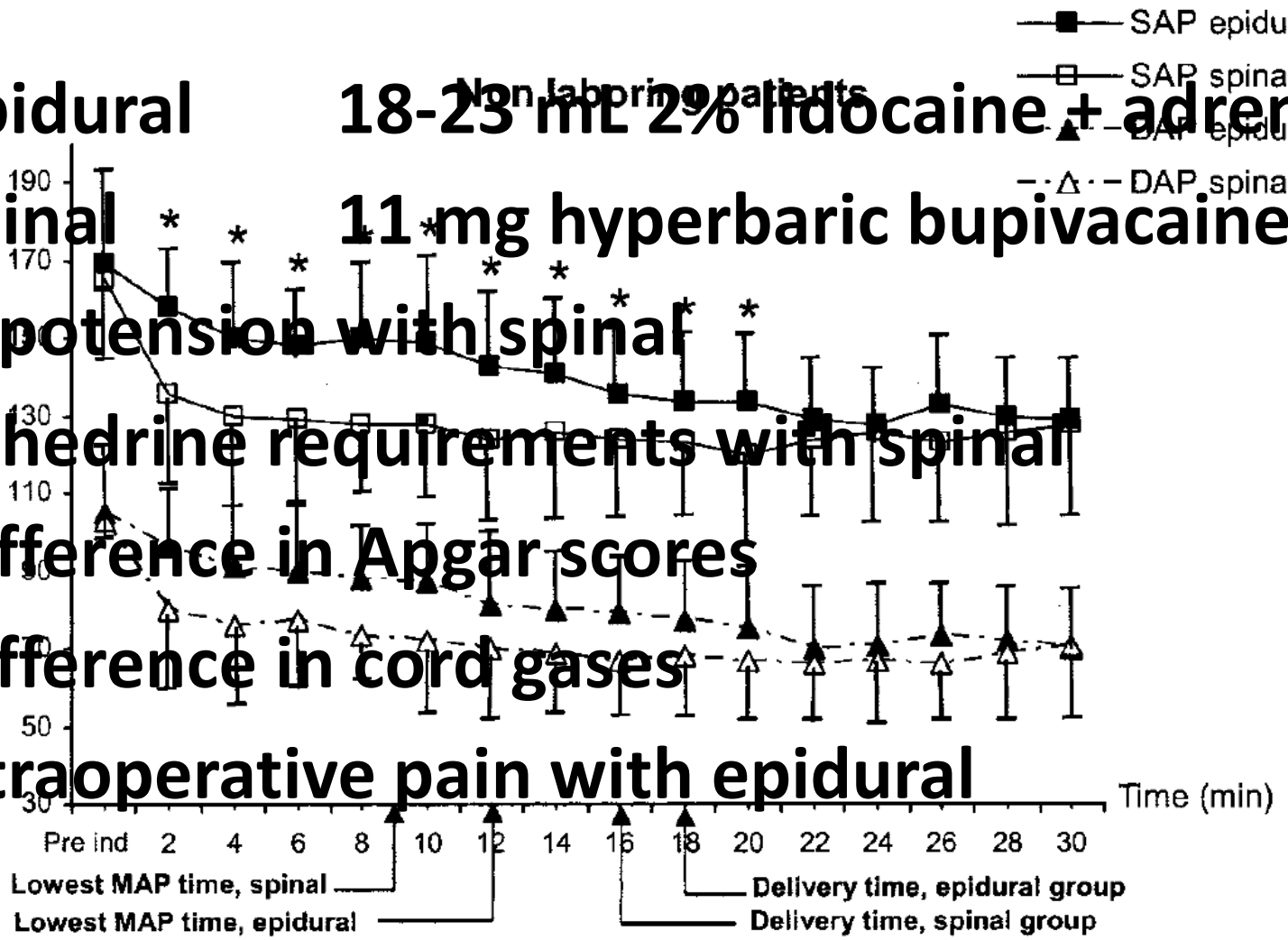
↑ hypotension with spinal

↑ ephedrine requirements with spinal

no difference in Apgar scores

no difference in cord gases

↑ intraoperative pain with epidural



Visalyaputra et al. *Anesth Analg* 2005

Anesthesiology 2008; 108:802–11

Hemodynamic Changes Associated with Spinal Anesthesia for Cesarean Delivery in Severe Preeclampsia

Robert A. Dyer, F.C.A. (S.A.), Jenna L. Piercy, F.C.A. (S.A.),† Anthony R. Reed, F.R.C.A.,† Carl J. Lombard, Ph.D.,‡ Leann K. Schoeman, F.C.O.G. (S.A.),§ Michael F. James, Ph.D.‖*

Background: Hemodynamic responses to spinal anesthesia (SA) for cesarean delivery in patients with severe preeclampsia are poorly understood. This study used a beat-by-beat monitor of cardiac output (CO) to characterize the response to SA. The hypothesis was that CO would decrease from baseline values by less than 20%.

Methods: Fifteen patients with severe preeclampsia consented to an observational study. The monitor employed used pulse wave form analysis to estimate nominal stroke volume. Calibration was by lithium dilution. CO and systemic vascular resistance were derived from the measured stroke volume, heart rate, and mean arterial pressure. In addition, the hemodynamic effects of phenylephrine, the response to delivery and oxytocin, and hemodynamics during recovery from SA were recorded. Hemodynamic values were averaged for defined time intervals before, during, and after SA.

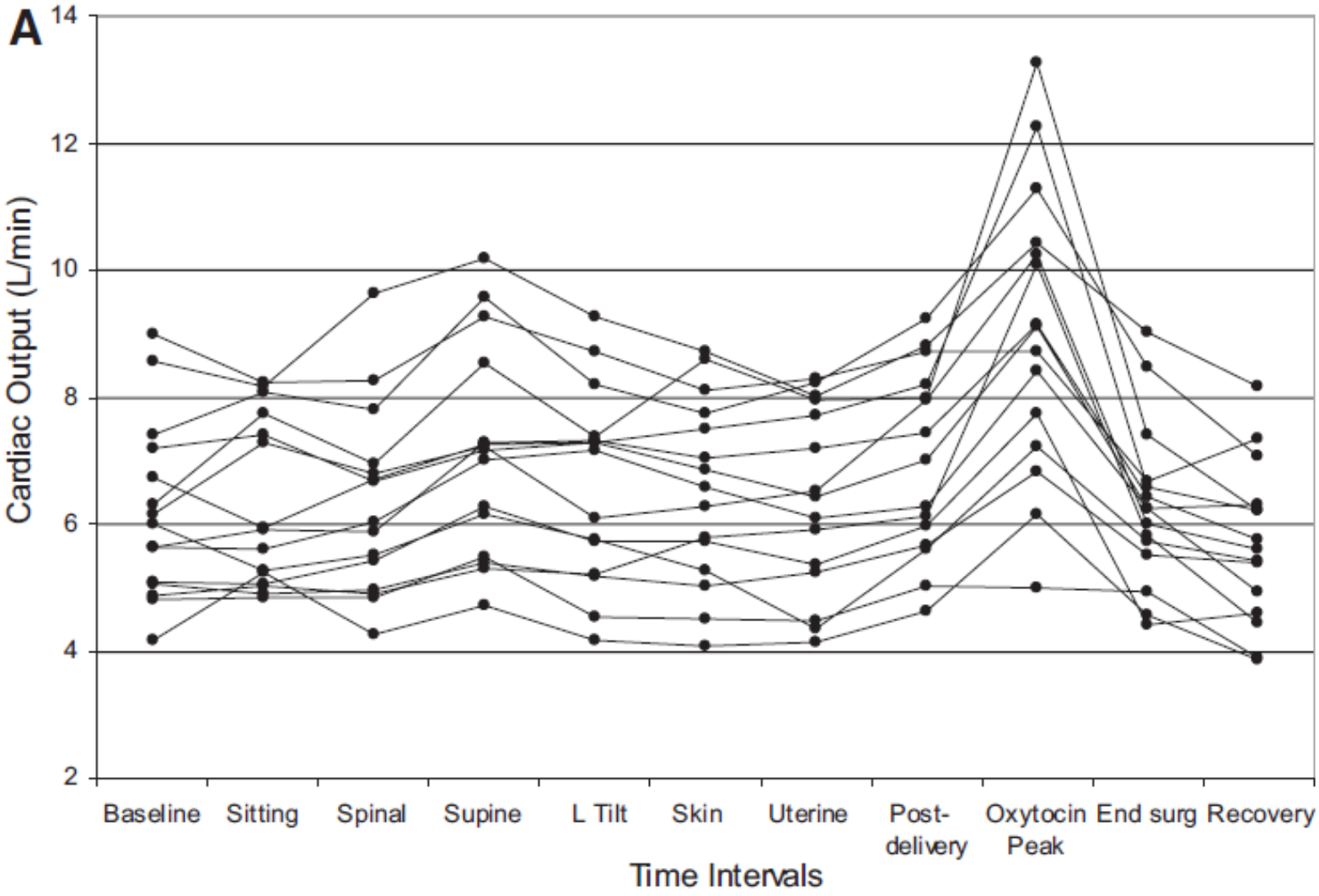
Results: Cardiac output remained stable from induction of SA until the time of request for analgesia. Mean arterial pressure and systemic vascular resistance decreased significantly from the time of adoption of the supine position until the end of surgery. After oxytocin administration, systemic vascular resistance decreased and heart rate and CO increased. Phenylephrine, 50 μg, increased mean arterial pressure to above target values and did not significantly change CO. At the time of recovery from SA, there were no clinically relevant changes from baseline hemodynamic values.

Conclusions: Spinal anesthesia in severe preeclampsia was associated with clinically insignificant changes in CO. Phenylephrine restored mean arterial pressure but did not increase maternal CO. Oxytocin caused transient marked hypotension, tachycardia, and increases in CO.

delivery in severe preeclampsia was published,[1] has spinal anesthesia (SA) been considered an option in this high-risk group of patients. As recently as 1998, an editorial recommended that epidural anesthesia is preferable to SA for cesarean delivery,[2] even if the patient has not received epidural anesthesia in labor. Many recent studies suggest that SA is safe in the absence of contraindications to regional anesthesia.[3–6] Some studies have shown less hypotension and lower vasopressor requirements than during SA in healthy parturients. One investigation found less hypotension during SA in severe preeclamptics than in preterm women in whom fetal weights were similar.[4] This eliminated the possibility that the more minor degree of hypotension was due to a lesser degree of aortocaval compression in preeclamptic patients. Nevertheless, hypotension and placental underperfusion remain a risk,[7] and SA may be associated with more neonatal acidosis than general anesthesia.[8]

Most studies have used heart rate (HR) and blood pressure measurements as surrogate markers of maternal cardiac output (CO). Although pulse and blood pressure measurements are of value in assessing the safety of an anesthetic technique, the true goal of SA for cesarean delivery is to maintain maternal CO and uteroplacental blood flow. In healthy patients, the maximum change in

Spinal anaesthesia & cardiac output



Dyer *et al. Anesthesiology* 2008

Spinal anaesthesia & vasopressors

Pre-eclamptic group

- ↓ IV fluid
- ↑ bupivacaine
- ↓ frequency hypotension
- ↓ severity hypotension
- ↓ vasoconstrictor requirement

OBSTETRIC ANESTHESIA
SECTION EDITOR
DAVID J. BIRNBACH

Patients with Severe Preeclampsia Experience Less Hypotension During Spinal Anesthesia for Elective Cesarean Delivery than Healthy Parturients: A Prospective Cohort Comparison

Antoine G. M. Aya, MD, PhD, Roseline Mangin, MD, MSc, Nathalie Vialles, MD, Jean-Michel Ferrer, MD, Colette Robert, MD, Jacques Ripart, MD, PhD, and Jean-Emmanuel de La Coussaye, MD, PhD
Division of Anesthesiology, Pain Management, Emergency and Critical Care Medicine, University Hospital, Nîmes, France

In this prospective cohort study, we compared the incidence and severity of spinal anesthesia (SA)-associated hypotension in severely preeclamptic parturients and healthy parturients undergoing elective cesarean delivery. After the administration of IV fluids, SA was performed with hyperbaric 0.5% bupivacaine, sufentanil, and morphine. Blood pressure (BP) was recorded before and at 2-min intervals for 30 min after SA. Clinically significant hypotension was defined as the need for ephedrine (systolic BP decrease to <100 mm Hg in healthy parturients or 30% decrease in mean BP in both groups). Despite receiving a smaller fluid volume (1653 ± 331 mL versus 1895 ± 150 mL; $P = 0.005$) and a larger bupivacaine dose (9.5 ± 0.9 mg versus 9.0 ± 0.0 mg; $P = 0.019$), the severely preeclamptic patients had a less frequent incidence of clinically significant hypotension (16.6% versus 53.3%; $P = 0.006$), which was less severe and required less ephedrine. The risk of hypotension was almost six times less in severely preeclamptic patients (odds ratio, 0.17; 95% confidence interval, 0.05–0.58; $P = 0.006$) than that in healthy patients.

(Anesth Analg 2003;97:867–72)

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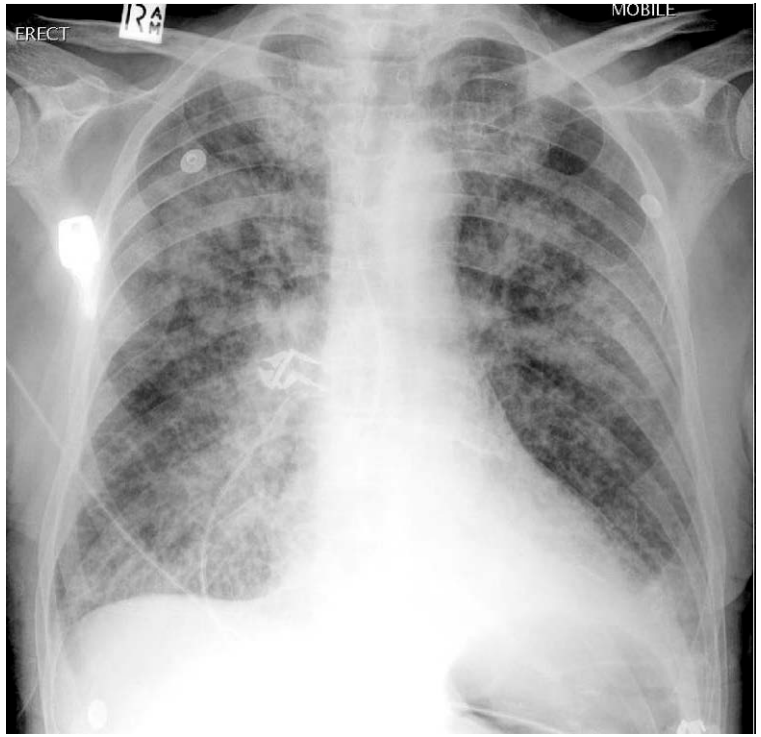
Pulmonary oedema

- pulmonary capillary leak
- ↓ colloid osmotic pressure
- left ventricular dysfunction
- excess iv fluid administration
- inadequate monitoring



Indications for increased monitoring

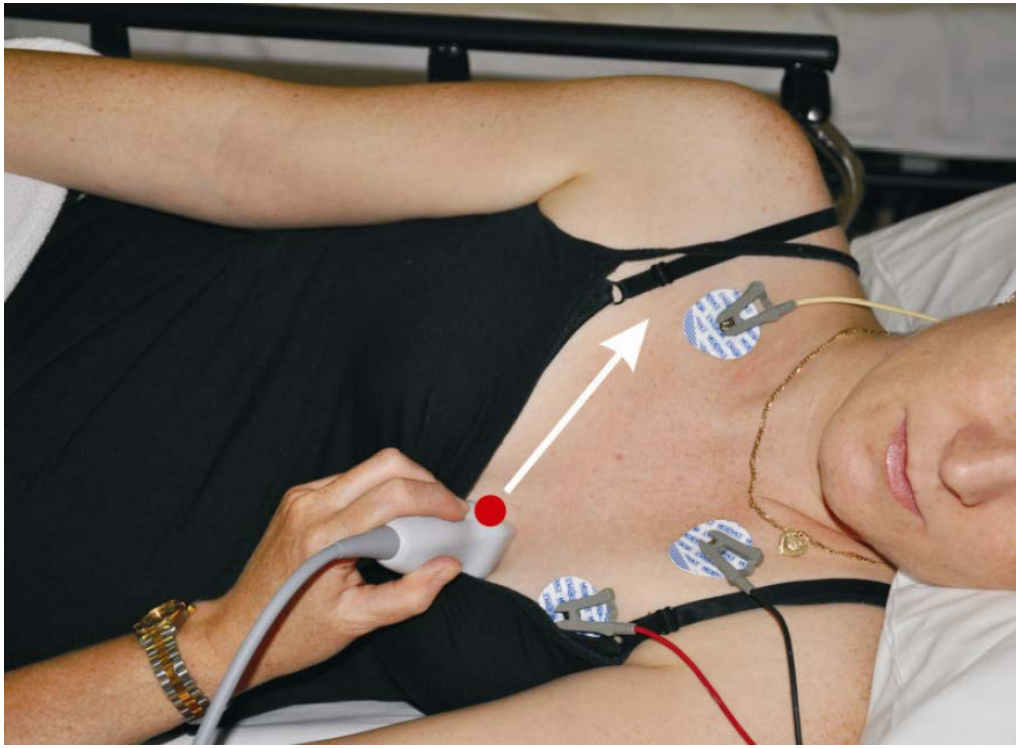
- severe refractory hypertension
- pulmonary oedema
- oliguria unresponsive to fluid therapy
- anaesthesia
- haemorrhage

Cardiac Output Monitoring

- **Pulse waveform analysis**
  - LiDCO®
  - PiCCO®
  - FloTrac-Vigileo®
- **Ultrasound**
  - Oesophageal Doppler
  - Suprasternal Doppler
  - Transthoracic echocardiography
  - Oesophageal echocardiography
- **Electrical resistance**
  - Bioimpedence
  - Bioreactance
  - Electrical velocimetry
- **Others**
  - Modelflow
  - Pleth variability index
  - Dye densitometry
  - Pulmonary artery catheter

Cardiac Output Monitoring

- Accuracy & precision
- Applicability
- Dynamic vs. static
- Cost
- Training
- Complications



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