What's New In Obstetric Anaesthetics
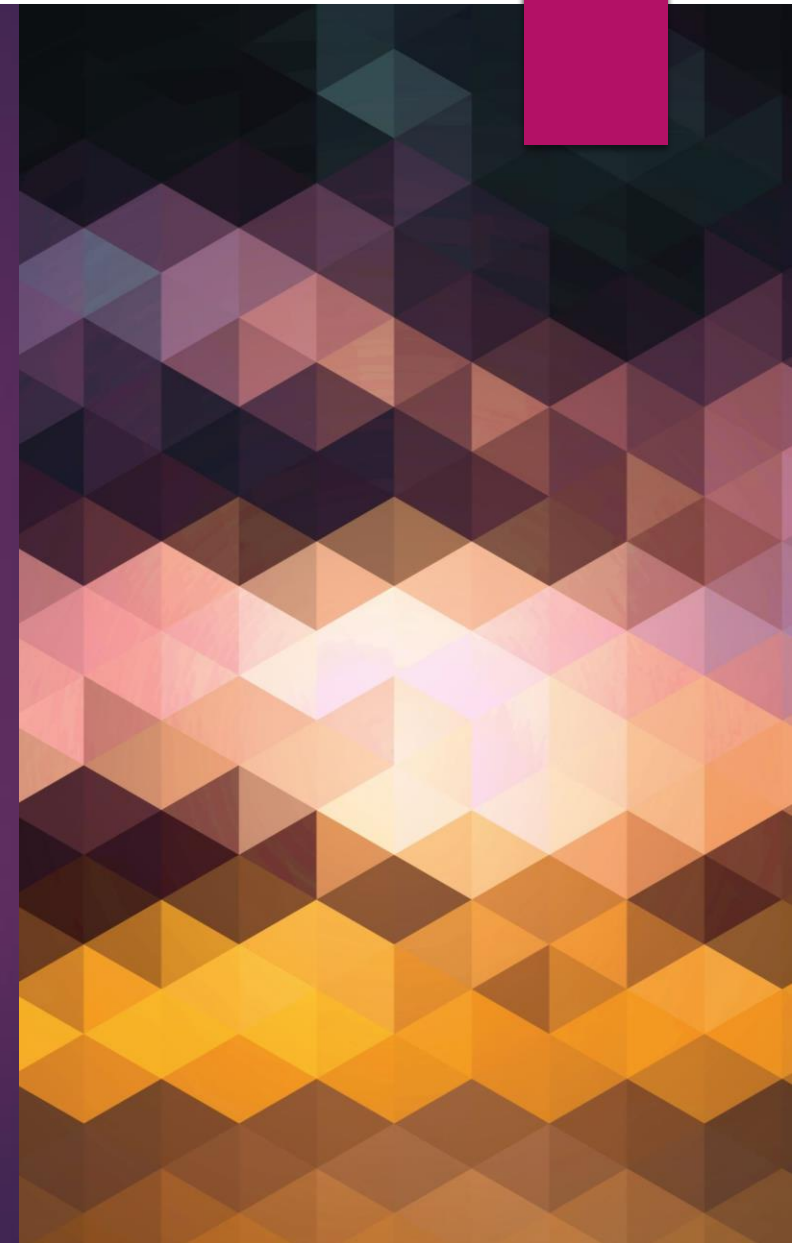
SOPHIE GORMACK

OBSTETRIC ANAESTHETIC SMO AT NATIONAL WOMEN'S HEALTH

Nothing to declare

What is in this talk

Range of topics of interest:

- Large audit data
- New guidelines

Inspiration to appraise current practice

What is not in this talk

In depth analysis

Every recent interesting topic in obstetrics

References

- I will provide a list at the end
- There will be a QR code you can scan at the end of the talk that will link you to the list

Main Points

▶ There was a statistically non significant increase in the overall maternal death rate in the UK between 2019-21 and 2020-22. This increase was present when deaths due to Covid-19 were excluded

▶ The increase in death rate was statistically significant when compared to 2017-19

▶ Thrombosis and thromboembolism was the leading cause of maternal death

- 293 deaths

- 21 were coincidental

- 2,028,543 maternities

- Maternal death rate of 13.41 per 100,000 maternities (95% CI 11.86-15.10).

Figure 1: Direct and indirect maternal mortality rates per 100,000 maternities using ICD-MM and previous UK classification systems; three-year rolling average rates 2003-2022

Sources: CMACE, MBRRACE-UK
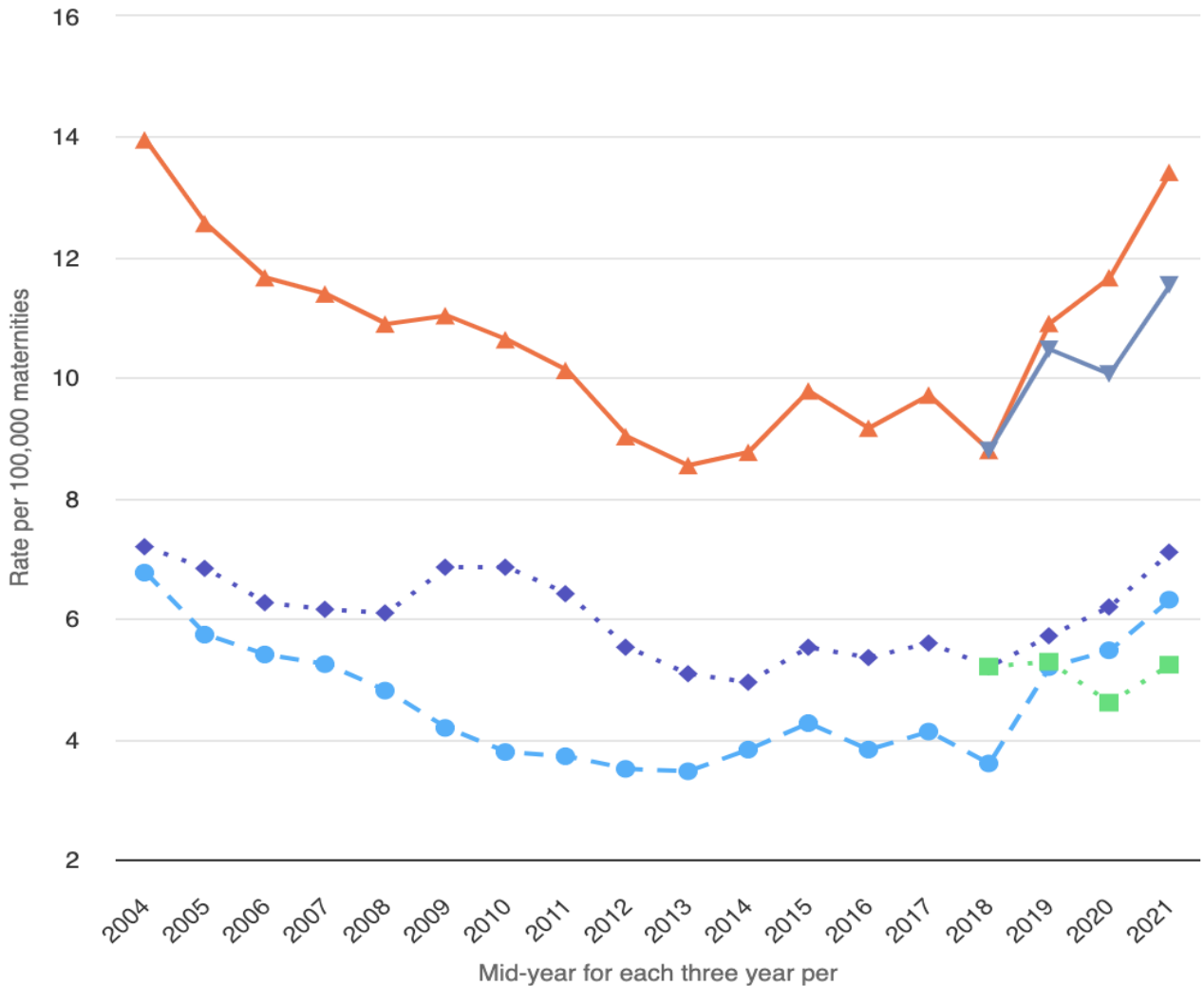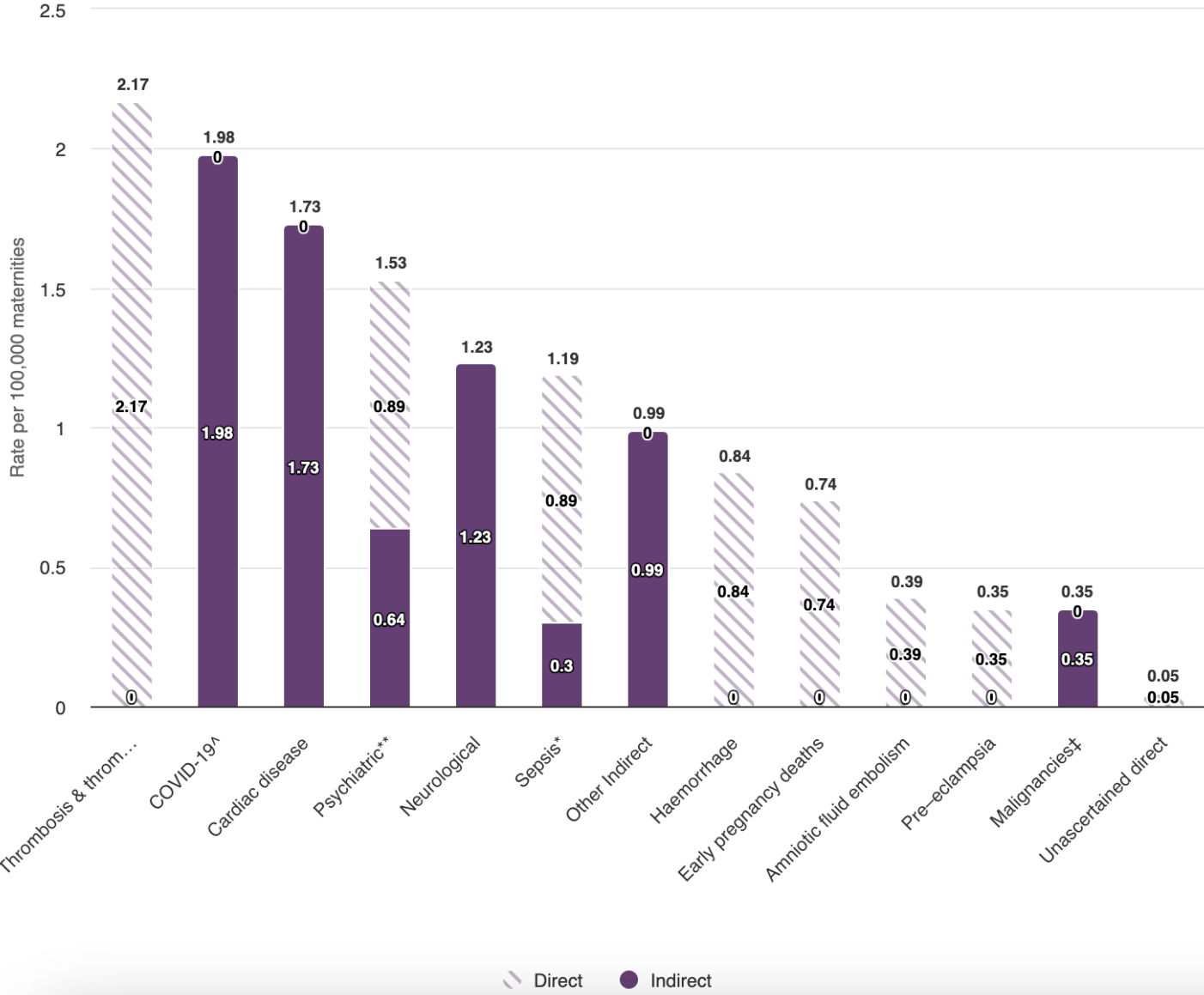

Legend:
- Direct deaths
- Indirect deaths
- Indirect deaths excl. Covid-19
- Total direct and indirect deaths
- Total direct and indirect deaths excl. Covid-19

Y-axis: Rate per 100,000 maternities

X-axis: Mid-year for each three year per

Figure 2: Maternal mortality by cause UK 2020-22
Source: MBRRACE-UK

Causes
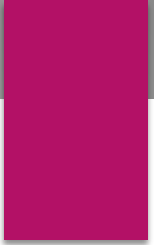
- There is an almost three-fold difference in maternal mortality rates amongst women from Black ethnic backgrounds compared to White women.

- There is an almost two-fold difference amongst Asian ethnic background compared to White women.

- Greater than double risk of mortality for women living in the most deprived areas compared to those living in the least deprived areas

Figure 4 Maternal mortality rates 2009-22 among women from different levels of socio-economic deprivation in England*

NAP7: Perioperative Cardiac Arrest

The Seventh National Audit Project (NAP7) of the Royal College of Anaesthetists examined Perioperative Cardiac Arrest.

NAP7 collected data on cases of perioperative cardiac arrest between 16th June 2021 and 15th June 2022. The report launched on 17th November 2023 and can be found below along with accompanying papers.

Workload Findings

- 74% of Anaesthetic departments provided Obstetriic care
- 23% of specialist reported Obstetric anaesthesia was their subspecialty area
- Obstetric anaesthetic activity accounted for 13% of all anaesthetic cases
  - In the evening obstetrics accounted for 31% of all anaesthetic activity
  - Between midnight and 08.00, obstetric anaesthesia and analgesia accounted for 70% of anaesthetic workload

Obstetric Cardiac Arrests

▶ 28 peri-operative cardiac arrests in obstetric patients

▶ 3.2% of all cases

▶ Incidence of 7.9 per 100,000

Figure 34.4 Relative risk of cardiac arrest by specialty. Size of coloured circle indicates magnitude of difference between proportion of cases in Activity Survey and case registry. Green circles are relatively underrepresented in the case registry and red circles relatively overrepresented. Dashed lines represent 2 : 1, 1 : 1 and 1 : 2 ratios.
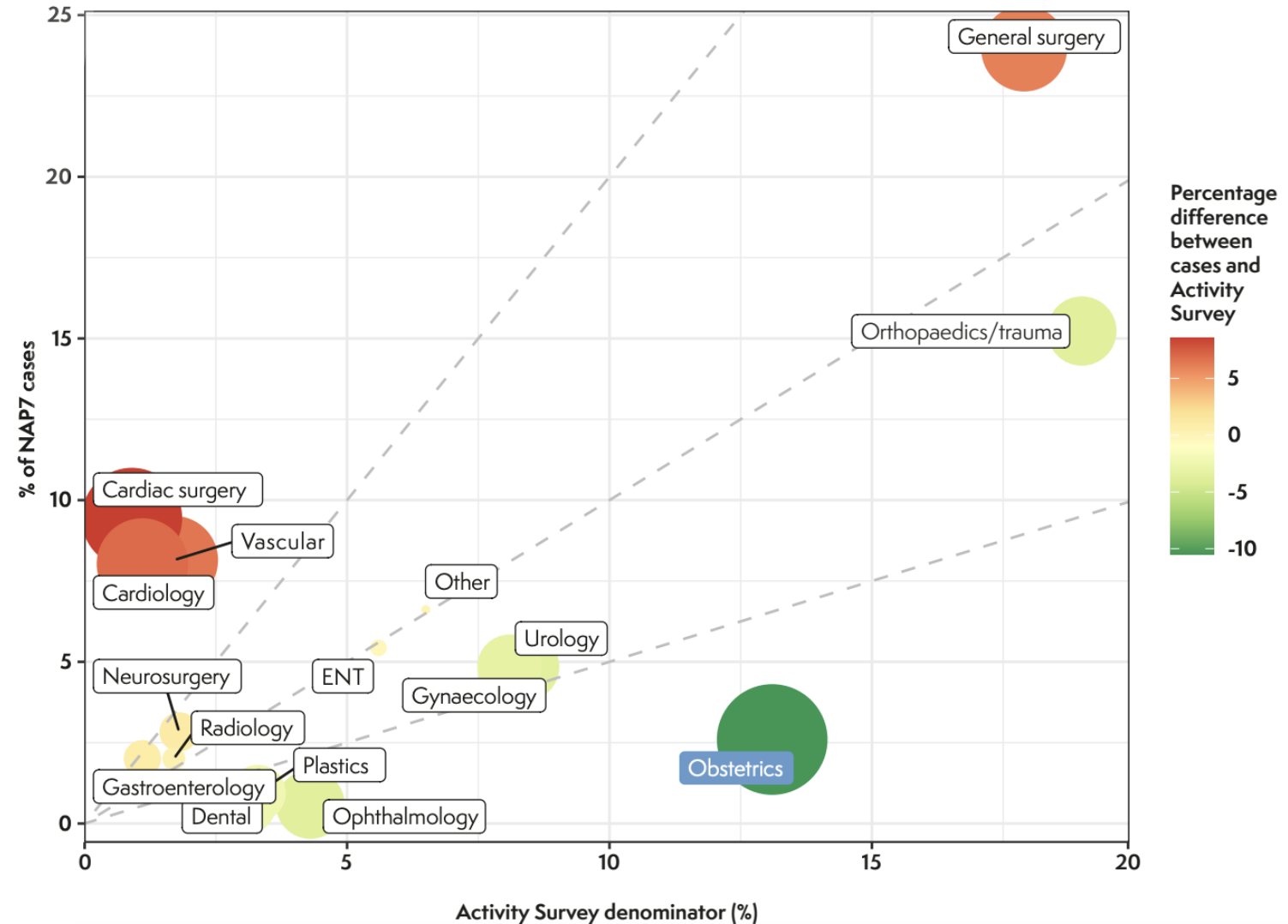
Table 34.1 Incidence of cardiac arrest in different obstetric settings. Annual activity is estimated using a multiplier of 112.14 as described in Chapter 6 Methods.

Setting	Cardiac arrests (n)	Cases in NAP7 Activity Survey (n)	Estimated annual denominator	Incidence per 100,000 (95% confidence interval)	Incidence as 1 per (95% CI)	Deaths, n=28 (n)
All obstetric anaesthetic care	28	3176	355,500	7.9 (5.2–11.4)	12,700 (8800–19,100)	5
Labour neuraxial analgesia	2	1010	113,000	1.8 (1.0–6.4)	56,500 (15,600–100,000)	0
Anaesthesia for caesarean section*	22	1681	188,500	11.7 (7.3–17.7)	8600 (5700–13,700)	4
Other obstetric cases	4	485	54,000	7.4 (2.0–19)	13,500 (5300–50,000)	1

* If using NHS Digital data for English births (scaled up for UK) of 202,500 caesarean sections: incidence 10.9 (6.8–16.4) per 100,000, 1 in 9200 (6100–14,700). https://digital.nhs.uk/data-and-information/publications/statistical/maternity-services-monthly-statistics

Arrest Setting

Mortality

Five (18%) women who had a cardiac arrest died

| Mortality rate of 1.4 per in 100,000 (1 in 71,000) anaesthetic interventions	Four were associated with caesarean section	One with a non-caesarean obstetric intervention.

Three women died from obstetric haemorrhage, one from severe COVID-19, and the cause of death in one woman was unascertained.

Table 34.2 Panel-agreed causes of cardiac arrest in obstetric patients (more than one cause may be attributed to one case); 41 causes were reported for 28 cases

Cause of cardiac arrest	No. of patients affected (n=28)	Proportion of patients affected by a particular cause (%)
Major haemorrhage	7	25
High neuraxial block	6	21
Bradyarrhythmia	6	21
Amniotic fluid embolism	4	14
Drug error	2	7.2
Anaphylaxis	1	3.6
Pulmonary embolism	1	3.6
Severe hypoxaemia	1	3.6
Vagal outflow (eg pneumoperitoneum, oculocardiac reflex)	1	3.6
Other	12	42

Cardiac Arrest Causes
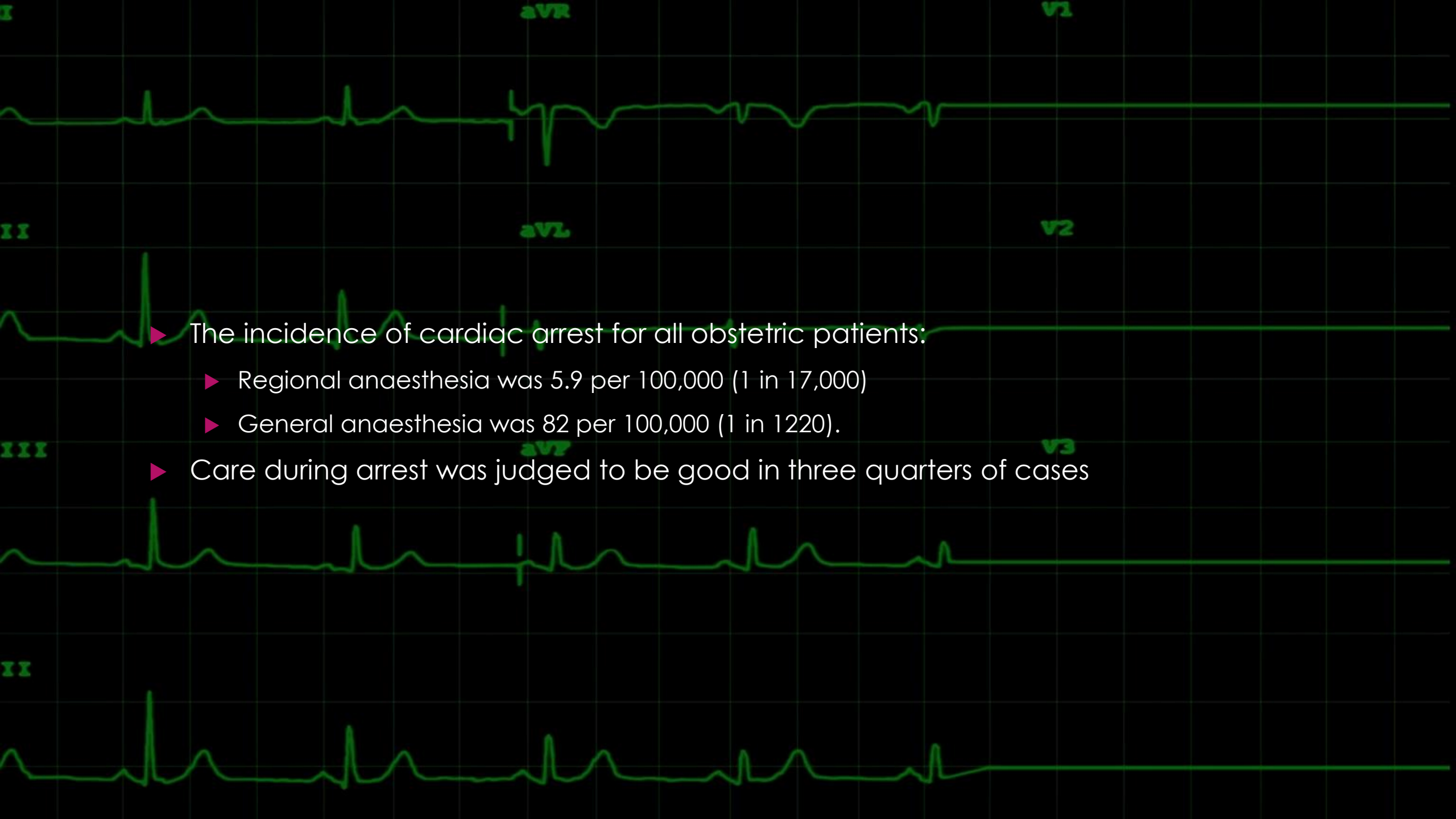
- The incidence of cardiac arrest for all obstetric patients:
  - Regional anaesthesia was 5.9 per 100,000 (1 in 17,000)
  - General anaesthesia was 82 per 100,000 (1 in 1220).
- Care during arrest was judged to be good in three quarters of cases

Figure 34.6 A) Obstetric patient characteristics in the NAP7 Activity Survey (purple lines) and among obstetric cases of perioperative cardiac arrest (solid blue bar). Where a blue bar is notably above or below the purple line the characteristic is over or underrepresented among patients who had a cardiac arrest, respectively. GA, general anaesthesia; RA, regional anaesthesia.
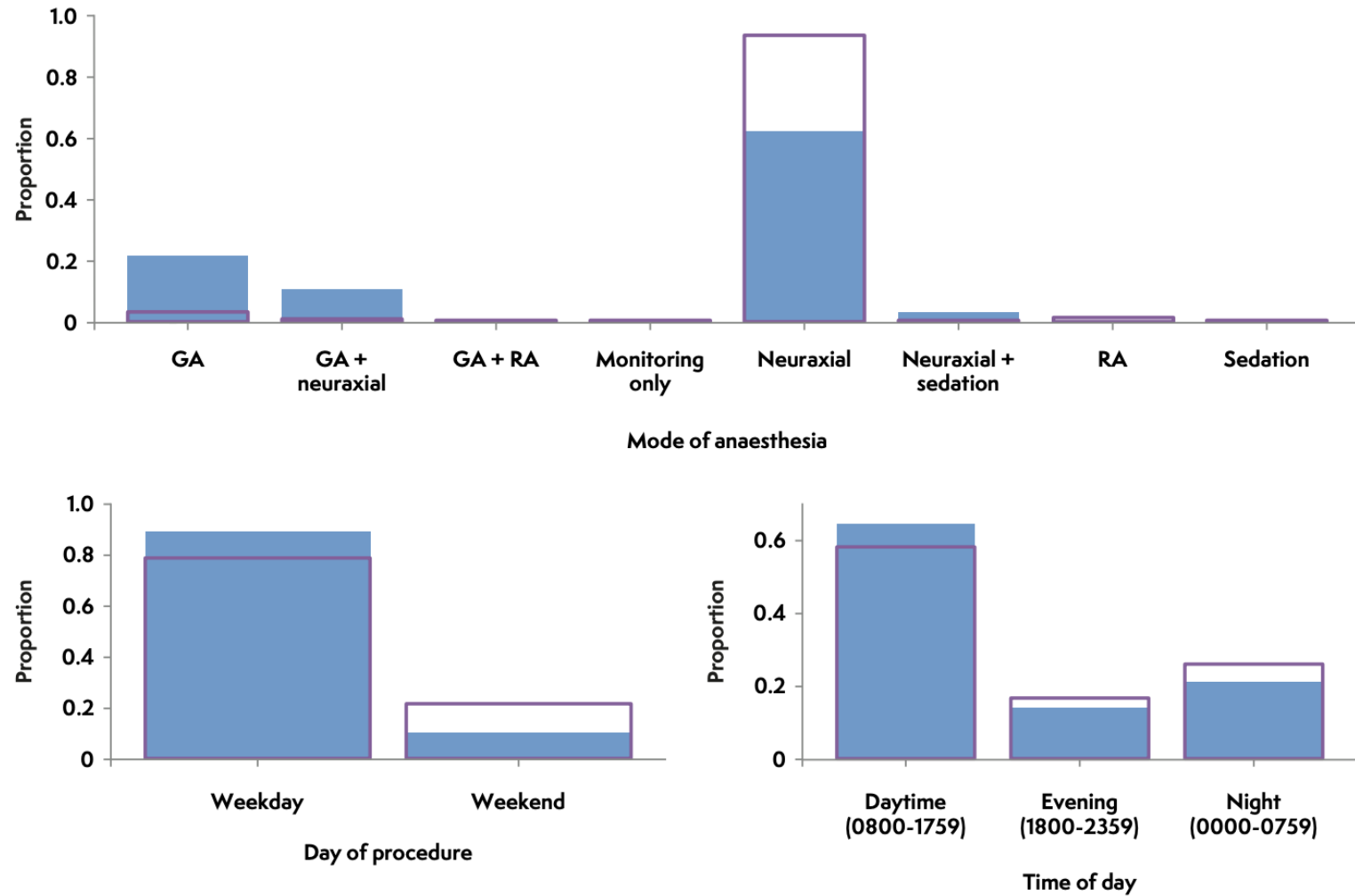
In an estimated

188,500

caesarean sections,

22 cardiac arrests occurred

An incidence of
11.6 per 100,000 (1 in 8600)
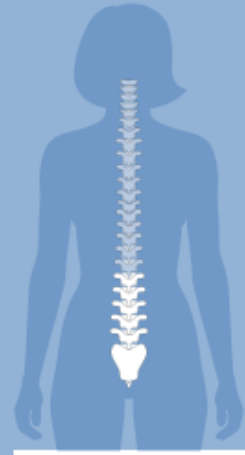
In an estimated

113,500

neuraxial procedures
for labour analgesia,

2 cardiac arrests occurred

An incidence of
1.8 per 100,000 (1 in 57,000)

BMI

Compared with the NAP5 Activity Survey, the estimated **median BMI of obstetric patients receiving anaesthetic care has increased from 24.8 to 27.1 kg m^{-2}**, and the proportion **classified as at least overweight has increased from 46% to 62%**

Between midnight and 08.00, obstetric anaesthesia and **analgesia accounted for 70% of anaesthetic workload**

The most common causes of cardiac arrest in obstetric patients receiving anaesthetic care were **haemorrhage**, **high neuraxial blocks** and **bradyarrhythmia associated with spinal anaesthesia**

NAP-7 Recommendations

National:

- Staffing models for obstetric anaesthesia should reflect the distribution of clinical activity, particularly the greater burden of workload overnight compared to other areas of anaesthetic practice to ensure that the staff levels are safe for patient care.

Institutional :

- Anaesthetic departments should have appropriate escalation strategies in place to support more junior anaesthetists caring for patients with comorbidity in an obstetric setting (e.g. an elevated BMI) and to facilitate rapid support in the event of a critical emergency.

- A consultant anaesthetist should attend as soon as possible to support clinical management of an obstetric patient who has had a cardiac arrest.

NAP-7 Recommendations

Individual:

▶ Anaesthetists should anticipate and be prepared to treat bradyarrhythmias during spinal anaesthesia, particularly when phenylephrine is used.

▶ For obstetric patients with spinal anaesthesia, inadequate relief of vena caval compression should be considered and managed as a contributing cause of bradyarrhythmias and tachyarrhythmias.

▶ For labour epidural analgesia, a test dose of local anaesthetic solution should not exceed the equivalent of 10 mg bupivacaine (e.g. 10 ml 0.1% bupivacaine and 2 µg/ml fentanyl or equivalent local anaesthetic).

▶ When undertaking a second neuraxial technique following the failure of the primary neuraxial anaesthetic, the risk of a high neuraxial block must be considered. Strategies should be used to modify the risk (e.g. a reduced dose of local anaesthetic or titration of doses of local anaesthetic or adjustments to the patient's position).

▶ When undertaking general anaesthesia on a background of obstetric haemorrhage, the patient should be adequately and promptly resuscitated. Vasopressors may be required to treat a hypotensive response to induction of general anaesthesia but should not be used as a substitute for adequate intravascular fluid replacement. This is particularly relevant in patients where anaesthesia is being converted from neuraxial to general.

What's new in labour analgesia

Novel Techniques

Dural puncture epidural

US guided neuraxial techniques

- Novel US software called the Automatic Spine Level Identification System

Comparison of different delivery modalities of epidural analgesia and intravenous analgesia in labour: a systematic review and network meta-analysis

Simon Wydall [1], Danaja Zolger [2], Adetokunbo Owolabi [2], Bernadette Nzekwu [2], Desire Onwochei [2][3], Neel Desai [2][3]

Affiliations + expand

Comparison of ultra-low, low and high concentration local anaesthetic for labour epidural analgesia: a systematic review and network meta-analysis

L Halliday [1], M Kinsella [1], M Shaw [2], J Cheyne [3], S M Nelson [4][5][1], R J Kearns [1]

Affiliations + expand

Dosing

European Practices in the Management of Accidental Dural Puncture in Obstetrics Investigators. Factors associated with failed epidural blood patch after accidental dural puncture in obstetrics: a prospective, multicentre, international cohort study.

- 643 women received epidural blood patch (591 full data available)

- Failed epidural blood patch in 28.3% women

- 33% completely successful, 38.7% partially successful

- 19.8% received a second epidural blood patch

- Factors associate with failure:

  - History of migraine

  - Higher lumbar level of accidental dural puncture (L1/3 compared to L3/5)

  - Blood patch performed <48 hours from puncture
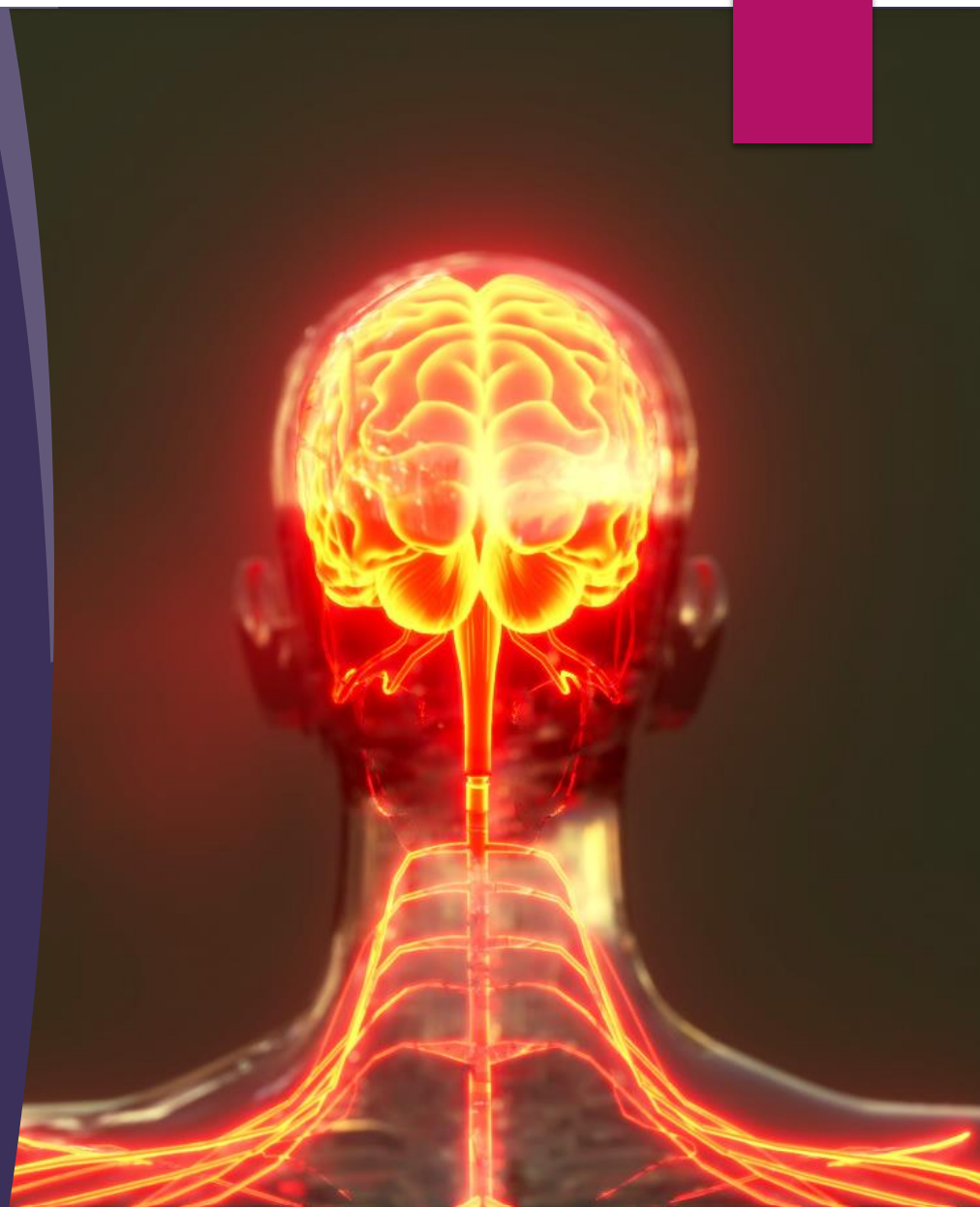
The effects of combined spinal-epidural analgesia and epidural anesthesia on maternal intrapartum temperature: a randomized controlled trial

Zhiping Yao [1], Jingxin Zhou [1], Shuying Li [2], Wenqin Zhou [1]

Affiliations + expand

PMID: 36380286   PMCID: PMC96648

Maternal serum C-reactive protein and white blood cell count at hospital admission as predictors of intrapartum maternal fever: a retrospective case-control study in women having epidural labor analgesia

W Zhao [1], L Z Wang [2], X Y Chang [3], Y F Zhang [3], F Xiao [3], F Xia [3]

Affiliations + expand

PMID: 35364474   DOI: 10.1016/

Interventions for the prevention or treatment of epidural-related maternal fever: a systematic review and meta-analysis

Anna Cartledge [1], Daniel Hind [2], Mike Bradburn [1], Marrissa Martyn-St James [1], Sophie Davenport [1], Wei Shao Tung [3], Hwu Yung [4], Jeyinn Wong [4], Matthew Wilson [1]

Affiliations + expand

PMID: 35934529   PMCID: PMC9575042   DOI: 10.1016/j.bja.2022.06.022

Thrombocytopenia
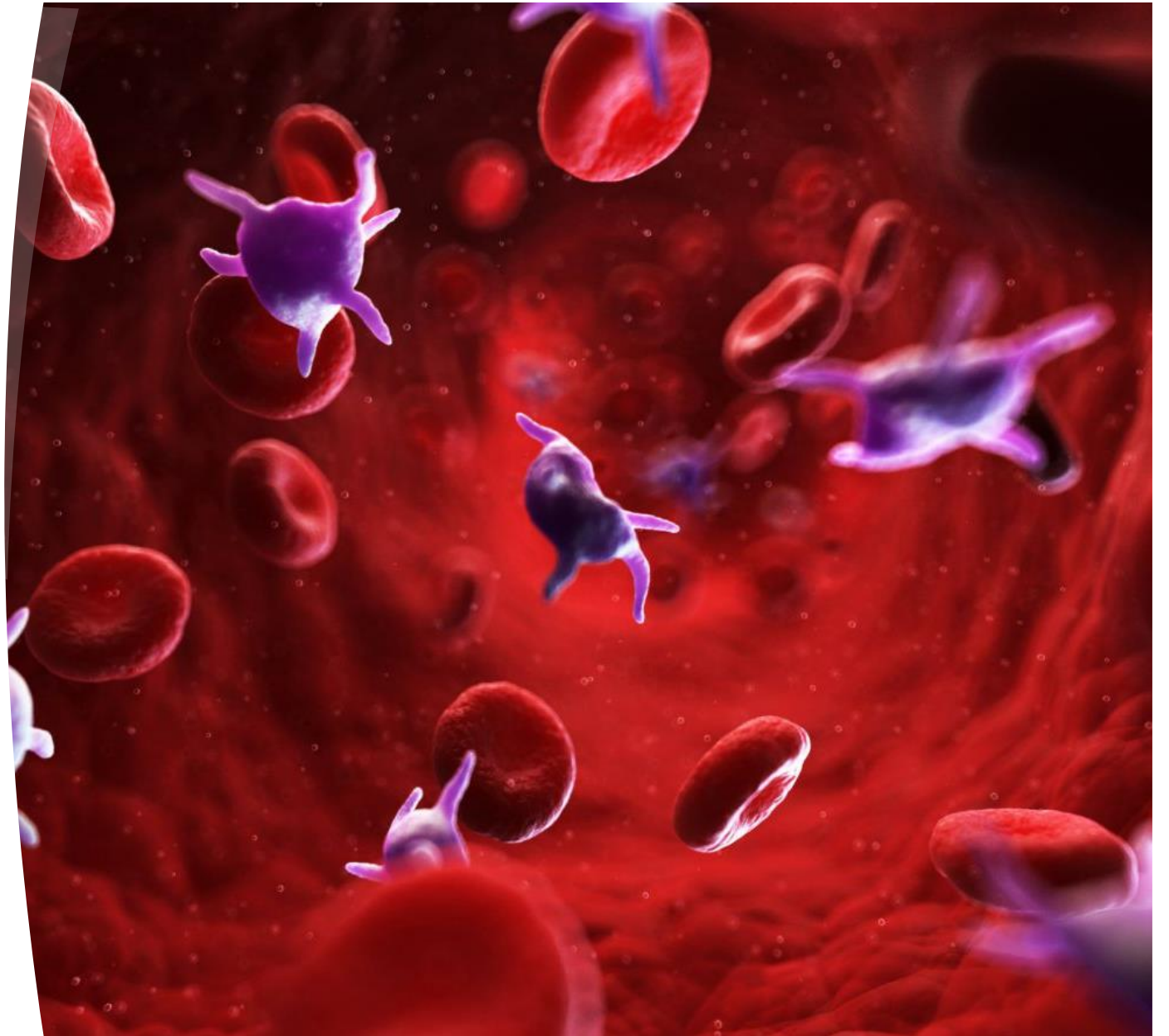
SOAP Guidelines 2021

In the absence of bleeding history, active bleeding, or HELLP, likely low risk with platelets ≥ 70.

HELLP should have platelet count within 6 hours.

50-70 is a risk benefit call.

< 50 "may likely be an increased risk".

But what if you don't know the platelet count?

The Obstetric Airway Management Registry (ObAMR)
undertook a multicenter observational study aimed to estimate
the proportion of patients receiving general anesthesia (GA)
for either confirmed or suspected thrombocytopenia

Proposed an algorithm

Flowchart: CS in patient with hypertensive disorder of pregnancy

CS in patient with hypertensive disorder of pregnancy
→ Are there clear-cut indications for GA?

Clear-cut indications for GA
- Confirmed HELLP syndrome; platelet count $<75 \times 10^9 \, L^{-1}$ within 6 h
- Eclampsia with GCS <14
- Likely coagulopathy:
  - *Abruptio placentae* with haemodynamic instability
  - Hepatic subcapsular haematoma
- Pulmonary oedema with hypoxaemia

Yes → GA

No → Is the platelet count known?

- $<50 \times 10^9 \, L^{-1}$ → GA
- $50–75 \times 10^9 \, L^{-1}$ → GA unless decision aid* favours SA
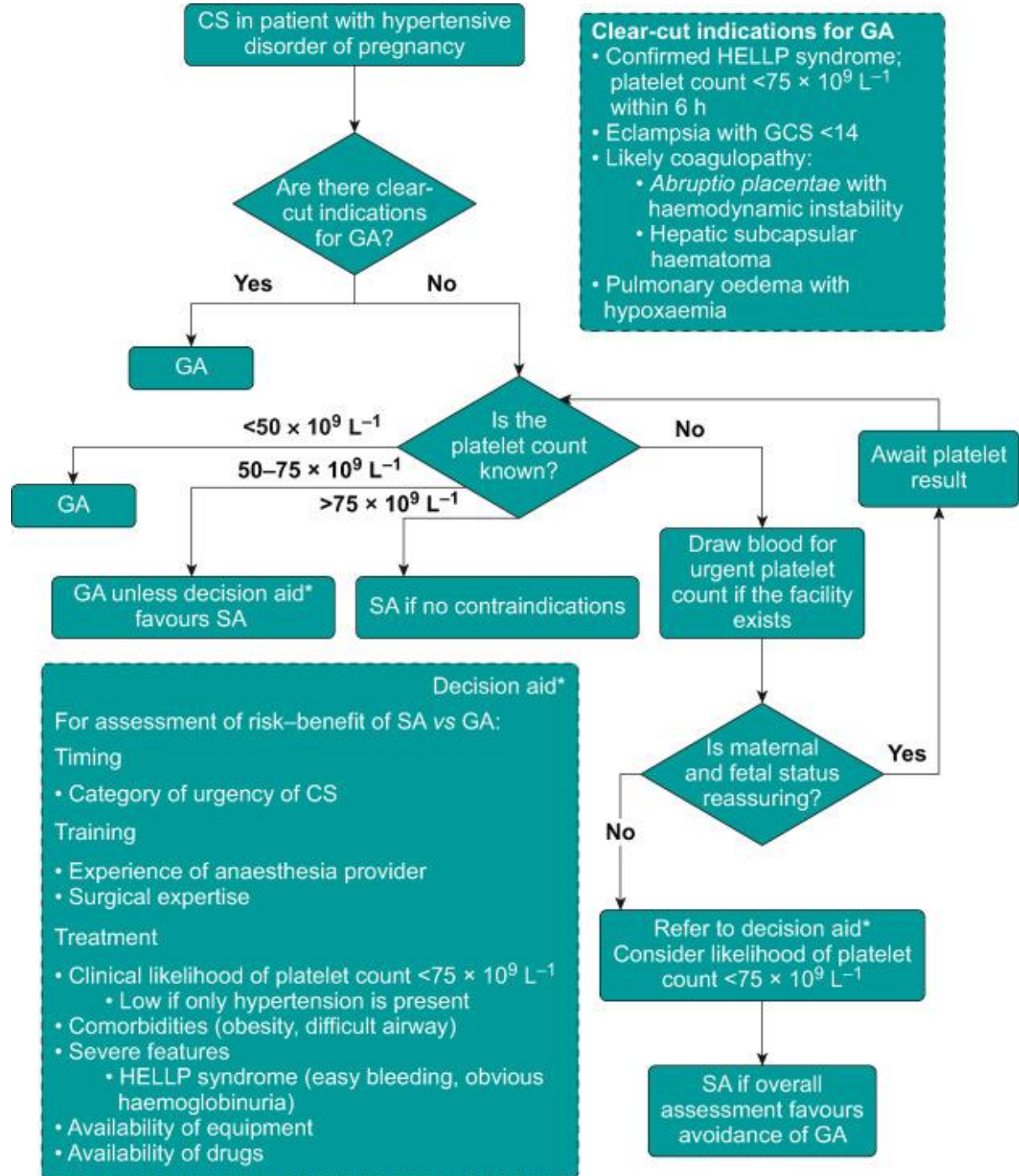- $>75 \times 10^9 \, L^{-1}$ → SA if no contraindications

No → Draw blood for urgent platelet count if the facility exists → Is maternal and fetal status reassuring?
- **Yes** → Await platelet result
- **No** → Refer to decision aid* Consider likelihood of platelet count $<75 \times 10^9 \, L^{-1}$ → SA if overall assessment favours avoidance of GA

Decision aid*

For assessment of risk–benefit of SA *vs* GA:

Timing
- Category of urgency of CS

Training
- Experience of anaesthesia provider
- Surgical expertise

Treatment
- Clinical likelihood of platelet count $<75 \times 10^9 \, L^{-1}$
  - Low if only hypertension is present
- Comorbidities (obesity, difficult airway)
- Severe features
  - HELLP syndrome (easy bleeding, obvious haemoglobinuria)
- Availability of equipment
- Availability of drugs

Maximum Allowable Blood Loss Estimator in Maternal Haemorrhage (MABLE-MH)

Sarjit Singh
CT3 Anaesthetics

MABLE-MH

- Prospective observational study
- 11 Scottish Maternity Units
- Patient undergoing elective and emergency caesarean sections
- Aims:
  - Assess accuracy of formulaic approaches
  - Develop a clinically-useful linear regression model predicting post-operative haemoglobin

What do we mean by Formulaic approach?

$$blood\ loss = circulating\ blood\ volume \times \frac{(haemoglobin_{inital} - haemoglobin_{final})}{haemoglobin_{average}}$$

$$circulating\ blood\ volume = body\ weight \times 100\ ml\ kg^{-1}$$

Formulaic approaches to blood loss

Weight: 80kg

Haemoglobin: 10g/dL

Blood loss to reach haemoglobin of 8g/dL?

$$blood\ loss = circulating\ blood\ volume \times \frac{(haemoglobin_{inital} - haemoglobin_{final})}{haemoglobin_{average}}$$

$$blood\ loss = (80\ kg\ \times 100\ ml\ kg^{-1}) \times \frac{(10 - 8)}{9}$$
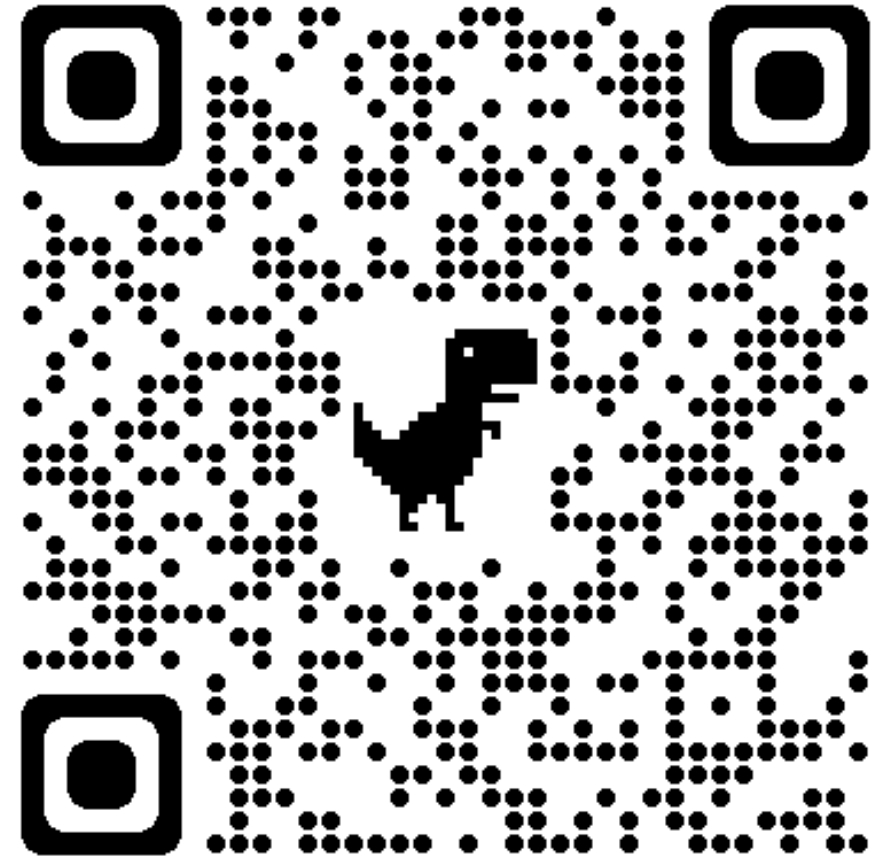
$$blood\ loss = 8000ml \times \frac{2}{9}$$

$$blood\ loss = 1777ml$$

Maximum Allowable Blood Loss to reach 8g/dL is **1.7L**

Results

▶ Using the formulaic approach resulted in Poor agreement between measured and calculated blood losses

▶ Regression modelling was found to be better

▶ App built to use regression model in clinical practice

▶ (Test phase – not for clinical use yet)

Maximum Allowable Blood Loss Estimator for Maternal Haemorrhage at Caesarean Section

Data Input —

Preoperative Haemoglobin

70 g/L   102 g/L   140 g/L

70 77 84 91 98 105 112 119 126 133 140

Height

1.4 metres   1.6 metres   1.9 metres

1.4 1.45 1.5 1.55 1.6 1.65 1.7 1.75 1.8 1.85 1.9

5 ft 3 in

Clinical Urgency

- ● Elective
- ○ Emergency

Age

16   26   50

16 20 24 28 32 36 40 44 48 50

Parity

- ○ Primigravida
- ● One
- ○ Two
- ○ Three
- ○ Four +

Predicted Haemoglobin

PREOP HAEMOGLOBIN

102 g/L

Estimated Blood Loss (mls)	Predicted Haemoglobin (g/L)	90% Prediction Interval (g/L)
250	97.2	(83.8 - 108.2)
500	94.6	(80.8 - 106.6)
750	92.1	(78.2 - 103.4)
1000	89.5	(74.9 - 101.2)
1250	87	(73.5 - 99.5)
1500	84.4	(70.6 - 95.8)
1750	81.9	(69.2 - 93.6)
2000	79.3	(66.4 - 91.5)
2250	76.8	(63.1 - 88.2)
2500	74.2	(60.7 - 86.2)

Interpreting the Results —

	The probability of Hb falling below 80 g/L for a given blood loss
GREEN	Low (Less than 5%)
AMBER	Moderate (Between 5 to 50%)
RED	High (Greater than 50%)

Data Input —

Preoperative Haemoglobin

| 70 g/L | | 102 g/L | | 140 g/L |

70 77 84 91 98 105 112 119 126 133 140

Height

| 1.4 metres | | 1.6 metres | | 1.9 metres |

1.4 1.45 1.5 1.55 1.6 1.65 1.7 1.75 1.8 1.85 1.9

5 ft 3 in

Clinical Urgency

- ⦿ Elective
- ◯ Emergency

Age

| 16 | | 26 | | 50 |

16 20 24 28 32 36 40 44 48 50

Parity

- ◯ Primigravida
- ⦿ One
- ◯ Two
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2500	74.2	(60.7 - 86.2)

140 g/L

140

.9 metres

1.9

ft 3 in

50

48   50

The probability of Hb falling below 80 g/L for a given blood loss	
GREEN	Low (Less than 5%)
AMBER	Moderate (Between 5 to 50%)
RED	High (Greater than 50%)

✓ Good predictive accuracy
✓ Quantifies predictive inaccuracy
✓ Can be used in evolving haemorrhage
✗ Transfused women excluded

Anaemia and Iron Deficiency in Pregnancy

Prevalence

The prevalence of perioperative iron deficiency anaemia in women undergoing caesarean section–a retrospective cohort study

Alicia T Dennis [1] [2] [3], Marissa Ferguson [4] [5] [6], Sarah Jackson [7]

Affiliations + expand

- Iron deficiency (<30) present in:
  - 33.9% of women at first appointment
  - 43.1% of women diagnosed with anaemia
  - 21.7% of women with no anaemia
  - Only 45.9% of women with iron deficiency at first appointment received treatment
- Anaemia (Hb <110) present in:
  - 6.1% women at first appointment
  - 26.1% women in third trimester
  - 12.2% pre-operatively
  - 23% of women post operatively
- Of the 112 women with hospital discharge Hb < 110 g/L, 35 (31.3%) women were iron deficient at their first hospital appointment.
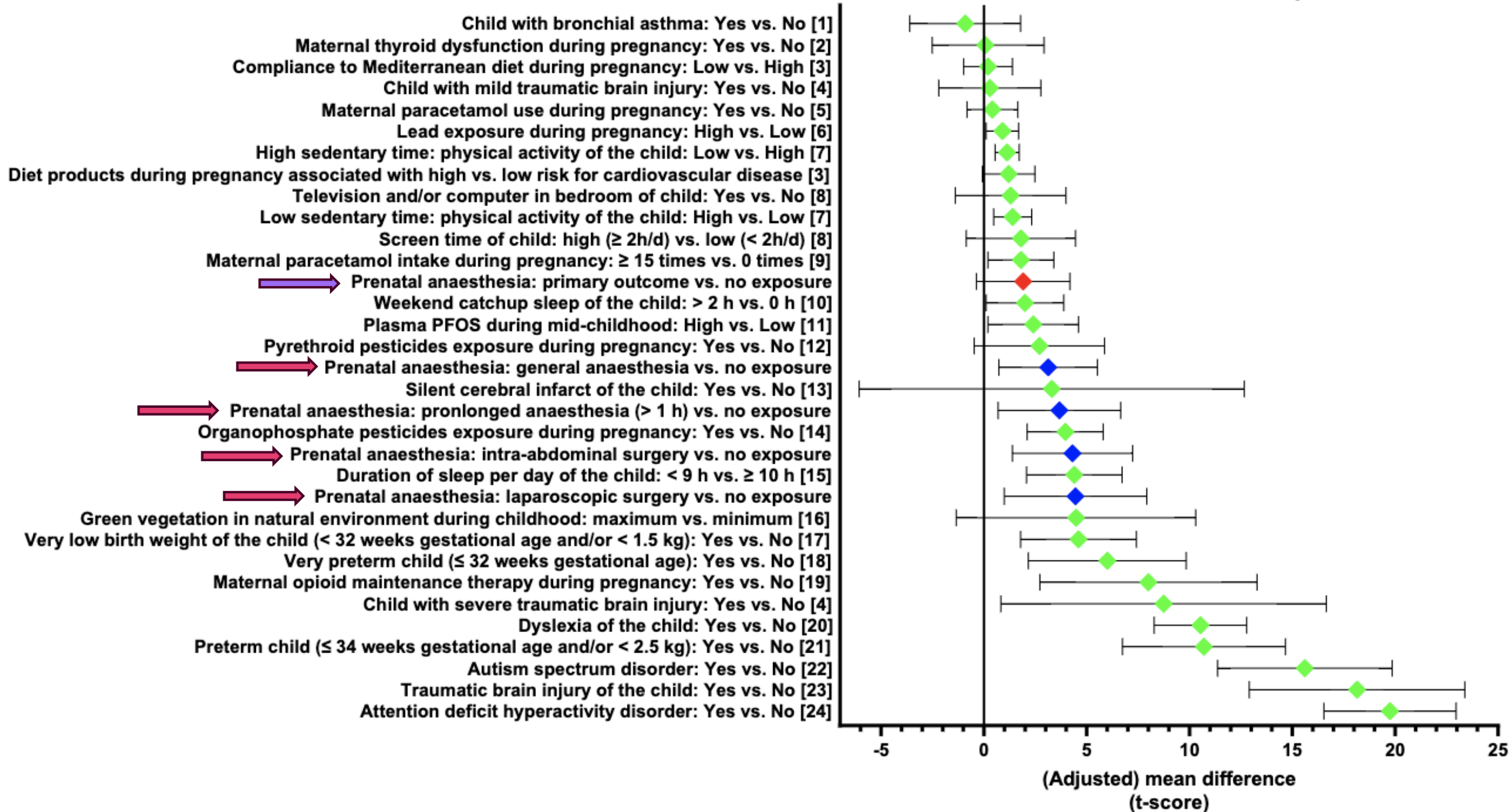
MAPOC

- ▶ Maternal Anaemia and Postoperative Outcomes After Caesarean Section Surgery - The MAPOC Study is coming- awaiting results!

- ▶ This study aims to assess the feasibility of undertaking a large multicentre trial to examine the impact of anaemia on postoperative outcomes

Neurodevelopmental Effects of Prenatal Exposure to Anaesthesia

BRIEF Global Executive Composite

Child with bronchial asthma: Yes vs. No [1]
Maternal thyroid dysfunction during pregnancy: Yes vs. No [2]
Compliance to Mediterranean diet during pregnancy: Low vs. High [3]
Child with mild traumatic brain injury: Yes vs. No [4]
Maternal paracetamol use during pregnancy: Yes vs. No [5]
Lead exposure during pregnancy: High vs. Low [6]
High sedentary time: physical activity of the child: Low vs. High [7]
Diet products during pregnancy associated with high vs. low risk for cardiovascular disease [3]
Television and/or computer in bedroom of child: Yes vs. No [8]
Low sedentary time: physical activity of the child: High vs. Low [7]
Screen time of child: high (≥ 2h/d) vs. low (< 2h/d) [8]
Maternal paracetamol intake during pregnancy: ≥ 15 times vs. 0 times [9]
Prenatal anaesthesia: primary outcome vs. no exposure
Weekend catchup sleep of the child: > 2 h vs. 0 h [10]
Plasma PFOS during mid-childhood: High vs. Low [11]
Pyrethroid pesticides exposure during pregnancy: Yes vs. No [12]
Prenatal anaesthesia: general anaesthesia vs. no exposure
Silent cerebral infarct of the child: Yes vs. No [13]
Prenatal anaesthesia: pronlonged anaesthesia (> 1 h) vs. no exposure
Organophosphate pesticides exposure during pregnancy: Yes vs. No [14]
Prenatal anaesthesia: intra-abdominal surgery vs. no exposure
Duration of sleep per day of the child: < 9 h vs. ≥ 10 h [15]
Prenatal anaesthesia: laparoscopic surgery vs. no exposure
Green vegetation in natural environment during childhood: maximum vs. minimum [16]
Very low birth weight of the child (< 32 weeks gestational age and/or < 1.5 kg): Yes vs. No [17]
Very preterm child (≤ 32 weeks gestational age): Yes vs. No [18]
Maternal opioid maintenance therapy during pregnancy: Yes vs. No [19]
Child with severe traumatic brain injury: Yes vs. No [4]
Dyslexia of the child: Yes vs. No [20]
Preterm child (≤ 34 weeks gestational age and/or < 2.5 kg): Yes vs. No [21]
Autism spectrum disorder: Yes vs. No [22]
Traumatic brain injury of the child: Yes vs. No [23]
Attention deficit hyperactivity disorder: Yes vs. No [24]

-5   0   5   10   15   20   25

(Adjusted) mean difference
(t-score)

Sip Til
Send

Sip till Send

- The number of patients reporting nausea or vomiting intraoperatively was 11/30 in control vs 6/30 in Sip group (p = 0.15).

- The mean drop in systolic blood pressure before delivery of the fetus was 24 mmHg in Sip group vs 26 mmHg in control group (p = 0.7).

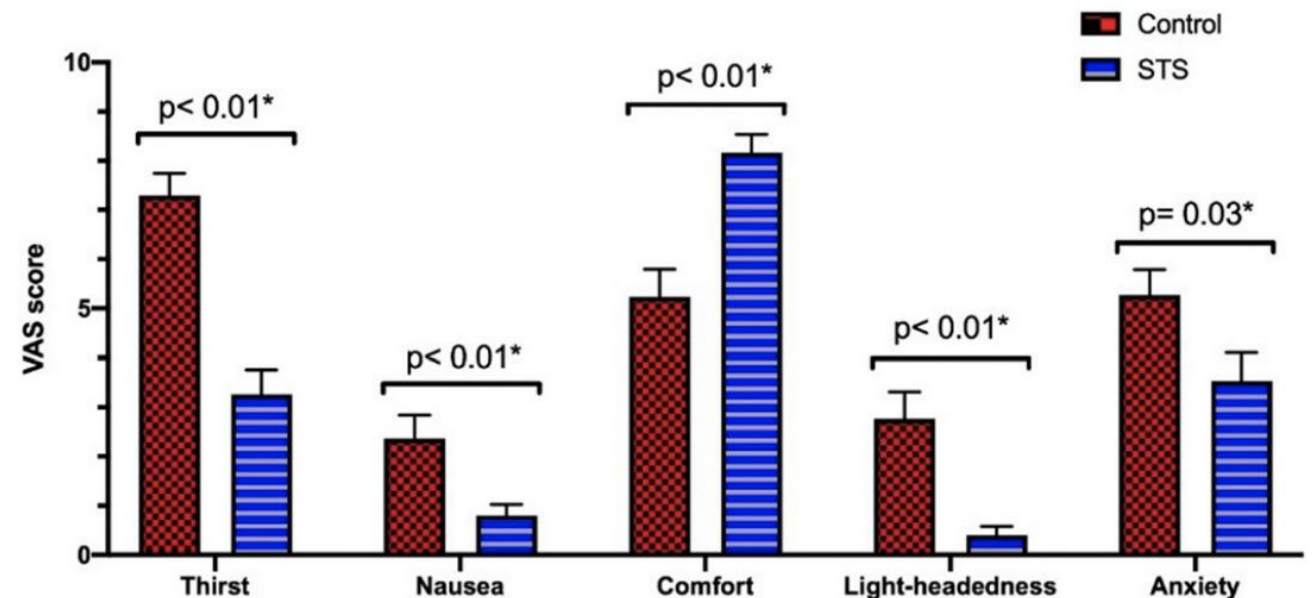- Mean phenylephrine consumption pre-delivery was 998 µg in Sip group vs 1181 µg in control group (p = 0.2).

Figure 1: Variables assessed immediately prior to surgery

4. Recommendations

4.1   For persons older than 16 years of age.

    4.1.1   **Solid food** - of a low calorific nature (light meal) may be allowed up to 6 hours prior to anaesthesia.

    4.1.2   **Clear liquids** - For elective and selected emergency procedures, clear liquids should be encouraged up to 2 hours prior to anaesthesia. While "SipTilSend"[4] is an emerging practice gaining increasing acceptance, a safe, acceptable rate of drinking clear liquids in elective situations is a maximum of 200ml/hr with a maximum volume of 400ml clear liquid 2 hours prior to the procedure. This does not appear to be associated with an increase in risk of regurgitation or aspiration.

                          ———————————————

Other interesting areas

- Persistent pain after childbirth

- Effects of assisted reproduction on maternal health and post partum bleeding

- Airway ultrasound parameters in pregnant patients

- Recent BJA Education articles on:

    - Communication after pregnancy and baby loss

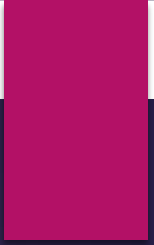   - Perioperative considerations for transgender and gender diverse adults

"That's all Folks!"

Questions?
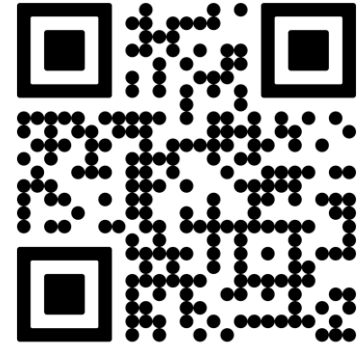
Link to references
SCAN ME

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