PIPADOR REVISION

MRCOG Part 1 Revision Notes

Perioperative Physiology

PHYSIOLOGY • LECTURE 163

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG PART 1 REVISION NOTES | PHYSIOLOGY

163 Perioperative Physiology

The surgical stress response, fluids and electrolytes, pre-operative optimisation, obstetric anaesthesia and post-operative care

6 h / 2 h	25–30 mL/kg/d	< 0.5 mL/kg/h	T4
Fasting: food / clear fluids	Maintenance water (NICE CG174)	Oliguria	Block height for caesarean

■ KEY FACTS: Learning objectives

- Describe the metabolic and neuroendocrine stress response to surgery.
- Describe body fluid compartments, fluid requirements and the composition of intravenous fluids.
- Describe pre-operative optimisation, enhanced recovery and the physiology of regional and general anaesthesia in obstetrics.
- Describe post-operative physiology and complications, including surgery during pregnancy.

163.1 The stress response

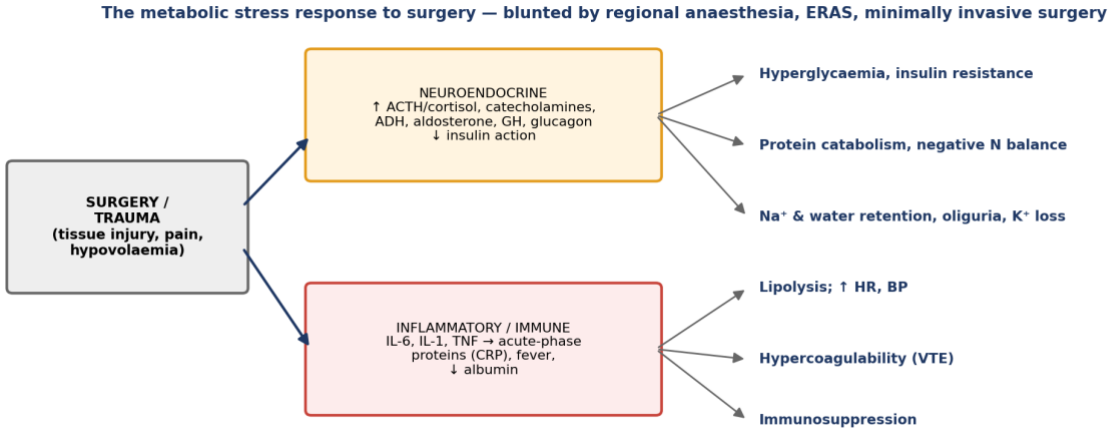


Figure 163.1 — Neuroendocrine and inflammatory responses to surgery

The response is proportional to tissue injury and lasts days; it aims to maintain volume and fuel supply but causes **catabolism, hyperglycaemia, fluid retention and hypercoagulability**. It is reduced by **regional anaesthesia**, minimally invasive surgery, normothermia, early feeding and mobilisation (**ERAS**).

163.2 Fluids and electrolytes

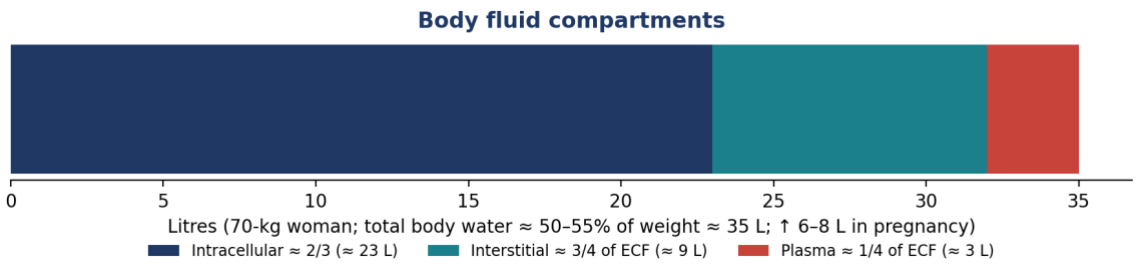


Figure 163.2 — Body fluid compartments

Daily maintenance (NICE CG174)	Amount
Water	25–30 mL/kg/day
Na^+, K^+, Cl^-	≈ 1 mmol/kg/day each
Glucose	50–100 g/day (limits starvation ketosis)
Insensible losses	≈ 500–800 mL/day (↑ fever, ventilation, open abdomen)

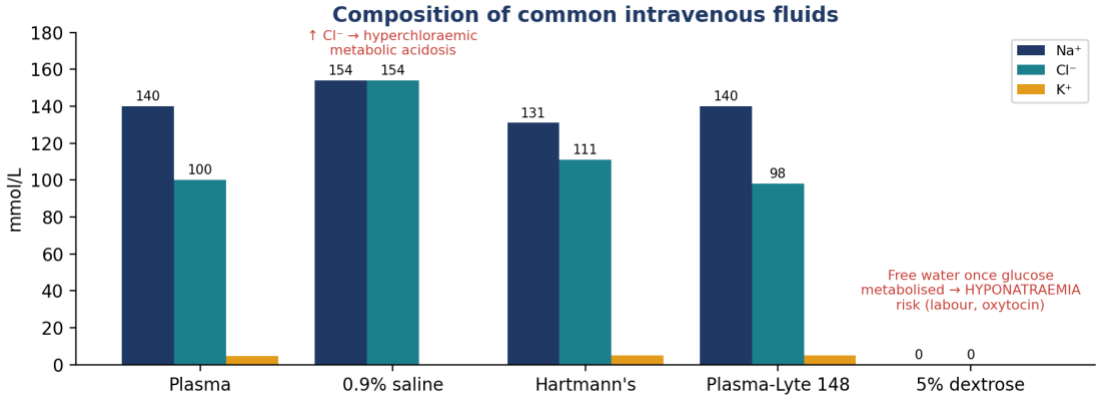


Figure 163.3 — Composition of intravenous fluids

- **Crystalloids** distribute across the ECF (only ≈ ¼ remains intravascular); **colloids** stay longer but offer no survival benefit and carry risks (starch — AKI; avoid).
- **0.9% saline** in large volume → **hyperchloraemic metabolic acidosis**; balanced solutions (Hartmann's, Plasma-Lyte) preferred for resuscitation.
- **Hyponatraemia in labour/obstetrics**: hypotonic fluids (5% dextrose), large oral water intake, **oxytocin** (ADH-like) and ADH release from stress/pain → maternal seizures and neonatal hyponatraemia.
- **Pre-eclampsia**: restrict to ≈ **80 mL/h** (pulmonary oedema risk; low oncotic pressure, capillary leak).

163.3 Pre-operative preparation

Element	Key points
Fasting	Solids 6 h, clear fluids 2 h (carbohydrate drinks in ERAS); labouring women at risk of GA — light diet/isotonic drinks per local policy
Aspiration prophylaxis	H_2-antagonist/PPI ± sodium citrate 0.3 M; RSI for GA (Lecture 131)
Anaemia	Optimise Hb (oral/IV iron) before elective surgery; group & save; cell salvage planning
VTE	Risk assessment; LMWH + mechanical prophylaxis (RCOG GTG 37a; NICE NG89)
Antibiotic prophylaxis	Within 60 min before incision (CS: before skin incision)
Comorbidities	Diabetes (variable-rate insulin infusion if prolonged fast), hypertension, cardiac, smoking cessation, anticoagulant bridging
Consent & communication	WHO surgical safety checklist; Montgomery-standard consent

163.4 Anaesthesia in obstetrics

	Neuraxial (spinal / epidural / CSE)	General anaesthesia
Use	Preferred for caesarean — awake mother, less aspiration and airway risk, better analgesia, ↓ blood loss, ↓ VTE	Category 1 CS without epidural in situ, contraindications to neuraxial (coagulopathy, platelets < ≈ 75, infection, maternal refusal)
Physiology	Sympathetic block → vasodilatation, hypotension, bradycardia (high block T1–4 cardioaccelerators); ↓ preload — phenylephrine infusion, left uterine displacement	Rapid desaturation (↓ FRC, ↑ VO_2); difficult/failed intubation (≈ 1 in 300–400 obstetric GAs); aspiration; awareness ↑; uterine relaxation with volatile agents (PPH)

	Neuraxial (spinal / epidural / CSE)	General anaesthesia
Complications	High/total spinal, post-dural puncture headache, LA toxicity, epidural haematoma/abscess (rare), nerve injury	Failed intubation (OAA/DAS guidelines), aspiration (Mendelson's), neonatal depression

163.5 Post-operative physiology and complications

Problem	Physiology / management
Pain	Multimodal: intrathecal diamorphine/morphine (CS), regular paracetamol + NSAIDs (if no contraindication), TAP/QL blocks, opioids as rescue
Oliguria	< 0.5 mL/kg/h: stress response (ADH, aldosterone) vs hypovolaemia vs AKI — assess volume status before giving fluid
PONV	Opioids, volatile agents, female sex; multimodal antiemetics (ondansetron, cyclizine, dexamethasone)
Ileus	Opioids, handling, electrolyte imbalance (↓ K^+); early feeding and mobilisation
Respiratory	Atelectasis (↓ FRC, pain-limited breathing), pneumonia, aspiration; incentive spirometry
Hypothermia	↑ Bleeding, infection, cardiac events — warm fluids, forced-air warming
VTE	Peak risk after CS — LMWH, early mobilisation
Sepsis	Recognise early (MEOWS/NEWS2, lactate) — 'Sepsis Six'; maternal sepsis a leading cause of death

163.6 Non-obstetric surgery in pregnancy

Defer elective surgery until postpartum; **2nd trimester** preferred for semi-urgent (lower miscarriage/preterm risk) ▶ **Left uterine displacement** > 20 wk; maintain MAP (uteroplacental flow not autoregulated) ▶ Avoid hypoxia, hypercarbia/hypocarbia, hypotension; RSI if GA ▶ Fetal monitoring when viable; anti-D if RhD-negative; consider steroids if preterm delivery possible ▶ Laparoscopy safe (lower insufflation pressure, open entry); VTE prophylaxis

163.7 Must-know summary

■ **EXAM TIP**

- Stress response: ↑ cortisol, catecholamines, ADH, aldosterone, glucagon; ↓ insulin effect → hyperglycaemia, Na^+/water retention, catabolism.
- Maintenance: **25–30 mL/kg/day water, 1 mmol/kg/day Na^+/K^+/Cl^-, 50–100 g glucose**.
- 0.9% saline → hyperchloraemic acidosis; 5% dextrose/oxytocin → **hyponatraemia**.
- Neuraxial anaesthesia preferred for CS (**T4 block**); spinal hypotension → phenylephrine + uterine displacement.
- Surgery in pregnancy: **2nd trimester**, left lateral tilt, avoid maternal hypotension/hypoxia.

■ **MNEMONIC / MEMORY AID**

Fasting — '6-4-2': 6 h food, 4 h breast milk (infants), 2 h clear fluids. **Sepsis Six — 'BUFALO'**: Blood cultures, Urine output, Fluids, Antibiotics, Lactate, Oxygen.