Physiological Monitoring of Surgical Patients

What You See, What You Do, and Why It Matters

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Objectives

- - Understand the purpose of physiological monitoring in surgery
- - Learn standard monitoring modalities
- - Recognize abnormal findings and their implications
- - Know when to escalate concerns to anesthesia

⚠️ Why Monitoring Matters

- - Early detection = Early intervention
- - You can’t fix what you don’t see
- - Surgery = controlled trauma → body reacts
- - Monitor = safety net
- - Pearl: It’s not about numbers, it’s about trends and context

✨ Goals of Monitoring

- - Maintain oxygen delivery
- - Ensure organ perfusion
- - Detect and treat physiological derangements early
- - Guide fluid and drug management
- - Monitor what you can change, not just what’s flashy

Basic Monitoring (ASA Standard)

- - ECG
- - Pulse oximetry (SpO_2)
- - Non-invasive blood pressure (NIBP)
- - End-tidal CO_2 ($ETCO_2$)
- - Temperature
- - These are minimum standards, not ideal limits

ECG Monitoring

- - Detects arrhythmias, ischemia
- - Lead II for rhythm
- - V5 or modified V5 for ischemia
- - Intra-op: watch for ST changes, new PVCs

Pulse Oximetry

- - Measures oxygen saturation
- - Delay in detecting hypoventilation
- - Motion, cold extremities, dyes affect reading
- - Watch pleth waveform for perfusion insight

 Capnography ($ETCO_2$)

- - Measures ventilation, NOT oxygenation
- - Confirms ETT placement
- - Trend changes = early sign of hypoventilation or embolism
- - Correlate $ETCO_2$ with $PaCO_2$ in ventilated patients

Non-invasive BP

- - Q5 minutes
- - Beware of false reassurance in shocky patients
- - Trending MAP is key (MAP > 65 mmHg generally)
- - Think in MAPs, not just systolic numbers

🌡️ Temperature Monitoring

- - Hypothermia = coagulopathy, delayed wake-up
- - Use esophageal or nasopharyngeal probes intra-op
- - Warming matters! (Bair Hugger, warm fluids)
- - Watch for temp < 36°C — act

Advanced Monitoring (When Needed)

- - Arterial line: real-time BP (Beat to beat), ABGs
- - Central line: CVP (limited value), volume status , medication administration
- - Urine output: Indicator of renal perfusion, Goal: ≥ 0.5 mL/kg/hr , Low output: Hypovolemia or AKI
- - Neuromuscular monitoring
- - Depth of Anesthesia: BIS: Optional in long/complex surgeries. Useful in high-risk patients or TIVA

Key Abnormal Patterns

- Parameter | Alarm Sign | Likely Cause
- ---------|------------|-------------
- BP ↓ | <90/60 | Bleeding, anesthesia
- HR ↑ | >100 | Pain, hypovolemia
- SpO_2 ↓ | <92% | Hypoxia, disconnection
- $EtCO_2$ ↓ | <30 | Embolism, arrest

⚠️ Intraoperative Red Flags (When to Alert Anesthesia)

- - Sudden Hypotension
- - Sudden Bradycardia/tachycardia
- - Sudden desaturation
- - EtCO2 drop = PE, disconnection, arrest
- - ECG changes = ischemia
- - Suspected awareness
- - Equipment disconnection

❤️ Postoperative Monitoring Considerations

- - Watch for:
- - Hypoxia
- - Delayed emergence
- - Hemodynamic instability
- - Bleeding (check drains, vitals, mental status)
- - SBAR handoff is your best friend!

SBAR Communication Tool

S

Situation

- Introduce yourself & clarify **who** you are speaking to
- Provide **basic details** of the patient and their location
- Briefly explain the situation and **why** you are calling

B

Background

- Give a **brief overview** of the patient, including relevant clinical details (avoid overloading the person receiving the handover with too much information)

A

Assessment

- Communicate **relevant clinical findings**
- Include vital signs, examination findings, relevant investigation results and your overall impression

R

Recommendations

- State what you would like to happen
- Ask if you should take any **further action**
- Clarify expectation of response

🔪 Surgeons & Monitoring – What You Can Do

- - Be aware of trends
- - Communicate concerns early
- - Pause surgery if needed
- - Ask for baseline vitals, updates

🧠 Case Vignette (Interactive)

- You’re in the OR. Patient suddenly becomes hypotensive and tachycardic. What’s your move?
- - A. Bolus fluids
- - B. Ask for vasopressors
- - C. Check for bleeding

Summary

- - Monitoring is shared responsibility
- - Know normal ranges, warning signs
- - Trends and context > isolated values
- - Early recognition saves lives
- - Collaborate with anesthesia

Questions ⁉