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Pediatric ERAS in Neonates and Infants:

Beyond the Protocol

Dr. Sedighe Shahhosseini

Fellowship of pediatric anesthesia , Isfahan medical university

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About the Speaker



- Assistant professor of anesthesia
- Isfahan university of medical science
- Fellowship of Pediatric anesthesia

Why Is Neonatal and Pediatric ERAS Different?

Developmental Physiology Defines Perioperative Risk

- Limited metabolic and glycogen reserves
- Immature respiratory control → apnea vulnerability
- High oxygen consumption / low respiratory reserve
- Immature hepatic and renal drug clearance
- Increased susceptibility to hypothermia
- Narrow physiological margin for perioperative stress

KEY CONCEPT

Neonatal ERAS must be developmentally adapted — not simply scaled down

Evidence Landscape: What Do We Really Know?

Promising Progress, Persistent Evidence Gaps

- Growing adoption of pediatric ERAS pathways
- Procedure-specific consensus recommendations
- Predominantly observational evidence
- Limited neonatal randomized controlled trials
- Significant heterogeneity in protocols and outcomes
- Limited generalizability from older children

Clinical principle: Evidence-informed adaptation, not blind protocol implementation

ERAS as a Continuum of Care

ERAS is a coordinated perioperative strategy, not a checklist.

Preoperative	Intraoperative	Postoperative
•Risk assessment and nutritional optimization	•Normothermia and hemodynamic stability	•Respiratory safety and effective pain control
•Individualized fasting strategy	•Goal-directed fluid and glucose management	Early enteral nutrition when appropriate
•Respiratory and metabolic optimization	•Lung-protective ventilation	•Developmental and family-centered care
	•Multimodal, opioid-sparing analgesia	
	•Blood conservation	

ERAS in Major Abdominal Surgery

Neonatal intestinal surgery

Preoperative	Intraoperative	Postoperative
•Nutritional / anemia assessment	•Strict normothermia (core temperature ≥36.5°C)	•Early enteral feeding (within 24–48 h, when feasible)
•Minimize fasting	•Perfusion-guided fluid therapy	•Human milk as first choice
•Timely antimicrobial prophylaxis	•Glucose / electrolyte monitoring	•Avoid waiting for formal return of bowel function
	•Multimodal, opioid-sparing analgesia	•Early opioid de-escalation

KEY MESSAGE

Gut recovery depends on perfusion, nutrition and opioid-sparing analgesia

ERAS in Major Thoracic Surgery

Respiratory Recovery Is the Primary Endpoint

Preoperative	Intraoperative	Postoperative
•Respiratory risk stratification	•Thoracoscopic approach when appropriate	•Chest-tube removal guided by clinical criteria
•Family counseling and surgical planning	Protect the lung — not just the blood gas	•Early feeding when tolerated
•Individualized extubation strategy	•Airway clearance / intraoperative air-leak assessment	•Age-appropriate mobilization
	•Regional + multimodal opioid-sparing analgesia	•Continuous respiratory monitoring
	•Early extubation in selected patients	

KEY MESSAGE

Effective analgesia + early chest-tube removal = better respiratory recovery

ERAS in Major Cranial Surgery

Cranial vault reconstruction / craniosynostosis

Preoperative	Intraoperative	Postoperative
•Hemoglobin / iron optimization	•Preserve CPP: avoid hypotension (CPP ≈ MAP – ICP)	•Avoid hypoxia, hypercapnia & hypotension
•Neurological assessment & raised-ICP risk	•Neutral head/neck; preserve venous drainage	•Neurological monitoring
•Blood-product planning	•Point-of-care Hb / coagulation assessment, TXA , cell salvage	•PONV prevention
•Multidisciplinary risk stratification	•Normothermia, Normoxia , normocapnia	•Age-appropriate mobilization
	•Multimodal analgesia / scalp infiltration or block	Individualized extubation / PICU disposition

KEY MESSAGE

Protect cerebral perfusion while minimizing blood loss and physiological stress

The Ultimate ERAS Challenge: One Infant, Multiple Trade-offs

Former preterm infant — major abdominal surgery
- PMA: 46 weeks
- Bronchopulmonary dysplasia
- Previous apnea
- Mild anemia

Challenge	Clinical decision
Limited respiratory reserve	Extubation vs. planned ventilation
Apnea susceptibility	Opioid reduction vs. adequate analgesia
Limited circulating volume	Fluid restriction vs. perfusion
Metabolic vulnerability	Standard vs. individualized glucose therapy

The central question

Can we accelerate recovery without compromising physiological safety?

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Take-Home Messages

Think Physiology, Not Just Protocols

Protect the Vulnerable Organs

Analgesia Without Unnecessary Opioid Burden

Recovery Must Be Procedure-Specific

Measure What Truly Matters

Right Care. Right Patient. Right Time.

Thank You for Your Attention