

Adult Living Donor: Kidney and Liver Enhanced Recovery After Surgery (ERAS) Pathway Synopsis

Objective of ERAS Pathway

The objectives of the Adult Living Donor: Kidney and Liver ERAS Pathway are to minimize variation in care for adult patients undergoing donor nephrectomy or hepatectomy, from the pre-admission testing visit through hospital discharge. This includes preoperative nutrition/metabolism optimization, reducing adverse medication side effects such as opioid-induced ileus and postoperative nausea and vomiting (PONV), promoting earlier return of bowel function, improving wound healing, reducing overall length of hospital stay, and reducing postoperative pain.¹⁻³

Background

Adult living donor kidney and liver transplantation improves patient and graft survival among pediatric recipients compared with deceased donor transplantation and is associated with fewer complications and lower waitlist mortality.⁴⁻⁷ Because these recipients are children while the donors are healthy adults undergoing major surgery for another person's benefit, children's hospitals must provide adult-specific perioperative care focused on donor safety, comfort, and recovery. Living donor surgery has historically involved substantial postoperative pain, opioid exposure, and delayed recovery, making optimization of the donor experience an ethical and clinical priority.⁸⁻⁹

Enhanced Recovery After Surgery (ERAS) pathways support this priority through coordinated, evidence-based interventions, including preoperative education, nutritional optimization, carbohydrate loading, multimodal opioid-sparing analgesia, early mobilization, and standardized postoperative care. Across surgical specialties, ERAS programs reduce complications and length of stay and accelerate recovery without increasing readmissions or mortality.¹⁰ Among living kidney donors, ERAS pathways are associated with lower opioid use and pain scores, faster gastrointestinal recovery, and shorter hospitalization without increasing postoperative complications or readmissions.¹¹⁻¹² Among living liver donors, ERAS pathways improve pain control, reduce opioid use, promote earlier return of bowel function, and enhance postoperative recovery.¹³

By implementing a dedicated ERAS pathway for adult living kidney and liver donors, the Adult Living Donor: Kidney and Liver ERAS Pathway Committee at Children's Mercy has provided a standardized, evidence-based, and donor-focused care pathway. This approach supports donor safety, recovery, and care experience while promoting optimal outcomes for pediatric transplant recipients.

Target Users

Target users of this surgical pathway include the following healthcare professionals:

- Physicians in anesthesiology, critical care medicine, and surgeons from the transplant team
- Fellow physicians
- Resident physicians
- Advanced practice providers
- Registered nurses

These clinical pathways do not establish a standard of care to be followed in every case. It is recognized that each case is different, and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time. It is impossible to anticipate all possible situations that may exist and to prepare a clinical pathway for each. Accordingly, these clinical pathways should guide care with the understanding that departures from them may be required at times.



Target Population

Inclusion Criteria

- Donor > 21 years of age
- No medical contraindication to donation
- Donor competent and willing to donate
- Donor able and willing to comply with follow-up
- Donor has a primary care physician and active health insurance

Exclusion Criteria: Relative

- BMI > 30
- > 55 years of age
- Serious chronic medical illness
- Recent history of malignancy

Exclusion Criteria: Absolute

- Age < 21 years
- Deemed mentally incapable of making an informed decision
- Living with HIV
- Active or incompletely treated malignancy that either
 - Requires treatment other than surveillance
 - or-
 - Has more than minimal known risk of transmission
- High suspicion of knowingly and unlawfully acquiring, receiving, or otherwise transferring anything of value in exchange for any human organ
- Acute symptomatic infection (until resolved)
- Unsuitable donor anatomy
- Uncontrolled diagnosable psychiatric conditions requiring treatment before donation, including any evidence of suicidality
- Psychosocial instability or an unsupportive social environment

For Kidney Donor Only:

- Uncontrolled hypertension or hypertensive end-organ damage
- Type 1 or 2 diabetes

For Liver Donor Only:

- HCV RNA positive
- HBsAg positive
- ZZ, Z-null, null-null, S-null, or untypeable alpha-1 antitrypsin phenotype
- Remnant liver volume < 30% of native liver volume
- Prior living liver donation

Core Principles of ERAS

- Preoperative education of patients and their families with an introduction to ERAS
- Reduced pre-operative fasting, with clear liquid oral carbohydrate loading until 2 hours prior to surgery
- Goal-directed strict intraoperative intravenous fluid therapy guidelines to avoid hypo-or hypervolemia

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- Avoidance of pre-operative mechanical bowel preparation
- Avoidance of routine nasogastric tube use
- Minimizing long-acting opioid analgesia in favor of regional anesthesia with epidural and/or local anesthesia for intra-operative and postoperative pain control when appropriate and using alternative non-opioid medications when appropriate (e.g., non-steroidal anti-inflammatories or acetaminophen)
- Early postoperative mobilization
- Early postoperative enteral feeding

ERAS Management Recommendations:

Pre-Operative Care

- Labs and testing to be ordered by the living donor surgery team and to be completed the day before surgery
- The pre-admission testing advanced practice nurse will:
 - Order a scopolamine patch if the patient is at high risk for postoperative nausea and vomiting
 - Order IV midazolam, adding a note in the plan
 - Instruct the patient on drinking a carbohydrate-rich drink up to 2 hours before surgery

Intra-Operative Care

- Anesthesia team will administer pre-operative medications (midazolam and scopolamine patch) following verification of donor paperwork with the living donor coordinator

For Kidney:

- Avoid NSAIDs
- For regional anesthesia, bilateral rectus sheath blocks plus TAP or QL blocks will be utilized
- Intraoperative medications will include mannitol, Lasix, and heparin.
- Avoidance of vasopressors and use of IVFs instead
- An anesthesiologist will order medications for the PACU

For Liver:

- For regional/neuraxial anesthesia, left lateral hepatectomy will use a thoracic epidural, and for right hepatectomy, an ESP catheter will be used, or a bilateral rectus sheath block will be used for either left or right hepatectomy. TAP or QL block will be utilized in addition to either option.
- Patients will be prepped to go directly to the PICU for post-operative care

Post-Operative Care

For Kidney:

- PACU to inpatient floor to include:
 - STAT labs in PACU include ionized CA, BMP, CBC, and then daily BMP and CBC once on the inpatient floor
 - Consultations from the Acute Pain Team, Nutrition, Social Work, and Medical/Pediatric Services for the living donor kidney program

For Liver:

- PICU care to include:
 - Abdominal/liver ultrasound upon arrival to PICU
 - Daily labs for BMP, hepatic function panel, and CBC

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- Consultations from the Acute Pain Team, Nutrition, Social Work, and Medical/Pediatric Services for the living donor liver program (when transferred from PICU to inpatient floor)

Additional Questions Posed by the ERAS Committee

No clinical questions were posed for this review.

Key Metrics Monitored:

Pre-Op	Intra-Op	Post-Op
Carbohydrate-rich drink	Avoidance of NSAIDs for the Kidney Donor	OOB first night
	Regional/Neuraxial Anesthesia	For Kidney Donor: STAT labs in PACU – ionized CA, BMP, CBC
	Multimodal Analgesia	For Liver Donor: Abdominal/liver ultrasound upon arrival to PICU

Value Implications

The following improvements may increase value by reducing healthcare costs and non-monetary costs (e.g., missed school/work, loss of wages, stress) for patients and families and reducing costs and resource utilization for healthcare facilities.

- Decreased inpatient length of stay
- Decreased unwarranted variation in care
- Improved communication between patients and care team throughout the perioperative period
- Improved post-operative pain control

Organizational Barriers and Facilitators

Potential Barriers

- Variability of acceptable level of risk among providers
- Challenges with follow-up faced by some patients and families

Potential Facilitators

- Collaborative engagement across care continuum settings during ERAS development
- High rate of use of the ERAS pathway

Bias Awareness

Our goal is to recognize the social determinants of health and minimize healthcare disparities, while acknowledging that unconscious biases can contribute to them.

Order Sets

- There are no order sets associated with this ERAS pathway

Education Materials

These clinical pathways do not establish a standard of care to be followed in every case. It is recognized that each case is different, and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time. It is impossible to anticipate all possible situations that may exist and to prepare a clinical pathway for each. Accordingly, these clinical pathways should guide care with the understanding that departures from them may be required at times.



- ERAS overview handout
 - Intended to be a general handout encompassing the key concepts and plan for an ERAS pathway
 - Found on the CM external website for each ERAS pathway
 - Available in [English](#) and [Spanish](#)

ERAS Pathway Preparation

This pathway was prepared by the EBP Department in collaboration with the Adult Living Donor: Kidney and Liver ERAS Pathway Committee, composed of content experts at Children's Mercy. If a conflict of interest is identified, the conflict will be disclosed next to the committee member's name.

Adult Living Donor: Kidney and Liver ERAS Committee Members and Representation

- Hilary Sheridan, MD | Pediatric Anesthesiology | Committee Chair
- Nichole Doyle, MD, FASA, FAAP | Pediatric Anesthesiology | Committee Member
- Emily Weisberg, MD, FASA | Pediatric Anesthesiology | Committee Member
- Gabriel Gallegos, MD | Pediatric Anesthesiology | Committee Member
- Andrew Bonham, MD, FACS | Transplant Surgery | Committee Member
- Tara Benton, MD, MSCI | Critical Care Medicine | Committee Member
- Amy Gallo, MD | Transplant Surgery | Committee Member
- Megan Faseler, BSN, RN, CPN, CCTC | Transplant Center | Committee Member
- Lindsey Patterson, BSN, RN | Transplant Center | Committee Member
- Heather Sambol, RN, APRN | Pediatric Anesthesiology | Committee Member

EBP Committee Members

- Todd Glenski, MD, MSHA, FASA | Anesthesiology, Evidence Based Practice
- Andrea Melanson, OTD, OTR/L | Evidence Based Practice

ERAS Development Funding

The development of this ERAS pathway was underwritten by the following departments/divisions: Pediatric Anesthesiology, Pediatric Surgery, Critical Care Medicine, The Transplant Center, and Evidence Based Practice.

Conflict of Interest

The contributors to the Adult Living Donor ERAS Pathway have no conflicts of interest to disclose related to the subject matter or materials discussed.

Approval Process

- This pathway was reviewed and approved by the EBP Department and the Adult Living Donor: Kidney and Liver ERAS Committee, after the committee members garnered feedback from their respective divisions/departments.

Review Requested

Department/Unit	Date Obtained
Pediatric Anesthesiology	October 2026

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Surgery	September 2026
Critical Care Medicine	September 2026
Transplant Center	September 2026
Evidence Based Practice	October 2026

Version History

Date		Comments
October 2026	Version one:	Developed algorithms and a synopsis

Date for Next Review:

- **October 2030**

Implementation & Follow-Up

- Once approved, the ERAS pathway was presented to appropriate care teams and implemented.
- Key metrics will be assessed and shared with the appropriate care teams to determine if changes are needed.
- Pathways are reviewed every 4 years (or sooner) and updated as necessary within the EBP Department at Children's Mercy. Pathway committees are involved with every review and update.

Disclaimer

When evidence is lacking or inconclusive, care options are provided in the supporting documents accompanying the ERAS pathway.

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