PERFECTING THE SURGICAL JOURNEY
ERAS CARDIAC

NEWSLETTER

November 1, 2024 | VOLUME 07 | ISSUE 03
Editor: Rawn Salenger, MD

RECENT FINDINGS FROM THE RANDOMIZED PROTECTION TRIAL

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Approximately 20 to 40% of patients undergoing cardiac surgery experience acute kidney injury (AKI), resulting in a higher rate of short and long-term mortality. (1)

A recent joint consensus statement suggested, with a moderate quality of evidence, routine screening for early diagnosis of post-operative AKI(2) Furthermore, where appropriate, the use of comprehensive treatment according to Kidney Disease: Improving Global Outcomes (KDIGO) care bundles is supported. Accepted interventions include rigorous monitoring of serum creatinine and urine output, avoiding administration of nephrotoxic agents and maintenance of adequate hemodynamic status. Notably, beyond the implementation of these supportive measures, no pharmacological preventive strategy is indicated.

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NOVEL PATHWAYS TO AVOID ACUTE KIDNEY INJURY FOLLOWING CARDIAC SURGERY

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The complement cascade is the brute force behind homeostasis management in the body. It protects our body against invading organisms and cleanses damaged and abnormal cells. Overactive complement activity, however, can lead to excessive inflammation and possibly end organ damage[1]. Specifically, there is evidence that the complement cascade may be involved in ischemia-reperfusion-injury and the subsequent development of acute kidney injury (AKI).[2]

Cardiac surgery-associated acute kidney injury (CSA-AKI) is one of the most prevalent complications of cardiac surgery, and in patients with chronic kidney disease (CKD) the outcomes of CSA-AKI are extremely poor[3]. This may be

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BEYOND MORTALITY - POST-OPERATIVE COMPLICATIONS REMAIN A THORN IN THE SIDE OF CARDIAC SURGERY

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Advancements in cardiac surgery procedures, processes, and quality initiatives have made major strides in recent years in reducing surgery-associated mortality. Yet, the rate of post-operative complications remains unchanged over time, with significant implications for patients, providers, and institutions. A major driver of postoperative complications is new organ dysfunction that is, in part, driven by inflammation and oxidative stress from patient baseline comorbidities and surgical triggers (i.e., cardiopulmonary bypass [CPB], surgical trauma, and ischemia-reperfusion injury).

The Society for Thoracic Surgery (STS) database collects a broad range of post-operative complications following surgery; however, quality measures have largely focused on mortality and the occurrence of 5 "major morbidities" (stroke, reoperation for bleeding, deep sternal wound infection, renal failure, and prolonged intubation). Seminal work by Mehaffey and colleagues[1] reported that approximately 1 in 3 patients

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COACH'S CORNER

A Deeper Dive into the Perioperative Care in Cardiac Surgery Joint Consensus Statement by the Enhanced Recovery After Surgery (ERAS) Cardiac Society, ERAS International Society, and The Society of Thoracic Surgeons (STS).

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Although patient engagement and education has always been a cornerstone element, the recent *Perioperative Care in Cardiac Surgery: Joint Consensus Statement* emphasized the term "shared decision-making" for the first time in any set of Enhanced Recovery After Surgery (ERAS) guidance.[1] Shared decision-making involves explicit discussion between the patient, their social support network and their clinical team to review their individual circumstances, the available therapeutic options and select the best course of action while incorporating the patient's personal goals, values, beliefs and preferences.[1]

Shared decision-making is endorsed by a number of recent guidelines and consensus statements, including those put forward by several major cardiac procedural societies.[2-3] It necessarily repositions the patient at the center of their own care, working in partnership with their physician, as opposed to the more traditional paternalistic role typically assumed by the surgeon and their team. By explicitly seeking to incorporate the

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MORE INSIDE:

RECENT FINDINGS FROM THE RANDOMIZED PROTECTION TRIAL

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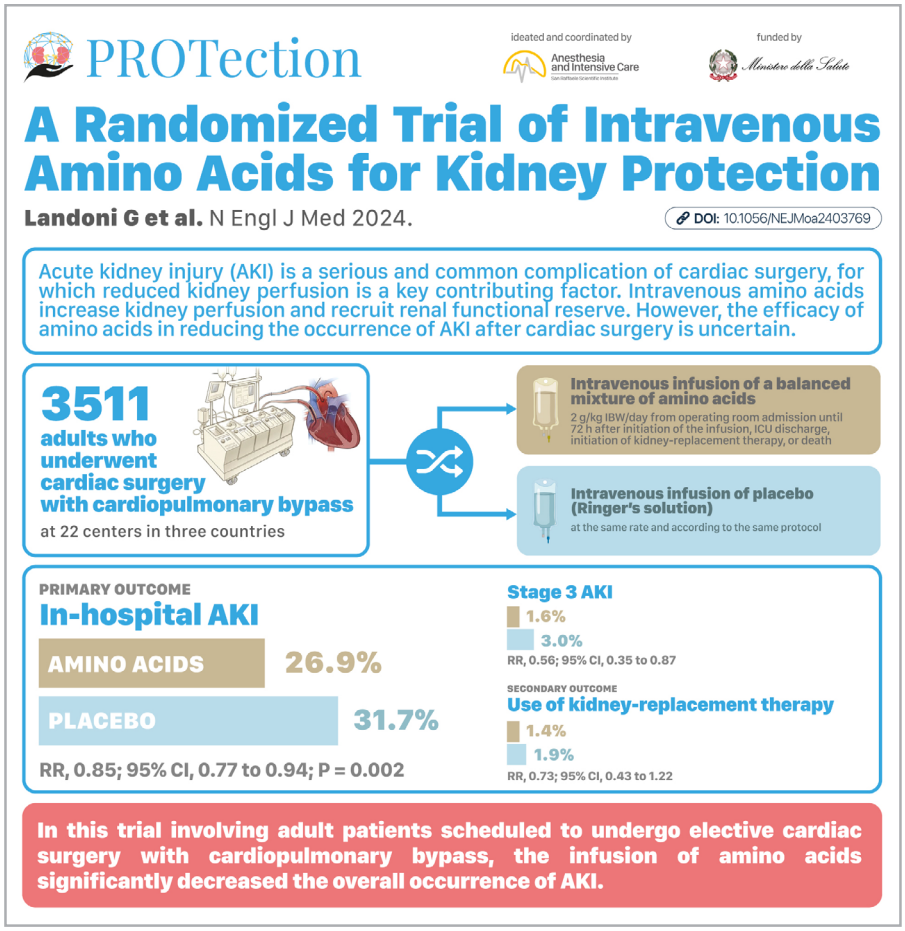
Intravenous amino acids are known to increase renal perfusion and renal functional reserve. Therefore, we performed the multinational, double-blind, randomized Intravenous Amino Acid Therapy for Kidney Protection in Cardiac Surgery (PROTECTION) trial, recently published in NEJM.[3]

Patients undergoing elective cardiac surgery requiring cardiopulmonary bypass and expecting to stay in the Intensive Care Unit at least one night after surgery were enrolled.

OUR RANDOMIZED TRIAL FOUND THAT 30-HOURS INFUSION OF INTRAVENOUS AMINO ACIDS REDUCED THE RISK OF CARDIAC SURGERY-ASSOCIATED AKI.

Patients were randomized to treatment group (infusion of a balanced mixture of amino acids at a dose of 2 g per kilogram of ideal body weight per day) or to Ringer's solution at the same rate for maximum 72 hours. The primary outcome was the occurrence of AKI within the first week after surgery. The PROTECTION trial enrolled 3512 patients: at the time of hospital discharge, the incidence of AKI was 26,9 % (474 patients) in the amino acid group and 31,7% in the placebo group (555 patients) (relative risk, 0.85; 95% confidence interval [CI], 0.77 to 0.94; P = 0.002). No drug adverse reaction was reported. Our randomized trial found that a 30-hours infusion of intravenous amino acids reduced the risk of cardiac surgery-associated AKI.



Dr. Landoni and the PROTECTION Trial team

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3. Landoni G, Monaco, F, Ti LK et al. A randomized trial of Intravenous Amino Acid for Kidney Protection. N Engl J Med 2024; 391: 687-98.

NOVEL PATHWAYS TO AVOID ACUTE KIDNEY INJURY FOLLOWING CARDIAC SURGERY

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related to renal functional reserve being diminished in patients with CKD. AKI occurs in approximately 50% of patients with CKD undergoing cardiac surgery[2] compared with 22% of patients without CKD[4] and is associated with increased costs, complications, and mortality.[5] A recent report from the STS Database analysed 287,359 patients and found that preoperative CKD was associated with increasing CSA-AKI rates, dialysis, transfusion need, and mortality at 30 days.[6] The incidence of AKI postoperatively increased with higher preoperative CKD stage, as did requirement for postoperative dialysis and operative mortality (Fig 1 and 2). Indeed, expected estimates of postoperative renal failure (approximating KDIGO stage 3 AKI) using the STS risk model underestimated the observed rates specifically for the CKD population. These data indicate the increased risk of deleterious outcomes that may occur in patients with CKD undergoing cardiac surgery with CPB and the continued unmet need for interventions to prevent or treat AKI[6].

The ARTEMIS (NCT05746559) study is an ongoing interventional phase 3 trial investigating a single dose of a complement inhibitor ahead of surgery to prevent major adverse kidney events. This study is focused on those CKD stage 3a, 3b, and 4 patients at highest risk of acute kidney injury[7].

PREOPERATIVE CKD WAS ASSOCIATED WITH INCREASING CSA-AKI RATES, DIALYSIS, TRANSFUSION NEED, AND MORTALITY AT 30 DAYS

1. Thurman J, Nester CM. All Things Complement Clin J Am Soc Nephrol 2016; 11 (10): 1856

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5. Schurle A, Koyner JL. CSA-AKI: Incidence, Epidemiology, Clinical Outcomes, and Economic Impact. J Clin Med 2021;10:5746.

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7. https://classic.clinicaltrials.gov/ct2/show/NCT05746559

Figure 1

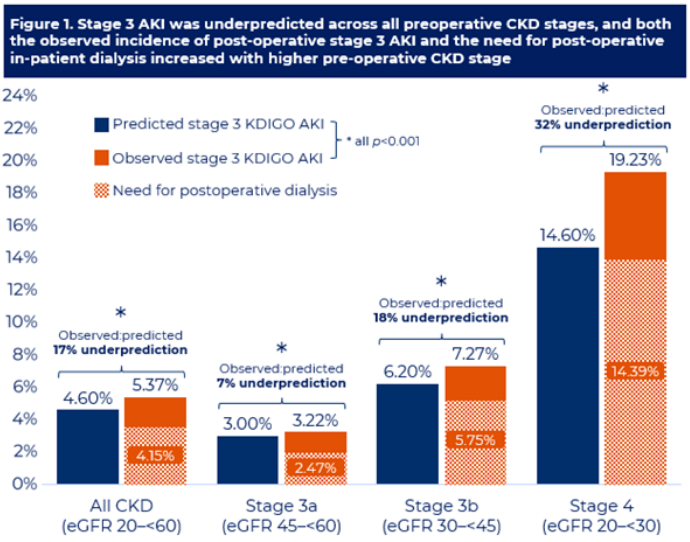
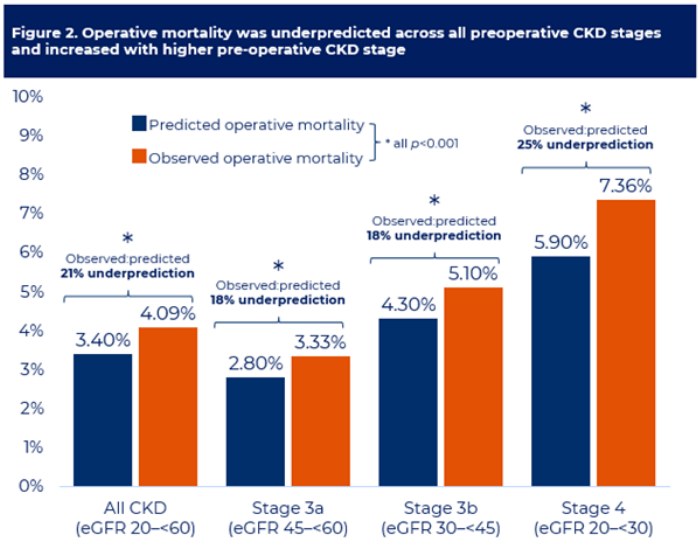


Figure 2



BEYOND MORTALITY - POST-OPERATIVE COMPLICATIONS REMAIN A THORN IN THE SIDE OF CARDIAC SURGERY

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undergoing CABG surgery experience at least one "major morbidity" following surgery. Additional studies have evaluated a wider range of complications. A Mayo Clinic study found that 67% of patients undergoing CABG and/or valve surgery experienced at least one of the 17 complications evaluated (including blood product transfusion).[2] Perhaps the largest dataset comes from an analysis of the 90 institutions participating in the IMPROVE Network. When assessing the occurrence of 19 potential complications within this large cohort, ~22-54% of patients undergoing CABG surgery experienced at least one postoperative complication.[3]

Other morbidities beyond the "major 5", such as new-onset atrial fibrillation, vasoplegia, blood product use, delirium, and readmissions, remain important issues to manage in cardiac surgery patients. Their impact can be far-reaching, such as increased rates of failure-to-rescue (defined as postoperative inpatient death after a potentially treatable STS major complication) and increased long-term mortality at 5-10 years post-surgery.[2,3] Patients suffering more than 1 postoperative complication (e.g. prolonged mechanical ventilation and acute kidney injury) experience higher mortality rates[2] and the costs associated with care rise exponentially with each additional complication.[1] Accurate measurement and awareness of rates of complications, frequent discussion on areas of improvement, and thoughtful analysis are critical to advance the quality of care and clinical outcomes.

Keys to quality improvement should include identifying what matters most to the patient, focusing on what can be feasibly measured and targeted, and establishing processes that facilitate interdisciplinary teamwork to implement change. Identifying risk factors and optimizing patients in the pre-operative setting is a critical first step. Further, systems or programs that are put in place should reduce unnecessary variability in patient care and be adaptable to changes in patient complications and outcomes over time.[4] As such, there is a need for the CT Surgery perioperative community to help steer the discussion from primarily focused on mortality, to concentrate on the incidence and severity of post-operative complications, in order to help return patients to their best functional status as quickly as possible after surgery.

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3.Likosky DS, Strobel RJ, Wu X, et al. Interhospital Failure to Rescue After Coronary Bypass Grafting. J Thorac Cardiovasc Surg. 2023;165(1):134-143.

4.Alabbadi S, Roach A, Chikwe J, et al. National trend in failure to rescue after cardiac surgeries. J Thorac Cardiovasc Surg. 2023; 166(4):1157-1165

COACHES CORNER

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patient's unique perspective, shared decision-making can serve as a mitigation strategy against potential bias, establish appropriate expectations, and provide a foundation for the informed consent process.[1]

A more ubiquitous part of the preoperative process, shared decision-making is now often included as part of the routine battery of laboratory work, functional testing, imaging and counseling that contribute to the overall risk assessment ahead of surgery.[4] Recent publications have highlighted elements that ensure greater success in shared decision-making, including having a consistent structure to the conversation, providing appropriate clinical context and rationale for the therapeutic options, and allowing for collaborative deliberation.[5] Application of the shared decision-making process has been shown to enhance comprehension, improve decision quality and reduce conflict without engendering greater anxiety among older patients undergoing cardiac surgery.[6] Although far more work is required to identify the key barriers and facilitators of high quality shared decision-making, it's clear the principle should be a core component of patient engagement and education.

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2. Writing Committee Members; Lawton JS, Tamis-Holland JE, Bangalore S, Bates ER, Beckie TM, Bischoff JM, Bittl JA, Cohen MG, DiMaio JM, Don CW, Fremes SE, Gaudino MF, Goldberger ZD, Grant MC, Jaswal JB, Kurlansky PA, Mehran R, Metkus TS Jr, Nnacheta LC, Rao SV, Sellke FW, Sharma G, Yong CM, Zwischenberger BA. 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol. 2022 Jan 18;79(2):e21-e129. doi: 10.1016/j.jacc.2021.09.006. Epub 2021 Dec 9. Erratum in: J Am Coll Cardiol. 2022 Apr 19;79(15):1547.

3. Writing Committee Members; Isselbacher EM, Preventza O, Hamilton Black Iii J, Augoustides JG, Beck AW, Bolen MA, Braverman AC, Bray BE, Brown-Zimmerman MM, Chen EP, Collins TJ, DeAnda A Jr, Fanola CL, Girardi LN, Hicks CW, Hui DS, Jones WS, Kalahasti V, Kim KM, Milewicz DM, Oderich GS, Ogbechie L, Promes SB, Ross EG, Schermerhorn ML, Times SS, Tseng EE, Wang GJ, Woo YJ. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol. 2022 Dec 13;80(24):e223-e393.

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RECENT ERAS® CARDIAC PUBLICATIONS:

>> Click titles for weblinks

Crisafi C, Grant MC, Rea A, et al. Enhanced Recovery After Surgery Cardiac Society turnkey order set for surgical-site infection prevention: Proceedings from the American Association for Thoracic Surgery ERAS Conclave 2023. J Thorac Cardiovasc Surg. 2024 Apr 3:S0022-5223(24)00281-2.

Chatterjee S, Cangut B, Rea A, et al. Enhanced Recovery After Surgery Cardiac Society turnkey order set for prevention and management of postoperative atrial fibrillation after cardiac surgery: Proceedings from the American Association for Thoracic Surgery ERAS Conclave 2023. JTCVS Open. 2024 Feb 19;18:118-122.

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Mauney C, Etchill E, Rea A, et al.. What drives variability in postoperative cardiac surgery transfusion rates? J Thorac Cardiovasc Surg. 2024 Feb 7:S0022-5223(24)00109-0.

Gerdisch MW, Johns CM, Barksdale A, Parikshak M. Rigid Sternal Fixation and Enhanced Recovery for Opioid-Free Analgesia After Cardiac Surgery. Ann Thorac Surg. 2024 Oct;118(4):931-939.

Rea A, Salenger R, Grant MC, et al. Preoperative medication management turnkey order set for nonemergent adult cardiac surgery. JTCVS Open, in press.

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Delijani D, Race A, Cassiere H, et al. Impact of Limited Enhanced Recovery Pathway for Cardiac Surgery: A Single-Institution Experience. J Cardiothorac Vasc Anesth. 2024 Jan;38(1):175-182.

UPCOMING MEETINGS:

>> Click on icons for weblinks

American Association of Anesthesiologists
October 19-22, Philadelphia, PA

STS Perioperative & Critical Care Conference
October 25-26, Philadelphia, PA

12th Current Trends in Aortic and Cardiovascular Surgery Symposium
November 1-2, Houston, TX

ERAS Cardiac Expert Retreat
November 8-9, Miami, FL

STS/EACTS/LACES Latin America Cardiovascular Surgery Conference
December 5-7, Buenos Aires, Argentina

Society of Thoracic Surgeons 61st Annual Meeting
January 24-26, Los Angeles, CA

Society of Critical Care Medicine
February 23-25, Orlando, FL

ERAS© Cardiac Society MISSION

The mission of the ERAS® Cardiac Society is to optimize perioperative care of cardiac surgical patients through collaborative discovery, analysis, expert consensus, and dissemination of best practices worldwide.

Who We Are

The ERAS® Cardiac Society is an international non-profit organization comprised of experts from around the world, including participation from all members of the healthcare team. Led by an executive board, an advisory board, and a pool of subject matter experts, our members strive to implement enhanced recovery principles at their local institutions while advancing improved patient care internationally through collaboration, education, and dissemination of up-to-date knowledge regarding optimal perioperative care.

ERAS® Society

The ERAS® Society is an international organization with enhanced recovery guidelines for several surgical sub-specialties. Beginning as the ERAS® Study Group in 2001, team leaders Professor Ken Fearon (University of Edinburgh) and Professor Olle Ljungqvist (Karolinska Insitutet) spearheaded the developments made in multimodal surgical care. The ERAS® Study Group soon discovered that there were a variety of local traditions in practice, as well as an inconsistent application of evidence-based best practices. This prompted the group to examine the process of change from tradition to best-practice. Since its inception, the ERAS® Society has expanded to include several subspecialties, emphasized the benefits of standardized best-practices across the continuum of the perioperative period, highlighted the importance of data-driven self-evaluation, and promoted the improvement of patient care.

Our Organizational Structure

Our ERAS® Cardiac Society is made up of experts from around the world, including participation from all members of the healthcare team. Our members strive to implement enhanced recovery principals at their local institutions while advancing improved patient care internationally through collaboration, education, and dissemination of up-to-date knowledge regarding optimal perioperative care. Our organization is divided into an Executive Board, Advisory Board, and a pool of Subject Matter Experts.

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