

AKI 01 Review - November 27, 2023

Review AKI 01 Measure Specification by selecting this [link](#)

Feedback from Measure Reviewer(s) Dr. Michael Mathis - University of Michigan

Review of new literature (Published 5/2017, Reviewed 10/2020)

- 1) Prowle JR, Forni LG, Bell M, Chew MS, Edwards M, Grams ME, Grocott MPW, Liu KD, McIlroy D, Murray PT, Ostermann M, Zarbock A, Bagshaw SM, Bartz R, Bell S, Bihorac A, Gan TJ, Hobson CE, Joannidis M, Koyner JL, Levett DZH, Mehta RL, Miller TE, Mythen MG, Nadim MK, Pearse RM, Rimmel T, Ronco C, Shaw AD, Kellum JA: **Postoperative acute kidney injury in adult non-cardiac surgery: joint consensus report of the Acute Disease Quality Initiative and PeriOperative Quality Initiative (ADQI/POQI)**. *Nat Rev Nephrol* 2021; 17:605–18

Prevention of postoperative AKI: Intraoperative Strategies:

- Consensus Statement 4a
 - We recommend not using restrictive or zero-balance perioperative fluid regimens in major elective surgery (except in specific circumstances). Such regimens are associated with increased risk of postoperative acute kidney injury (PO-AKI) (grade B evidence; strong recommendation).
- Consensus Statement 4b
 - We recommend the use of goal-directed haemodynamic therapy in high-risk patients to optimize volume status, blood pressure and cardiac output and reduce the risk of PO-AKI (grade B evidence; strong recommendation).
- **Consensus Statement 4c**
 - **We recommend maintaining an intraoperative mean arterial blood pressure (MAP) >65 mmHg to reduce the risk of PO-AKI. The risk of AKI is a function of both the magnitude of hypotension and its duration. For selected patients, including those with pre-existing systemic hypertension, a higher MAP target should be considered (grade C evidence; weak recommendation).**
- **Consensus Statement 4d**
 - **We recommend the perioperative use of balanced crystalloids rather than 0.9% saline to reduce the risk of PO-AKI (grade C evidence; strong recommendation).**
- Consensus Statement 4e

- In the setting of elective surgery outside of the ICU, insufficient evidence exists to make a recommendation regarding the choice of crystalloids or colloids for volume expansion to modify the risk of PO-AKI (ungraded).

- 2) Maheshwari K, Turan A, Makarova N, Ma C, Ali Sakr Esa W, Ruetzler K, Barsoum S, Kuhel A, Ritchey MR, Higuera-Rueda C, Kpyeva T, Stocchi L, Essber H, Cohen B, Suleiman I, Bajracharya GR, Chelnick D, Mascha EJ, Kurz A, Sessler DI: **Saline versus Lactated Ringer's Solution: The Saline or Lactated Ringer's (SOLAR) Trial.** *Anesthesiology* 2020.

There were **no significant differences** in acute kidney injury stages [between patients receiving lactated ringers versus 0.9% saline,] and the magnitude of the changes was not clinically meaningful.

- 3) Privratsky JR, Fuller M, Raghunathan K, Ohnuma T, Bartz RR, Schroeder R, Price TM, Martinez MR, Sigurdsson MI, Mathis MR, Naik B, Krishnamoorthy V: **Postoperative Acute Kidney Injury by Age and Sex: A Retrospective Cohort Association Study.** *Anesthesiology* 2023; 138:184–94

Appropriateness of rationale

Postoperative AKI remains a common complication after surgery with substantial patient health impact, leading to increased hospital length of stay, additional complications, progression to chronic kidney disease, and mortality. Mechanisms of postoperative AKI are multifactorial (renal hypoperfusion, oxido-inflammatory stress, nephrotoxic medication administration, and neuroendocrine responses to surgery) and mitigating these intraoperative renal insults therefore is a joint responsibility across all perioperative care team members.

The anesthesiologist's role in AKI risk-reducing perioperative practice patterns includes:

- Avoiding hypotension
- Goal-directed hemodynamic therapy to optimize volume status and cardiac output
- Use of balanced crystalloids rather than 0.9% saline, when appropriate
- Managing risk vs. benefit of discontinuing ACEIs/ARBs; risk vs. benefit of NSAIDs
- Avoiding perioperative hyperglycemia

Whereas not all postoperative AKI is avoidable - and most postoperative AKI is not *solely* attributable to the anesthesiologist - this quality measure remains highly appropriate to the extent that anesthesiologists can play a role in (i) upholding best practices for reducing AKI, and (ii) participating in hospital-level perioperative care initiatives potentially impacting postoperative AKI.

Evaluation of inclusion/ exclusion criteria

Inclusions and exclusions remain appropriate; these primarily cover:

- 1) Moribund patients or patients with pre-existing renal failure
- 2) Patients where creatinine values are unavailable
- 3) Short/minor procedures for which any postoperative AKI was more likely a result of a patient's underlying pathology and/or acute disease state warranting the procedure, rather than the quality of perioperative care surrounding the procedure.
- 4) Procedures in which direct injury to kidneys and/or ureter occurs
- 5) Procedures with complex pathophysiology (e.g., liver transplant) warranting evaluation potentially with a future, separate quality measure more precisely tailored to nuances of those cases.

Evaluation of definition of success or flagged cases

Measure success remains based upon the creatinine component of the KDIGO international consensus guideline definition of AKI. As (i) the KDIGO AKI definition remains unchanged since the time of the 2020 review of this measure; and (ii) the other components of the KDIGO AKI definition (urine output, postoperative dialysis) remain incompletely captured within MPOG, the definition of measure success may be kept as-is.

Other feedback

1. (Moderate recommendation): Based on consensus statement 4c in ADQI/POQI article above, we might consider the attributable provider to be any provider who failed the BP-03 measure (MAP <65 for >15 minutes) as opposed to BP-01 (MAP <55 for >20 minutes) for the case.
2. (Future consideration): Based on consensus statement 4d in ADQI/POQI, in cases of AKI without intraoperative hypotension, we might consider the attributable provider as the provider who administered the most 0.9% saline (as opposed to balanced crystalloids, e.g. lactated ringers) during the case.

However, in contrast to the consensus guideline recommendation (which remains Grade C evidence), **the SOLAR trial found no statistically significant or clinically meaningful difference in AKI** (secondary outcome; hence Grade C evidence) among patients undergoing colorectal or orthopedic surgery:

“Presumably, the key distinction is that surgical patients are relatively healthy and the amount of intraoperative fluid given is relatively small. Available evidence thus suggests that modest volumes of intraoperative saline do not cause more renal injury than lactated Ringer’s solution, but that prolonged administration of large volumes in critically ill patients does.”

Should stronger future evidence emerge in favor of balanced crystalloids over 0.9% saline, we might consider a “minimizing 0.9% saline” (as opposed to balanced crystalloids) QI measure, with multiple exclusions which would acknowledge exclusion reasons for situations in which it may be appropriate to administer 0.9% saline instead of balanced crystalloids:

- a. Preoperative hypochloremia based upon [preoperative chloride](#) phenotype
- b. Preoperative hyponatremia based upon [preoperative sodium](#) phenotype
- c. Lactic acidosis based upon [preoperative lactate](#) phenotype
- d. Preoperative eGFR <30 mL/min/1.73m² based on [Preoperative eGFR \(Lowest\)](#) phenotype
- e. Massive transfusion (e.g. >4 units of blood transfused or EBL >2000 mL)
- f. Surgical cases at risk of elevated ICP (e.g. neurosurgical cases, traumatic brain injury patients)
- g. etc.

Recommendation from Dr. Mathis for AKI 01:

	Dr. Mathis	QC Vote 11.27.23
Keep as is: no changes at all	☐	☐
Modify: changes to measure specifications (see “other feedback” for proposed changes)	☒	☒
Retire: eliminate entirely from dashboard and emails	☐	☐



Current AKI 01 Performance (Inverse Measure)
All MPOG Institutions
November 2022 - October 2023

