

AKIN Classification for Acute Kidney Injury (AKI)

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Evidence to Action: Official Journal of MDCalc

Vol. 042024, Issue 01, 2024

Article Information

Keywords: AKI, acute kidney injury, acute renal failure, AKF, acute kidney failure, glomerular filtration rate, kidney disease, urine output, RIFLE criteria

<https://doi.org/10.65357/001c.142303>

Submitted: November 01, 2024 EST

Published: November 20, 2024 EST

Abstract

The AKIN (Acute Kidney Injury Network) score is a classification system used to identify and stage acute kidney injury (AKI) based on changes in serum creatinine and urine output over a short period. It helps clinicians detect AKI early, particularly in hospitalized or critically ill patients. While the AKIN score is sensitive for early detection, its predictive accuracy for long-term outcomes like mortality or need for dialysis is modest. It should be used as a bedside tool to prompt closer monitoring and early intervention. Clinicians should be cautious in patients with fluctuating creatinine levels or pre-existing kidney disease, as baseline function and fluid status may affect accuracy.

HOW TO USE

When to Use

To detect acute kidney injury when serum creatinine is above baseline levels.

Pearls and Pitfalls

It is important to remember that creatinine is a product of normal turnover of muscle cells and is merely a marker of kidney function. Serum creatinine is a late marker of kidney injury, often lagging the onset of AKI. This can result in underestimation of the true incidence and severity of AKI. The relationship between serum creatinine and eGFR (amount of kidney function) is not linear but rather curvilinear. Therefore, the same absolute increase in creatinine may represent a different severity of acute kidney injury (AKI) depending on the presence or absence of baseline kidney dysfunction.

Differences in assay methods can affect serum creatinine measurements, impacting AKI staging accuracy. AKIN criteria may not adequately identify or distinguish between different etiologies of AKI, which might have different prognoses and treatment implications. RIFLE score that is also used to classify the severity of acute kidney injury performs similar to AKIN score.¹⁻⁵

Patients who require Renal Replacement Therapy (RRT) are automatically assigned to Stage 3, regardless of their serum or urine creatinine level..²

Why Use

It is important to recognize when a change in creatinine is clinically significant so that a search for the cause can

be undertaken to prevent further damage. The score provides a standardized definition and staging system for AKI, which improves consistency and comparability of AKI research and clinical practice across different institutions.

NEXT STEPS

Advice

1. Prerenal: Not all elevations in creatinine represent actual injury to cells within the kidneys. Volume depletion (or effective arterial volume depletion) results in a need to retain sodium and other solutes at the level of the tubule to help support blood pressure. This can be marked by the presence of a low fractional excretion of sodium and can be effectively treated with volume expansion. While this is often called AKI, it is technically a physiologic response to decreased renal perfusion.
2. Renal: Renal or intrarenal causes of acute kidney injury include damage to the glomeruli (glomerulopathies) or tubules (acute tubular necrosis or allergic interstitial nephritis). Next steps should include the examination of the urine to try to determine the location of the injury within the nephron.
3. Postrenal: Post renal causes are generally due to obstruction to urine flow at the level of the ureters, bladder, or urethra.^{1,2,4}

Management

The management of AKI is both supportive and etiology-focused. While kidney biopsy is frequently not needed to

determine the cause of AKI, it can provide essential information particularly if a glomerulopathy is felt to be the cause of the loss of kidney function.

Critical Actions

Management should focus on identification of the cause of kidney injury, determination of the need for a kidney biopsy, and reversal of all contributing factors to prevent further loss of kidney function.

AKIN should be used after adequate hydration and exclusion of reversible causes such as obstruction.

EVIDENCE

Evidence Appraisal

While studies have shown that AKI identified using the AKIN criteria is associated with an increased risk of dialysis and mortality, the strength of this association remains uncertain due to limited long-term follow-up in most trials. As a result, the long-term prognostic value of the AKIN tool has not been definitively established.

Formula

To be diagnosed with acute kidney injury by the AKIN definition, patient must have at least one of the following

within the past 48 hours: 1. Absolute increase in serum creatinine ≥ 0.3 mg/dL (≥ 26.4 $\mu\text{mol/L}$), or 2. Increase in serum creatinine ≥ 1.5 x above baseline, or 3. Oliguria (urine output < 0.5 mL/kg/hr) for > 6 hrs. Then, select the appropriate criterion leading to the highest possible stage, e.g. if serum creatinine is normal but urine output is < 0.5 mL/kg/hour for > 12 hours, AKIN Stage is 2. Akin stages are listed in [Table 1](#).^{1,2}

Table 1. Akin Stages

AKIN Stage	Serum Creatinine	Duration of Oliguria
Stage 1	Absolute increase ≥ 0.3 mg/dL (≥ 26.4 $\mu\text{mol/L}$) or ≥ 1.5 – 2 x from baseline	> 6 to 12 hr
Stage 2	Increase to > 2 – 3 x from baseline	> 12 to < 24 hr
Stage 3	Increase to > 3 x from baseline, or ≥ 4.0 mg/dL (≥ 354 $\mu\text{mol/L}$) with acute increase ≥ 0.5 mg/dL (≥ 44 $\mu\text{mol/L}$)	≥ 24 hr (or anuria for 12 hr)

MDCALC URL

<https://www.mdcalc.com/calc/10018/akin-classification-acute-kidney-injury-aki>

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SUPPLEMENTARY MATERIALS

AKIN SCF

Download: <https://mdcalc.scholasticahq.com/article/142303-akin-classification-for-acute-kidney-injury-aki/attachment/294573.docx>
