

# KDIGO

## GUIDELINES FOR ACUTE KIDNEY INJURY

A Quick Reference Guide



***Baxter***

# About The Quick Reference

The 2012 Kidney Disease: Improving Global Outcomes (KDIGO) Clinical Practice Guideline for acute kidney injury (AKI)<sup>1</sup> aims to assist practitioners caring for adults and children at risk for or with AKI. Guideline development followed an explicit process of evidence review and appraisal.

Guideline recommendations are based on systematic reviews of relevant trials. Appraisal of the quality of the evidence and the strength of recommendations followed the GRADE approach.

This Quick Reference Guide contains a number of important recommendations that have been extracted directly from the published KDIGO Guidelines. For the full version of the KDIGO Guidelines, please visit [www.kdigo.com](http://www.kdigo.com).



# Guideline Rating Nomenclature

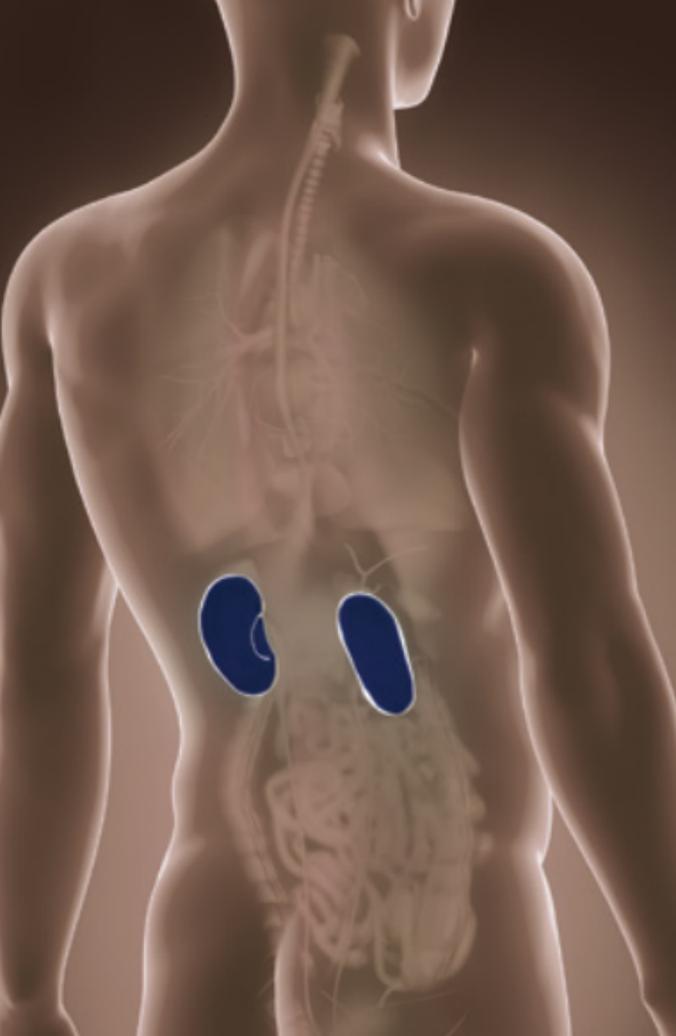
Within each recommendation, the strength of recommendation is indicated as Level 1, Level 2, or Not Graded, and the quality of the supporting evidence is shown as A, B, C, or D. The implications of the recommendation for clinicians and the meaning of the assigned quality of evidence are as follows\*:

Grade**	Clinicians
<b>Level 1</b> “We recommend”	Most patients should receive the recommended course of action.
<b>Level 2</b> “We suggest”	Different choices will be appropriate for different patients. Each patient needs help to arrive at a management decision consistent with her or his values and preferences.

Grade	Quality of evidence	Meaning
A	High	We are confident that the true effect lies close to that of the estimate of the effect.
B	Moderate	The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
C	Low	The true effect may be substantially different from the estimate of the effect.
D	Very low	The estimate of effect is very uncertain, and often will be far from the truth.

\*Please refer to the Guideline for the implications of the recommendation for patients and for policy

\*\*The additional category "Not Graded" was used, typically, to provide guidance based on common sense or where the topic does not allow adequate application of evidence. The most common examples include recommendations regarding monitoring intervals, counseling, and referral to other clinical specialists. The ungraded recommendations are generally written as simple declarative statements, but are not meant to be interpreted as being stronger recommendations than Level 1 or 2 recommendations.



## Definitions

**CRRT** - Continuous Renal Replacement Therapy

**RRT** - Renal Replacement Therapy

## AKI Definitions

**2.1.1:** AKI is defined as any of the following  
(Not Graded):

- Increase in SCr by  $\geq 0.3$  mg/dl ( $\geq 26.5$   $\mu\text{mol/l}$ ) within 48 hours; OR
- Increase in SCr to  $\geq 1.5$  times baseline, which is known or presumed to have occurred within prior 7 days; OR
- Urine volume  $<0.5$  ml/kg/h for 6 hours

# Staging

**2.1.2:** AKI is staged for severity according to the following criteria (below).  
(Not Graded)

## Staging of AKI

Stage	Serum Creatinine	Urine Output
1	1.5-1.9 times baseline OR $\geq 0.3$ mg/dl ( $\geq 26.5$ $\mu$ mol/l) increase	$< 0.5$ ml/kg/h for 6-12 hours
2	2.0-2.9 times baseline	$< 0.5$ ml/kg/h for $\geq 12$ hours
3	3.0 times baseline OR increase in serum creatinine to $\geq 4.0$ mg/dl ( $\geq 353.6$ $\mu$ mol/l) OR initiation of renal replacement therapy OR, in patients $< 18$ years, decrease in eGFR to $< 35$ ml/min per $1.73$ m <sup>2</sup>	$< 0.3$ ml/kg/h for $\geq 24$ hours OR Anuria for $\geq 12$ hours

## AKI Stage:

### Stage-based management of AKI

Shading of boxes indicates priority of action—solid shading indicates actions that are equally appropriate at all stages whereas graded shading indicates increasing priority as intensity increases.

## High Risk

1

Discontinue all nephrotoxic agents when possible

Ensure volume status and perfusion pressure

Consider functional hemodynamic monitoring

Monitor Serum creatinine and urine output

Avoid hyperglycemia

Consider alternatives to radiocontrast procedures

Non-invasive diagnostic

Consider invasive diagnostic

2

3

ic workup

nostic workup

Check for changes in drug dosing

Consider Renal Replacement Therapy

Consider ICU admission

Avoid subclavian catheters if possible

# RRT Use

- 5.1.1:** Initiate RRT emergently when life-threatening changes in fluid, electrolyte, and acid-base balance exist. (Not Graded)
- 5.1.2:** Consider the broader clinical context, the presence of conditions that can be modified with RRT, and trends of laboratory tests—rather than single BUN and creatinine thresholds alone—when making the decision to start RRT. (Not Graded)
- 5.2.1:** Discontinue RRT when it is no longer required, either because intrinsic kidney function has recovered to the point that it is adequate to meet patient needs, or because RRT is no longer consistent with the goals of care. (Not Graded)
- 5.2.2:** We suggest not using diuretics to enhance kidney function recovery, or to reduce the duration or frequency of RRT. (2B)

# RRT Anticoagulation

**5.3.1:** In a patient with AKI requiring RRT, base the decision to use anticoagulation for RRT on assessment of the patient's potential risks and benefits from anticoagulation (see flow chart on next page). (Not Graded)

**5.3.1.1:** We recommend using anticoagulation during RRT in AKI if a patient does not have an increased bleeding risk or impaired coagulation and is not already receiving systemic anticoagulation. (1B)

Some of the uses of the products described in the KDIGO guidelines have not been approved or cleared by the FDA. For example, citrate has not been approved for use as an anticoagulant for CRRT in the United States.

**5.3.2:** For patients without an increased bleeding risk or impaired coagulation and not already receiving effective systemic anticoagulation, we suggest the following:

**5.3.2.1:** For anticoagulation in intermittent RRT, we recommend using either unfractionated or low-molecular-weight heparin, rather than other anticoagulants. (1C)

**5.3.2.2:** For anticoagulation in CRRT, we suggest using regional citrate anticoagulation rather than heparin in patients who do not have contraindications for citrate. (2B)

**5.3.2.3:** For anticoagulation during CRRT in patients who have contraindications for citrate, we suggest using either unfractionated or low-molecular-weight heparin, rather than other anticoagulants. (2C)

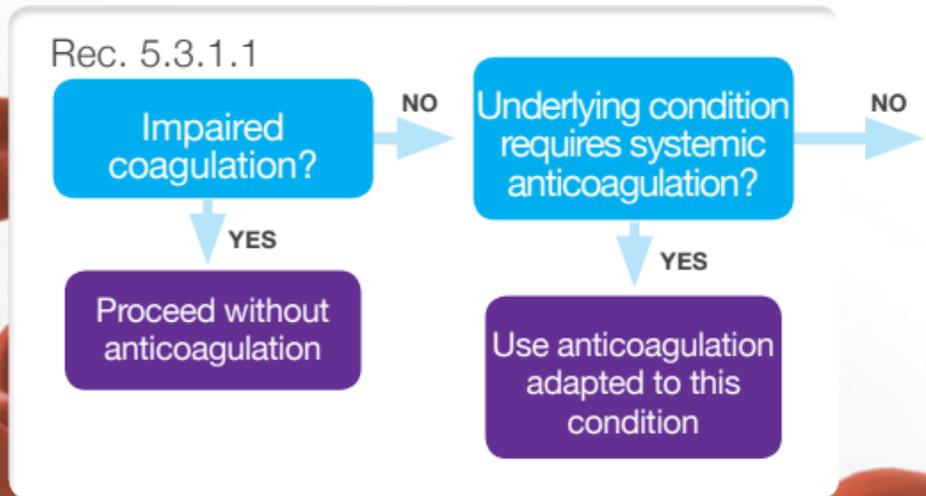
**5.3.3:** For patients with increased bleeding risk who are not receiving anticoagulation, we suggest the following for anticoagulation during RRT:

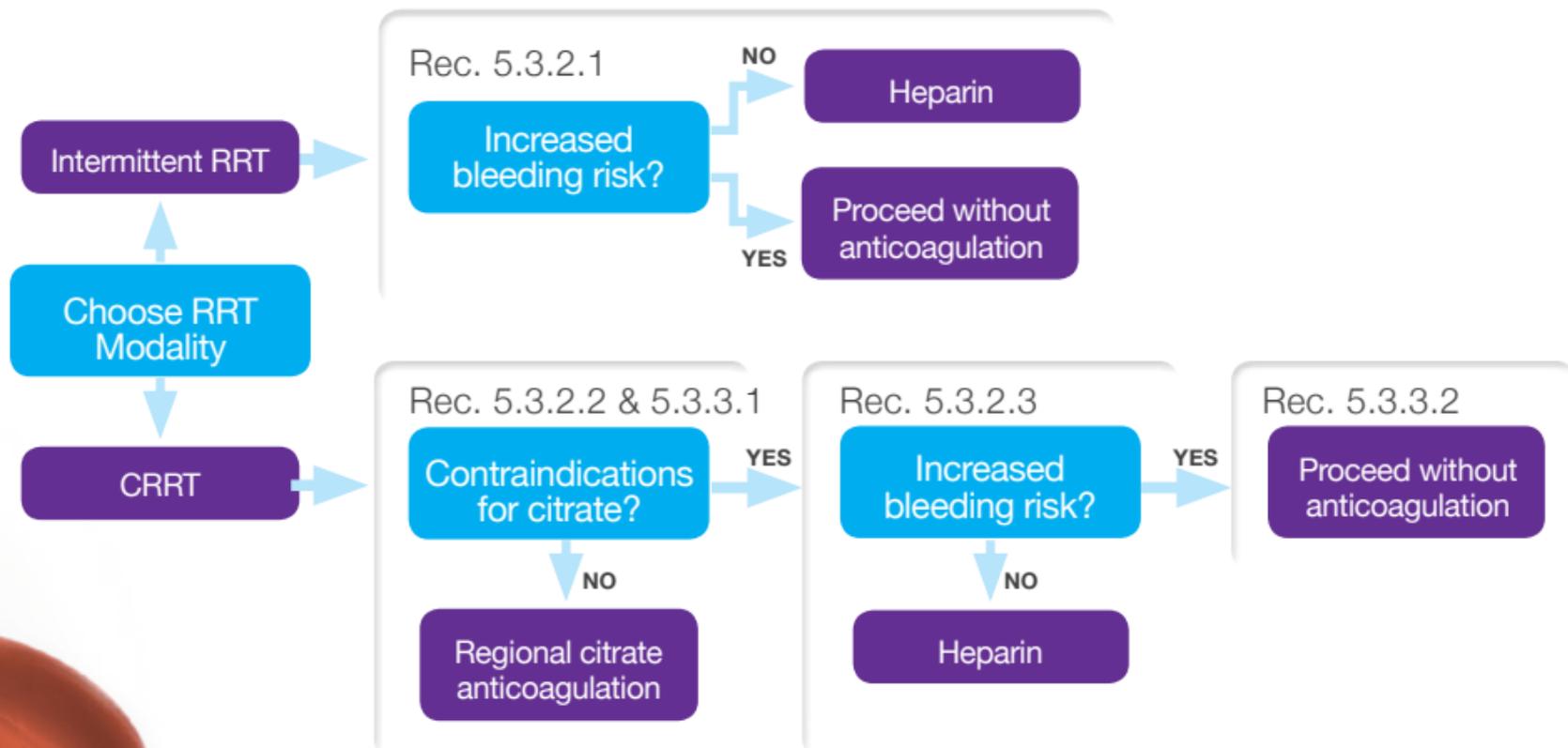
**5.3.3.1:** We suggest using regional citrate anticoagulation, rather than no anticoagulation, during CRRT in a patient without contraindications for citrate. (2C)

**5.3.3.2:** We suggest avoiding regional heparinization during CRRT in a patient with increased risk of bleeding. (2C)

**Flow-chart summary  
of recommendations  
regarding RRT  
anticoagulation.**

Heparin includes low-molecular-weight or unfractionated heparin.



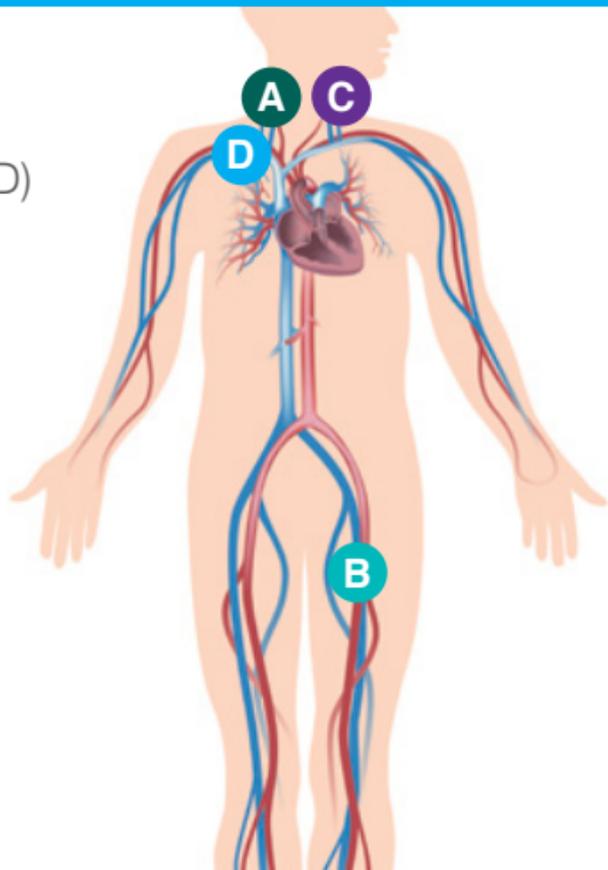


# Vascular Access

**5.4.1:** We suggest initiating RRT in patients with AKI via an uncuffed nontunneled dialysis catheter, rather than a tunneled catheter. (2D)

**5.4.2:** When choosing a vein for insertion of a dialysis catheter in patients with AKI, consider these preferences (Not Graded):

- A.** First choice: right jugular vein;
- B.** Second choice: femoral vein;
- C.** Third choice: left jugular vein;
- D.** Last choice: subclavian vein with preference for the dominant side.



## RRT Modality

- 5.6.1:** Use continuous and intermittent RRT as complementary therapies in AKI patients. (Not Graded)
- 5.6.2:** We suggest using CRRT, rather than standard intermittent RRT, for hemodynamically unstable patients. (2B)
- 5.6.3:** We suggest using CRRT, rather than intermittent RRT, for AKI patients with acute brain injury or other causes of increased intracranial pressure or generalized brain edema. (2B)

# RRT Solutions

- 5.7.1:** We suggest using bicarbonate, rather than lactate, as a buffer in dialysate and replacement fluid for RRT in patients with AKI. (2C)
- 5.7.2:** We recommend using bicarbonate, rather than lactate, as a buffer in dialysate and replacement fluid for RRT in patients with AKI and circulatory shock. (1B)
- 5.7.3:** We suggest using bicarbonate, rather than lactate, as a buffer in dialysate and replacement fluid for RRT in patients with AKI and liver failure and/or lactic acidemia. (2B)

# RRT Dosing

- 5.8.1:** The dose of RRT to be delivered should be prescribed before starting each session of RRT. (Not Graded) We recommend frequent assessment of the actual delivered dose in order to adjust the prescription. (1B)
- 5.8.2:** Provide RRT to achieve the goals of electrolyte, acid-base, solute, and fluid balance that will meet the patient's needs. (Not Graded)
- 5.8.3:** We recommend delivering a  $Kt/V$  of 3.9 per week when using intermittent or extended RRT in AKI. (1A)
- 5.8.4:** We recommend delivering an effluent volume of 20–25 ml/kg/h for CRRT in AKI (1A). This will usually require a higher prescription of effluent volume. (Not Graded)

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To access the Intensive Care Online Network call: 1-800-554-1312

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