



Evaluation & Management of a Patient with Renal Failure

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| Description of the Activity | Renal failure is kidney dysfunction that manifests as a disruption in the body's fluid, electrolyte, or acid-base equilibrium. All surgical intensivists must be able to diagnose, classify, and treat renal failure along its entire spectrum of grade and acuity. |
| Functions | <ul style="list-style-type: none">❖ Resuscitation<ul style="list-style-type: none">➤ Apply grading scales to patients with acute renal failure, demonstrating understanding of their prognostic implications and limitations.<ul style="list-style-type: none">▪ Use scales such as RIFLE (Risk, Injury, Failure, Loss, End-stage kidney disease), AKIN (Acute Kidney Injury Network), and KDIGO (Kidney Disease: Improving Global Outcomes).➤ Classify acute renal failure by etiology and solute handling, such as prerenal, intrarenal, and postrenal.➤ Recognize common toxins and medications associated with acute renal failure.➤ Employ temporizing measures in the management of complications associated with acute renal failure.➤ Identify the indications for and timing of renal replacement therapy (RRT).➤ Display cognitive and technical competence in obtaining urgent vascular access for RRT.<ul style="list-style-type: none">▪ Identify site selection risks and benefits.▪ Identify and manage vascular access–related complications.❖ Ongoing Management<ul style="list-style-type: none">➤ Identify, appraise, and apply renal failure prevention strategies.➤ Manage patients with acute renal failure.<ul style="list-style-type: none">▪ Perform pharmacologic optimization of acid-base status and electrolyte derangements.▪ Employ a comprehensive approach to volume status optimization using noninvasive and invasive measures.▪ Recognize and treat complications associated with uremia.➤ Demonstrate expertise in diuretic pharmacology, including loop diuretics, thiazide diuretics, potassium-sparing diuretics, osmotic diuretics, carbonic anhydrase inhibitors, and vasopressin receptor antagonists, and identify each of their distinct effects on physiology.➤ Diagnose and manage the interplay of renal failure in multisystem organ dysfunction, including hepatorenal syndrome and cardiorenal syndrome.➤ Apply considerations of chronic renal failure to acutely ill patients.➤ Manage and appreciate the pharmacokinetics, pharmacodynamics, and medication adjustments necessary for patients with renal failure.➤ Demonstrate understanding of renal replacement strategies, such as intermittent, prolonged intermittent, and continuous CRRT, and the implications of dose and prescription titration. |



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| | <ul style="list-style-type: none">❖ Transition of Care<ul style="list-style-type: none">➤ Coordinate the multidisciplinary care team, including appropriate consultation with nephrology, interventional radiology, and transplant teams.➤ Recognize how renal comorbidities contribute to risk and prognosis for surgery.➤ Appreciate limitations in health care resources with regards to RRT.➤ Communicate an updated plan of care to a patient/caregiver(s) to ensure an understanding of the illness severity, prognosis, additional treatment options, and feasibility of carrying out the plan within the patient's psychosocial and socioeconomic context.➤ In complex patient care scenarios, lead the team in weighing the risks, benefits, and goal concordance of RRT, using assistance of subspecialty palliative care and ethics teams as needed.➤ In the event that disease has become acutely life-limiting and there are no additional disease-directed treatments, identify the end-of-life stage of care, and lead the team in helping patients/caregivers into this stage, prioritizing comfort and symptom-directed therapy as indicated. |
| Scope | <ul style="list-style-type: none">❖ In scope<ul style="list-style-type: none">➤ Acute renal failure➤ Chronic renal failure in the critically ill patient➤ Fundamentals of RRT and modality selection➤ Goals of care alignment➤ Multisystem organ failure➤ Urgent dialysis access |



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| Level | Resuscitation | Ongoing Management | Transition of Care |
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| <p style="text-align: center;">1</p> <p><u>Limited Participation</u> Demonstrates limited critical care knowledge and skills</p> <p>Framework: What a learner directly out of residency should know</p> <p>Performs ICU procedures on straightforward patients but requires supervision/direction for more complex patients/procedures</p> <p>Requires continuous direct supervision by the attending for patient management</p> | <ul style="list-style-type: none"> Orders basic diagnostic studies to evaluate AKI and CKD and develops a limited differential Requires active assistance to place RRT access Describes indications for intervention in AKI/CKD, including RRT | <ul style="list-style-type: none"> Defines basic principles and goals of RRT Demonstrates limited understanding of renal pharmacology, nephrotoxicity, and dose modification in AKI/CKD Demonstrates limited understanding of multisystem organ dysfunction in renal failure (eg, uremia, hepatorenal syndrome, cardiorenal syndrome, rhabdomyolysis) Demonstrates understanding of basic management of electrolyte and volume disorders related to renal failure but requires active direction to address them | <ul style="list-style-type: none"> Describes with prompting the impact of AKI/CKD on patient outcome Requests consultation (eg, nephrology, palliative care) for initiation, maintenance, modality transition, or withdrawal of AKI/CKD care with supervision |
| <p style="text-align: center;">2</p> <p><u>Direct Supervision</u></p> <p>Initiates straightforward management for many critical illnesses but requires active direction for further management and complex critical illnesses</p> <p>Framework: Demonstrates a sufficient fund of knowledge for basic critical</p> | <ul style="list-style-type: none"> Interprets clinical and lab data to categorize AKI and CKD by sodium handling, etiology (including volume status), and grade, requiring assistance for comprehensive management Independently places RRT vascular access with correct site selection and manages complications in a straightforward patient With direct supervision, implements strategies for prevention and complication mitigation in AKI/CKD | <ul style="list-style-type: none"> Describes the strengths and limitations of each RRT modality (eg, IHD vs CRRT) in a straightforward patient Demonstrates understanding of renal pharmacology and nephrotoxicity in a straightforward patient with AKI/CKD With direct supervision, manages multisystem organ dysfunction in a patient with renal failure (eg, uremia, hepatorenal syndrome, cardiorenal syndrome, rhabdomyolysis) | <ul style="list-style-type: none"> Prognosticates the impact of AKI/CKD on the outcome for a straightforward patient Incorporates consultant teams (eg, nephrology, palliative care) in initiation, maintenance, modality transition, or withdrawal of AKI/CKD care |



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| <p>care and some knowledge of complex critical illness</p> <p>Performs ICU procedures on straightforward patients but may require supervision/direction for more complex patients/procedures</p> <p>The attending gives active help throughout to direct the clinical course.</p> | | <ul style="list-style-type: none"> Recognizes and uses knowledge of electrolyte and volume disorders related to renal failure to initiate management with intermittent direction | |
| <p>3</p> <p><u>Indirect Supervision</u></p> <p>Manages most critical illnesses but may require guidance for more complex patients or atypical presentations</p> <p><u>Framework:</u></p> <p>Demonstrates a sufficient fund of knowledge for basic and most complex critical care</p> <p>Independently performs most ICU procedures and supervises procedures on straightforward patients</p> <p>The learner can manage a critically ill patient in straightforward circumstances but may require input to</p> | <ul style="list-style-type: none"> Initiates emergent treatment of AKI and CKD with intermittent guidance, including pharmacologic measures, volume status/electrolyte optimization, and RRT Independently places RRT vascular access and mitigates complications in a high-risk patient (eg, site selection limitations, coagulopathy, body habitus) Independently implements strategies for prevention and complication mitigation in a patient with AKI/CKD | <ul style="list-style-type: none"> Chooses a patient-tailored RRT modality with indirect supervision Demonstrates an understanding of renal pharmacology and nephrotoxicity in a complex patient with AKI/CKD Independently manages multisystem organ dysfunction in renal failure (eg, uremia, hepatorenal syndrome, cardiorenal syndrome, rhabdomyolysis) with limited supervision Uses advanced knowledge of electrolyte and volume disorders related to renal failure to initiate management in a straightforward patient | <ul style="list-style-type: none"> Prognosticates the impact of AKI/CKD on the outcome of a complex scenario, including identifying the need for long-term dialysis access Coordinates a multidisciplinary team (eg, nephrology, palliative care) for initiation, maintenance, modality transition, or withdrawal of AKI/CKD care |



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| manage the most complicated ICU patients. | | | |
| <p>4</p> <p>Practice Ready</p> <p>Independently manages complex critical illnesses and leads a critical care team</p> <p>Framework:</p> <p>Demonstrates an attending-level fund of knowledge</p> <p>Independently performs and supervises procedures</p> <p>The attending is available at the request of the learner but is not routinely needed for common or complex critical illness.</p> | <ul style="list-style-type: none">• Directs emergent treatment of AKI and CKD, including pharmacologic measures, volume status/electrolyte optimization, and RRT• Independently places or supervises placement of RRT vascular access, including in a high-risk patient, and manages/troubleshoots complications as they occur• Independently incorporates and appraises evidence-based strategies for prevention and complication mitigation of AKI/CKD in a complex patient | <ul style="list-style-type: none">• Collaboratively directs management of ongoing RRT, including assessment of treatment response• Applies knowledge of renal pharmacology and nephrotoxicity to a complex patient and anticipates complications in AKI/CKD• Leads the team in managing multisystem organ dysfunction in a patient with renal failure (eg, uremia, hepatorenal syndrome, cardiorenal syndrome, rhabdomyolysis)• Uses advanced knowledge of electrolyte and volume disorders related to renal failure to initiate management in a complex patient | <ul style="list-style-type: none">• Communicates complex prognostic information in a critically ill patient with AKI/CKD to the patient/caregiver(s) and the team, including the need for long-term dialysis access• Leads the multidisciplinary team (eg, nephrology, palliative care) in aligning goals for initiation, maintenance, modality transition, or withdrawal of AKI/CKD care |