

Renal Issues in Older Adults in Critical Care

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KEYWORDS

- Acute kidney injury • Older adults • Critical care • Renal complications

KEY POINTS

- Renal issues are a major source of complications in the intensive care unit.
- Older adults in critical care are at an increased risk for renal complications because of the effects of aging and a higher rate of comorbid conditions that effect kidney function.
- Primary and secondary prevention are the most important management strategies in acute kidney injury.
- Acute kidney injury in older adults in critical care carries a high rate of mortality and morbidity, which increases with the severity of injury.

INTRODUCTION

Renal issues are among the most common complications encountered in critical illness and are known to increase mortality, morbidity, and health care costs.^{1–3} As the population ages and medical and surgical treatments for disease become increasingly aggressive, the rates of these complications continue to increase.³ Older adult patients are at a particular risk for the development of renal problems because of several factors, including the normal effects of aging and a higher rate of comorbid conditions that may affect kidney function.

In recent years, more attention has been paid to the deleterious effects of renal dysfunction at earlier stages of injury. *Acute kidney injury* (AKI) has largely replaced *acute renal failure* as the preferred terminology in referring to renal disease because it highlights the spectrum of injury from oliguria to complete renal collapse. This article describes AKI in critically ill older adults, risk factors for the development of AKI, management techniques, and short- and long-term outcomes in this population.

AKI IN CRITICALLY ILL OLDER ADULTS

One of the challenges in studying the incidence and prevalence of renal dysfunction in critically ill older adults has been the lack of a consensus definition, with various

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studies using widely divergent criteria for renal failure. However, in 2004, the Acute Dialysis Quality Initiative group proposed the RIFLE criteria (Risk, Injury, Failure, Loss, End-stage Renal Disease) for grading and classifying renal injury according to severity.⁴ Five levels of renal injury exist under the RIFLE scheme covering the range of AKI, from risk to end-stage renal disease. The RIFLE classification provides specific serum creatinine and urine output criteria for each level (**Table 1**).

Further complicating matters is the ambiguity surrounding the terms *older adult* and *elderly*. Despite the increasing emphasis on geriatric care and research, there is no uniform definition for what constitutes an older adult. Commonly, 60 years of age^{5,6} has been used as a lower cutoff for segregating older patients from the rest of the population. However, some have argued that because of the increasing lifespan and improvement in functional health, 70 years of age and older⁷ might be a more appropriate definition. Some studies on kidney disease in the elderly define the population even more narrowly, using 80 years of age and older.⁶ For the purposes of this article, *older adult* is defined as 60 years of age and older unless otherwise specified.

Despite the challenges presented by ambiguous definitions, recent studies can help to illustrate the incidence and prevalence of AKI in critically ill older adults. A review of the literature concerning studies evaluating the use of RIFLE criteria for epidemiology and outcomes of AKI found that when RIFLE criteria were applied, the incidence of AKI among critically ill patients ranged from 15.4% to 78.3%, with the higher percentages being reported in the higher acuity cohorts.³ This finding is higher than previously reported using stricter interpretations of acute renal failure, a fact that is not surprising given that the RIFLE criteria purposefully include a wider spectrum of disease than was previously defined.⁴ Several studies have identified advanced age as an independent risk factor for the development of AKI.^{1,2,8}

RISK FACTORS

Certain anatomic and physiologic changes to the kidney take place as a normal part of the aging process (**Box 1**). As they age, kidneys lose cortical mass, resulting in a loss of 30% to 50% of glomeruli by 70 years of age.⁹ This loss, combined with an increase in glomerular sclerosis and a loss of functional renal reserve, results in a marked reduction in the glomerular filtration rate (GFR) and a 50% decrease in renal blood flow.¹⁰ Additionally, there is a significant reduction in the ability to conserve sodium

Stage	Creatinine Criteria	Urine Output Criteria
Risk	Increase of 1.5–2.0 times baseline (or GFR decrease >25%)	<0.5 mL/kg/h × 6 h
Injury	Increase of 2–3 times baseline (or GFR decrease >50%)	<0.5 mL/kg/h × 12 h
Failure	Increase of >3 times baseline or creatinine value of 4 mg/dL with an acute increase of ≥0.5 mg/dL (or GFR decrease >75%)	<0.3 mg/kg/h × 24 h or anuria × 12 h
Loss	Persistent loss of renal function >4 wk	—
ESKD	ESKD >3 mo	—

Abbreviations: ESKD, end-stage kidney disease; GFR, glomerular filtration rate.

Adapted from Bellomo R, Ronco C, Kellum JA, et al. Acute renal failure - definition, outcome measures, animal models, fluid therapy and information technology needs: the Second International Consensus Conference of the Acute Dialysis Quality Initiative (ADQI) Group. *Crit Care* 2004;8(4):R206.

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