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Editors

Core Concepts in Acute Kidney Injury

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Preface

Acute kidney injury or AKI refers to an extremely heterogeneous group of clinical conditions that share common diagnostic features: a rise in the serum creatinine concentration and/or a decrease in urine output. These two elements that comprise the diagnostic criteria for AKI reflect major life-sustaining functions of the kidneys, which are to clear the blood of waste products and to regulate circulating plasma volume. A wide array of conditions can acutely injure or impair kidney function and result in a diagnosis of AKI, including tubular injury, tubulointerstitial nephritis, glomerulonephritis, and pre-renal azotemia (functional AKI).

AKI has a multitude of causes. Worldwide, the most common cause of AKI is pre-renal azotemia from diarrheal illnesses. Environmental exposures, toxins, and injuries are among the many environmental factors that can lead to AKI. Over the past 30 years, the advent of new technologies to diagnose and treat human disease has resulted in a whole new set of causes of AKI, such as cardiac surgery, immune checkpoint inhibitors, iodinated contrast media, and various nephrotoxic injuries.

Notions about the natural history of AKI date back to a seminal report by Swann and Merrill in 1953 that espoused sequential phases: initiation, maintenance, extension, and recovery. This description was based on cases of severe oligoanuric AKI in hospitalized individuals at the Peter Bent Brigham Hospital who had conditions barely recognizable in today's modern hospitals, such as transfusion reactions (25%), distilled water irrigation or infusion (9%), and carbon tetrachloride toxicity (8%)—in addition to more recognizable entities such as postoperative hemorrhage (21%). AKI today frequently does not adhere to the idealized phases outlined by Swann and Merrill.

The importance of AKI as a public health issue in both the developed and developing world is indisputable. AKI is a major risk factor for prolonged length of stay, mortality, and subsequent cardiovascular disease and chronic kidney disease. AKI continues to evolve as our population ages, new environmental threats arise, and new drugs and procedures with nephrotoxic potential are developed. Along with this, basic and clinical investigation into AKI prevention and treatment continues. Although only a single drug has been FDA approved for the treatment or prevention of AKI ("Osmitrol" or intravenous mannitol, approved on June 8, 1964), a number of novel targets and strategies are being investigated, with some promising signs.

In this textbook, we have invited leading clinicians, epidemiologists, basic scientists, and clinical trialists to provide an update on AKI. After reading their contributions, we hope you will share both their and our optimism and enthusiasm for a future in which AKI prevention and treatment will be yet another one of modern medicine's success stories.

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