disease, or urinary tract obstruction, or it can develop slowly (e.g., CKD) as a result of longstanding kidney disease or an anomaly.

Azotemia and *uremia* are terms often used in relation to renal failure. **Azotemia** is the accumulation of nitrogenous waste within the blood. **Uremia** is a more advanced condition in which retention of nitrogenous products produces toxic symptoms. Whereas azotemia is not life threatening, uremia is a serious condition that often involves other body systems.

Acute Kidney Injury

AKI is said to exist when the kidneys suddenly are unable to regulate the volume and composition of urine appropriately in response to food and fluid intake and the needs of the organism. The principal feature of AKI is oliguria* associated with azotemia, metabolic acidosis, and diverse electrolyte disturbances. AKI is not common in childhood, and the outcome depends on the cause, associated findings, and prompt recognition and treatment.

The pathologic conditions that produce AKI caused by glomerulonephritis and HUS are discussed in relation to those disorders. AKI can also develop as a result of a large number of related or unrelated clinical conditions: poor renal perfusion; urinary tract obstruction; acute renal injury; cardiac surgery (Susantitaphong, Cruz, Cerda, et al, 2013); or the final expression of chronic, irreversible renal disease. The most common cause in children is transient renal failure resulting from severe dehydration or other causes of poor perfusion that may respond to restoration of fluid volume.

Pathophysiology

AKI is usually reversible, but the deviations of physiologic function can be extreme, and mortality in the pediatric age group remains high. There is severe reduction in the GFR, an elevated BUN level, and a significant reduction in renal blood flow.

The clinical course is variable and depends on the cause. In reversible AKI, there is a period of severe oliguria, or a low-output phase, followed by an abrupt onset of diuresis, or a high-output phase, and then a gradual return to (or toward) normal urine volumes.