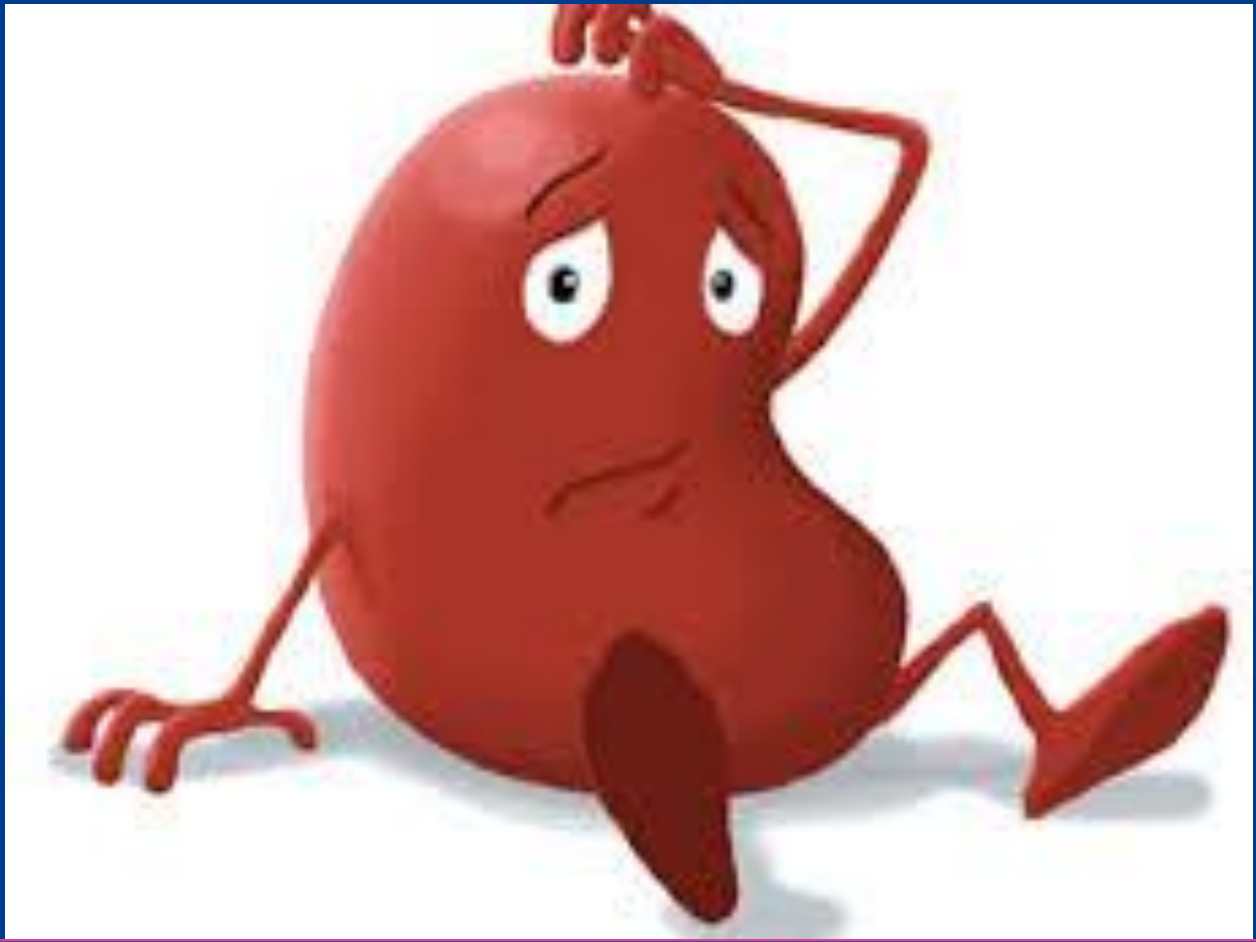
RENAL FAILURE



By
Dr. Duraid Al-Hadithi

ACUTE KIDNEY INJURY

- defined as a rapid reduction in renal function characterized by progressive azotemia (best measured clinically by serum creatinine which may or may not be accompanied by oliguria.
- This abrupt decline in renal function occurs over the course of hours to days and results in the failure to excrete nitrogenous wastes from the plasma or to maintain normal volume and electrolyte.
- The cardinal feature of AKI is a decline in glomerular filtration rate (GFR).
- Clinically, it is useful to separate the causes of AKI into three major categories: **pre-renal**, **intra-renal**, and **post-renal**.

Pre-renal Causes of Acute Kidney Injury

A. Volume depletion

- 1. Surgical: hemorrhage, shock
- 2. Gastrointestinal losses: vomiting, diarrhea, fistulae
- 3. Renal: overdiuresis, salt-wasting disorders

B. Cardiac causes: Primary decrease in cardiac output

- 1. Acute disorders: myocardial infarction, arrhythmias, malignant hypertension, tamponade, endocarditis
- 2. Chronic disorders: valvular diseases, chronic cardiomyopathy (ischemic heart disease, hypertensive heart disease)

C. Redistribution of extracellular fluid

- 1. Hypoalbuminemic states: nephrotic syndrome, advanced liver disease, malnutrition
- 2. Physical causes: peritonitis, burns, crush injury
- 3. Peripheral vasodilatation: sepsis, antihypertensive agents
- 4. Renal artery stenosis (bilateral)

Renal causes

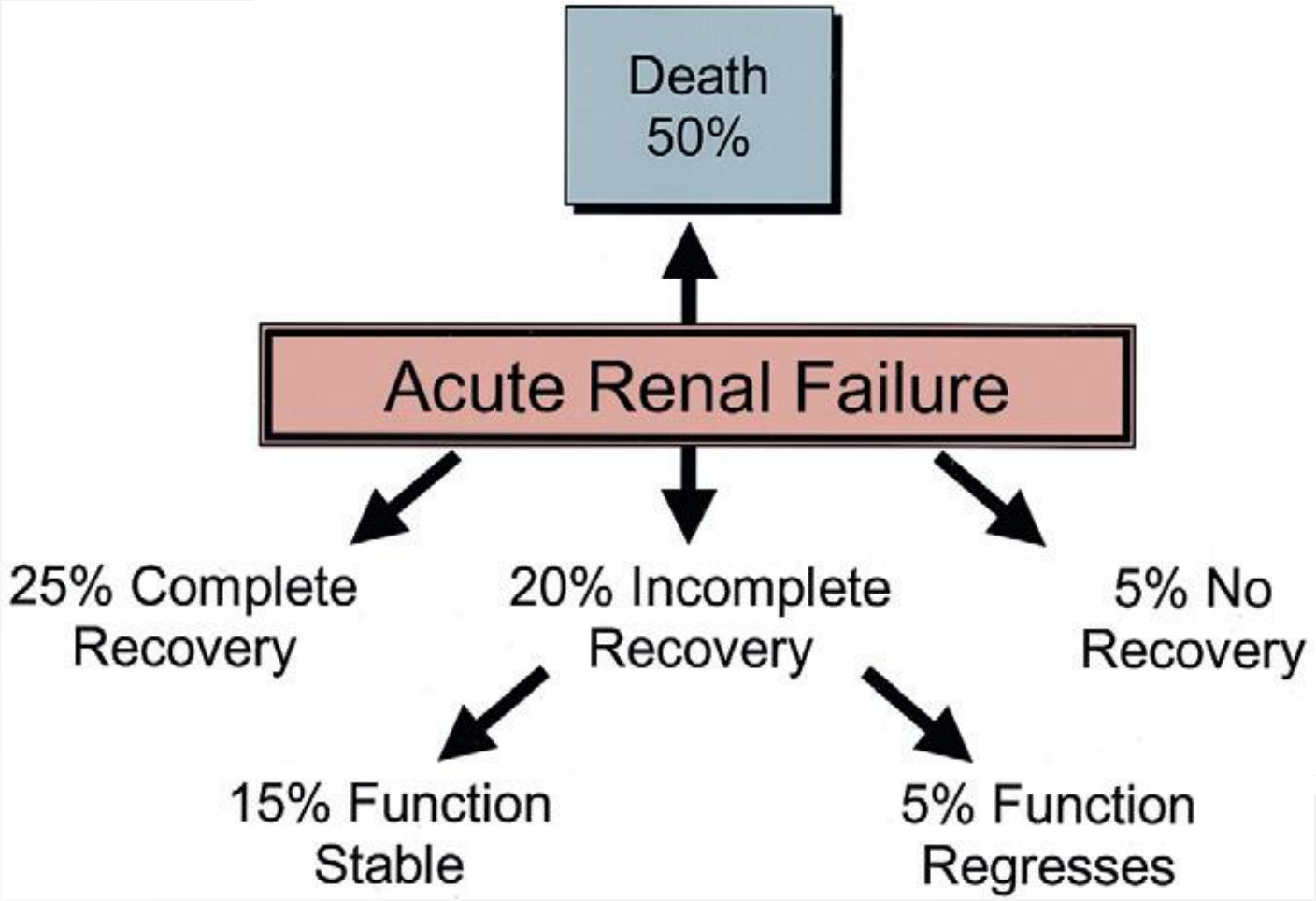
- **Multisystem Diseases**
  - SLE, Goodpasture disease, Henoch-Schönlein, Necrotizing vasculitis (including Wegener granulomatosis) Cryoglobulinemia (hepatitis B or C related), Neoplasia (colon, lung) Relapsing polychondritis Behçet disease
- **Superimposed on Primary Glomerular Disease**
  - Membranoproliferative glomerulonephritis (type I, II), Membranous glomerulonephritis,IgA nephropathy
- **Infectious Diseases**
  - Poststreptococcal glomerulonephritis, Infectious endocarditis, Visceral sepsis, Hepatitis B or hepatitis C infection
- **Drugs and Toxic Agents**
  - Allopurinol, D-Penicillamine, Hydralazine, Rifampin
- **Idiopathic**

Post-renal causes

- Obstruction of the urinary tract may cause AKI.
- To be the cause of AKI, urinary tract obstruction must involve the outflow tract of both kidneys.
- unless preexisting renal dysfunction is present, in which case the obstruction may involve only a single kidney
- Patients with acute urinary tract obstruction may present with hematuria, flank or abdominal pain, or signs of uremia.

Complications of Acute Kidney Injury

- Fluid Overload, Hypertension, Edema ,Acute pulmonary edema
- Electrolyte Disturbances
- Metabolic acidosis
- Nausea, Vomiting, Upper gastrointestinal bleeding
- Mental status changes, Encephalopathy, Coma, Seizures, Peripheral neuropathy,
- Pericarditis, Uremic cardiomyopathy,
- Pulmonary, Pleuritis,
- Bleeding, Anemia
- Impaired granulocyte function ,Impaired lymphocyte function


Death
50%
Acute Renal Failure
25% Complete
Recovery
20% Incomplete
Recovery
5% No
Recovery
15% Function
Stable
5% Function
Regresses

MANAGEMENT OF ACUTE KIDNEY INJURY

- Management of AKI is based on its cause. When AKI is identified as prerenal, correction of the precipitating factors and restoration of renal perfusion usually leads to its resolution.
- Nephrotoxic drugs should be eliminated when clinically appropriate.
- Maintaining normal volume status is essential. In the postoperative setting, this implies judicious replacement of crystalloid, colloid, and blood with close monitoring of the central venous pressure.
- The management of postrenal AKI will depend on its etiology. Any obstruction needs appropriate drainage, and urinary extravasation needs to be controlled.

Conservative Medical Management of Acute Kidney Injury

Fluid Balance

- Careful monitoring of intake/output and weights, Fluid restriction

Electrolytes and Acid-Base Balance

- Prevent and treat hyperkalemia, Avoid hyponatremia, Keep serum bicarbonate >15 mEq/L ,Minimize hyperphosphatemia ,Treat hypocalcemia only if symptomatic or if intravenous bicarbonate is required

Uremia and Nutrition

- Protein (1 to 1.8 g/kg/day) and maintain caloric intake; consider forms of nutritional support, Carbohydrate intake at least 100 g/day to minimize ketosis and, endogenous protein Catabolism

Drugs

- Review all medications, Stop magnesium-containing medications Adjust dosage for renal failure; readjust with improvement of glomerular filtration rate

CHRONIC KIDNEY DISEASE

- **Chronic kidney disease** defined as sustained kidney injury greater than 3 months resulting in a GFR of less than 60 mL/min.
- After an initial kidney insult, if the acute injury does not completely resolve, a continuing attrition of functional nephrons occurs over time.
- When kidney function is minimally impaired (≤60%), physiologic adaptation is complete.
- Because the GFR usually falls below 20% of normal, progressive anorexia with nausea, salt retention, acidosis, insomnia, anemia, muscle fatigue, and worsening BP control may occur.

Stages of Chronic Kidney Disease of all Types		
Stage	**Qualitative Description**	**Renal Function (mL/min/1.73 m²)**
1	Kidney damage-normal GFR	≥90
2	Kidney damage-mild ↓ GFR	60-89
3	Moderate ↓ GFR	30-59
4	Severe ↓ GFR	15-29
5	End-stage renal disease	<15 (or dialysis)

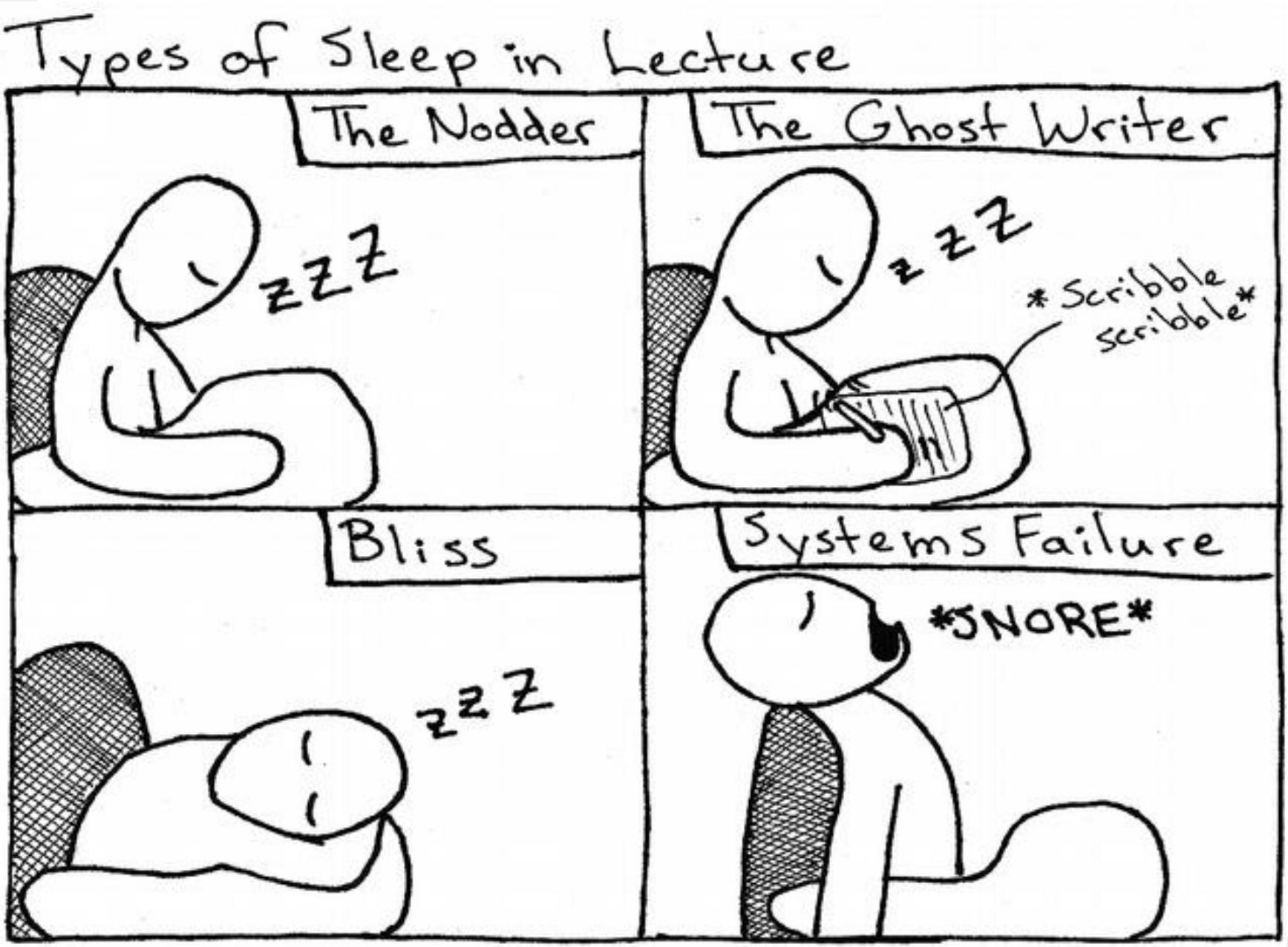
Etiologies for Chronic Kidney Disease

- Diabetes mellitus 44.4
- Hypertension 26.8
- Glomerulonephritis 7.2
- Cystic kidney disease 2.4
- Urologic 1.5
- All others 16.8
- Missing 1.5

- The National Institute of Health (NIH) Consensus Conference of 1993 recommended that patients with CKD be referred to a nephrologist when the SCr has increased to 1.5 mg/dL in females and 2 mg/dL in males.

Proposed Criteria for Initiation of Renal Replacement Therapy

- Oliguria (urine output <200 mL/12 hr)
- Anuria or extreme oliguria (urine output <50 mL/12 hr)
- Hyperkalemia ([K+] >6.5 mmol/L)
- Severe acidemia (pH <7.1)
- Azotemia ([urea] >30 mmol/L)
- Clinical significant organ (especially lung) edema
- Uremic encephalopathy
- Uremic pericarditis
- Uremic neuropathy/myopathy
- Severe dysnatremia ([Na] >160 or <115 mmol/L)
- Drug overdose with dialyzable toxin


Types of Sleep in Lecture
The Nodder
zzz
The Ghost Writer
zzz
* Scribble scribble*
Bliss
zzz
Systems Failure
SNORE