

Timing of Dialysis for Renal Replacement Therapy (RRT)

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An intuitively critical component of the care of chronic kidney disease (CKD) patients is the timing of the initiation of RRT. Surprisingly, there is limited outcome data that defines a preferred timing for the initiation of dialysis. This knowledge gap is true based on patients' symptoms, residual renal function, or GFR. However, pharmacokinetic assumptions can be used to derive a GFR-based time to initiate dialysis. Relying on pharmacokinetic assumptions about the minimum amount of solute clearance needed for patient survival in end stage renal disease (ESRD), a weekly Kt/V_{urea} of 2.0 is equivalent to an unequilibrated Kt/V of 1.2 per hemodialysis session (3×per week). This yields a renal urea clearance of 7 mL/min (normalized to V), renal creatinine clearance of 9-14 mL/min/1.73 m² or a GFR 10.5 mL/min/1.73 m².

Although the mean glomerular filtration rate (GFR) of incident ESRD patients in the U.S. has increased from 7.2 to 9.5 mL/min from 1995 to 2000, most patients initiate dialysis at a level that arguably may be associated with less than optimal outcomes. An alternative approach to defining the appropriate timing of dialysis is based on the prevention of protein-calorie malnutrition that accompanies declining renal function, especially with advanced CKD. Likely as a consequence of declining dietary protein intake, numerous anthropometric and biochemical surrogates of nutrition decline with progressive CKD, such as body mass index, percent body fat, serum albumin, creatinine, and transferrin concentrations. Moreover, some of these measures are predictably associated with mortality in incident ESRD patients. Hence, renal replacement therapy has been advocated for advanced CKD patients if signs of protein-energy malnutrition develops or persists despite vigorous attempts to optimize intake or no other apparent cause of malnutrition are identified. Based on nutritional criteria, the preponderance of American ESRD patients initiate dialysis late. In 1999, the median creatinine concentration of incident ESRD patients was 7.6 mg/dL, a value that is associated with a 58% increased in risk of death in comparison to patients with creatinine concentrations of 10-11.9 mg/dL. In summary, based on theoretical constructs, renal replacement therapy should be considered if the weekly Kt/V <2.0.

Dialysis may be withheld if the Kt/V is below this threshold value if: (1) no signs or symptoms of uremia are present, (2) the patient's edema-free weight is stable or increasing, (3) lean body mass is >63%, (4) the Subjective Global Assessment score is good, and/or (5) the serum albumin concentration is normal, stable, or rising.