Discriminators of death and survival in the first year of hemodialysis: Threshold Values and hierarchical Importance – The United States Renal Data System

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Introduction
- Inordinately high mortality in maintenance hemodialysis patients is an ongoing public health in the U.S.
- International comparisons show that mortality in the US is among the highest in the world.
- In spite of these unfavorable comparisons, mortality rates in US hemodialysis patients have decreased, year-on-year since the early 1990s.
- Among incident patients, these salutary trends are easily apparent, and clinically meaningful, for mortality in the 2nd through 5th years following dialysis inception.
- Mortality rates in the first year, in contrast, have not changed meaningfully in the last decade.
- Few, if any, studies have specifically focused on earlier-phase mortality in new hemodialysis patients.
- Knowing the characteristics that discriminate short-term death from survival might help with the decision to initiate renal replacement therapy.

Methods
- Among those 18 years and older initiating hemodialysis between May 1st, 2005 and Dec. 31st, 2006, the main objectives of this study were to:
  - Identify parameter thresholds with maximum sensitivity and specificity (MaxSn+Sp) for predicting death in the first year of hemodialysis therapy.
  - Use classification tree analysis to rank thresholds within and between variables, with successive subgroup formation based on MaxSn+Sp for first-year death: in death in the first 30 days of hemodialysis therapy was handled similarly.
- We studied patients ≥18 years of who initiated hemodialysis between May 1st, 2005 and Dec. 31st, 2006 with arteriovenous fistula, graft or central venous catheter as modes of access, without a prior kidney transplant (n = 156,924).
- Follow-up began at the initiation of dialysis. For 1-year (30-day) mortality, follow-up ended at the earliest appearance in all 32 iterations, respectively.
- Figure 1 shows a classification tree with 5 levels of iteration based on thresholds related to age, death in the first year of hemodialysis, and congestive heart failure, body mass index, sex and race were discriminators of 1st year mortality similarly.
- Table 1: Baseline Characteristics (n = 156,924)

Conclusions
- Along with older age, hypalbuminemia, and congestive heart failure were dominant associations of early mortality in this study.
- Catheter use was a second iteration entity after age that appeared in all 32 subgroups of the 1-year mortality tree was also a dominant association; catheter use, arguably, might be the most reversible of all major associations.
- While randomized evidence trials are lacking, continuous efforts from association studies that native arteriovenous fistulas should be used preferentially for treatment delivery, as central catheters have been linked with blood-borne infections, mortality, and costs.
- The findings of this study lend support to Fistula First Breakthrough Initiative’s goal of 40% use of fistula in US hemodialysis patients.