Statistics

Patients who received RRT during their SICU stay (EARLY) were compared to propensity score matched SICU patients who had not received RRT (DEFERRED) by the day of the match. For daily vital signs, we used the ones taken closest to 0700. Fluid inputs and outputs were used based on totals present by 1200 on the day of analysis and for the 24 hours of the preceeding day. We included variables that are either clinically relevant for the decision for RRT or are associated with mortality in critically ill patients. Where, both the daily high and daily low values for laboratory tests might indicate need for RRT or be associated with mortality, and the normal value would not, we separately included the high and low values in the analyses. If patients had only one level that day for that laboratory test, it was deemed both the high and the low value.

Each patient day was treated as an individual case for matching. Patient-days with CRRT were matched with those without CRRT with a nearest neighbor propensity score including the prior day's values for urine output, highest creatinine, BUN, and potassium, diuretic use, and requirement for vasopressors, and the given day's values for urine output between midnight and noon, highest creatinine, BUN, and potassium, lowest bicarbonate , diuretic use and requirement for vasopressors. For each patient and for every day, propensity scores were calculated using binary logistic regression with initiation of RRT as the outcome. This produced a score between 0 and 1 that is the probability that that patient had RRT initiated on that day. Patients who had RRT initiated were matched to a non-RRT patient. Matches were made by nearest neighbor, using the MatchIt package in R. Since each patient had multiple potential matching days, for patients who matched more than once, one matched pair was chosen by random number. All unmatched patients, including pairs to those who were randomly removed, were used in a second iteration of the matching. This continued until all eligible patients with CRRT were matched,

either as a case or as a control on one of their patient-days before receiving CRRT. Matches were assessed using standardized differences to compare the CRRT group to the no CRRT group. Due to the large number of patient-days missing the prior day's urine value, the subset of patient-days without this value was matched separately using the same method, except we excluded the prior day's urine from the propensity score. Matched patients who received EARLY RRT were univariately compared to the DEFERRED patients using Fisher's exact test for categorical variables, Student-t test for normally distributed continuous variables, and rank sum test for other continuous variables.

Missing values of respiratory rate, phosphorous, magnesium, glucose, hemoglobin, platelets, blood pressure, and prior day's fluid balance were imputed using 100 multiple imputations with the Amelia package in R. We then used each propensity matched patient in regressions to adjust for the variables that were not included in the propensity score. For each imputed data set, a logistic regression with the hospital death and ICU death outcomes were fit with RRT status and all the factors not included in calculating the propensity scores, i.e., diagnosis, gender, age, APACHE score, heart rate, respiratory rate, highest phosphorous value, highest magnesium value, highest and lowest glucose values, lowest hemoglobin value, lowest platelet value, MAP, fluid balance at noon on the given day and fluid balance from the prior day categorized into a five level categorical variable—quartiles and a fifth category for missing values—as variables potentially associated with the deaths. Variables from these regressions were selected using stepwise variable selection by Akaike Information Criteria (AIC). Final models were made using the variables that had remained in more than 50% of the AIC stepwise variable selections. For comparison, variables were also selected from the full model using least absolute shrinkage and

selection operator (lasso), with final models including variables that had remained in more than 50% of the lasso selections. Then pooled logistic regressions with the selected variables from each method of variable selection (AIC and lasso) as independent variables were estimated by Zelig on the imputed data sets. Overall survival was displayed as Cox plot. All analyses were performed in R (version 3.3.0) with p-values less than .05 considered significant. Data are presented as frequency (percentage), mean ± standard deviation, and median [interquartile range].