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Hyponatremia – Predictor of mortality among patients on the Liver-Transplant Waiting List

Roxana SISU, MD

Cardiology Department, Emergency University Hospital, Bucharest, Romania

The allocation of grafts for liver transplantation in the United States is based on medical urgency, which is estimated according to the Model for End-Stage Liver Disease (MELD) score, since 2002. The MELD score (on a scale of 6 to 40, with higher values indicating more severe disease) is calculated on the basis of the serum bilirubin, creatinine and the international normalized ratio for the prothrombin time.

In addition to the MELD score, the serum sodium (Na) concentration has been recognized as an important prognostic factor in patients with liver cirrhosis. Hyponatremia at the time of liver transplantation has been associated with increased morbidity, due to central pontine myelinolysis and mortality in the immediate postoperative period. The small size of the studies conducted to date has precluded adequate examination of the interaction between the MELD score and the serum Na concentration.

In this study, data on all patients who were registered on the waiting list in the United States were obtained from the Organ Procurement and Transplantation Network (OPTN) database. The aim was to measure the effect of the MELD score, the serum Na concentration, and the interaction between these two in predicting mortality among adult patients on a waiting list for a first liver transplantation.

The predictor variables consisted of the MELD score and the serum sodium concentration at the time of registration on the waiting list. This analysis also included, as outcome, death before transplantation and within 90 days after registration. The strategy was to build a prediction model based on data from 2005 and to validate the model using the 2006 data. A total of 14,130 adults met the inclusion criteria in 2005 and 2006. Predictor and outcome variables were complete for 13,940 patients (99%).

There was a near-linear relation between the MELD score and mortality among patients on the waiting list. On average, the risk of death increased by 21% ($P<0.001$) per unit increase in the MELD score.

A decrease in the serum Na concentration was associated with an increase in the risk of death, even after adjustment for the MELD score. The most important differential effect of hyponatremia on mortality, occured at a serum Na concentration between 125 and 140 mmol/l. Patients with hyponatremia could have up to 13 points added to their MELD score, which would equate their risk of death to the risk for patients with normal sodium concentrations. For patients with MELD scores above 30, the effect of hyponatremia was quite small.

Since the MELD score was adopted in 2002 as the standard for liver allocation, mortality

among patients on the waiting list has decreased substantially in the United States. The current approach to liver transplantation is to prioritize the allocation of liver grafts on the basis of urgency (the estimated risk of death for a patient on the waiting list).

This study, had found that as compared with the MELD score, the MELDNa score provides better calibration and discrimination of the risk of death among candidates for liver transplantation; thus, use of the MELDNa score may reduce mortality among patients on the waiting

In conclusion, the MELDNa score may provide significantly better prediction of mortality among registrants with chirrosis on the waiting list for liver transplantation.

Comment on the paper:
W. Ray Kim, et al – Hyponatremia and Mortality among Patients on the Liver-Transplant Waiting List, *N Engl J Med* 2008; 359:1018-1026