M O N D O: MONitoring Dialysis Outcomes

Low systolic blood pressure and low serum sodium concentration jointly associate with an increased risk of death: Results from the MONitoring Dialysis Outcomes (MONDO) Initiative.

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Background

Both low and high systolic blood pressure (SBP), and low serum sodium levels are related to mortality in dialysis patients A recent publication associated systolic blood pressure to circulating serum sodium suggesting a relationship between both parameters [1]. Here we investigated the relationship between SBP and SNa⁺ jointly in a patient cohort from the international MONDO database.

Methods

We used data from incident patients between 2000 and 2010 from the international MONDO database initiative. We computed means of pre-HD SBP and pre HD SNa⁺ in the first year on HD. The risk of all-cause mortality in the second year on HD was modeled employing a semi-parametric logistic regression using smoothing spline ANOVA models [2, 3] adjusted for age, gender, diabetes, dialysis access, serum albumin, serum sodium, dialysate sodium, nPCR, interdialytic weight gain (IDWG; as % of post body weight), SBP slope (from the same fitted linear model over all data in Year 1), body mass index and region of origin. In addition the analysis was adjusted for SBP slope and SBP SD residuals, and SNa⁺ slope and SD residuals, respectively, based on the coefficients of a fitted linear model over all data in Year 1 of the respective parameter.

References:
[1] He et al. (2013). Plasma sodium and blood pressure in individuals on haemodialysis. J Hum Hypertens 27(2): p. 85-9.
[2] Wang (2011). Smoothing Splines: Methods and Applications Chapman & Hall
[3] Gu (2002). Smoothing Spline ANOVA Models, Springer.

Figure 1: Estimated probability of death in the second year on HD as estimated by semi-parametric logistic regression using smoothing spline ANOVA models plotted as bivariate spline fits of SBP and SNa⁺. Yellow indicates a low risk of death, while red indicated a higher risk of death.

Results

We studied 18408 incident HD patients (11057 from Europe, 5507 from North America and 1844 from Asia-Pacific; 63 ± 15 years old, 38% diabetics, 58% male, 3.2 ± 1.2 % of body weight IDWG, average SBP 141 ± 18 mmHg). Based on the model, we found that incident HD patients are at highest risk in the presence of low SBP and low SNa⁺ , regardless of slope and variability (Figure 1).

Conclusion

Low SBP and low SNa⁺ associate with increased risk of death when analyzed jointly in an ANOVA logistic regression model. This result is independent of the variability and the systematic trend of SBP and SNa⁺ in the first year after HD initiation. Given the highly increased risk of adverse outcomes of this combination, affected patients may require special medical attention and tailored care.

L7) Dialysis. Epidemiology, outcome research, health services research.

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