M O N D O: MONitoring Dialysis Outcomes

Higher variability of systolic blood pressure associates with an increased risk of death: distinguishing between trend-dependent and -independent sources.

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Background

Pre HD systolic blood pressure (SBP) variability [defined as the standard deviation (SD), the coefficient of variation (CV), the slope and also the standard deviation of the residuals of a fitted linear model (SD residuals) of SBP] has been shown to predict adverse outcomes in HD patients [1,2,3]. While SD and CV may be affected by the slope of the regression line, the SD of the residuals reflects variability independent of slope. Extending on available evidence, we included SD of residuals and slope separately in an analysis, in order to distinguish between trend and trend-independent variability.

Methods

We included incident patients from the international MONDO database initiative. We computed mean pre-HD SBP and SBP SD residuals in the first year on HD for patients commencing HD treatment in all regions captured in the database. 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 [4, 5] adjusted for age, gender, diabetes, dialysis access, serum albumin, serum sodium, dialysate sodium, nPCR, interdialytic weight gain (IDWG; as % of post HD body weight), SBP slope (from the same fitted linear model over all data in Year 1), body mass index and region of origin.

References:

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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,. Based on the model, we found that incident HD patients are at highest risk with low SBP and at higher SBP SD residuals (at all levels of SBP) (Figure 1).

Conclusion

While lower SBP (approximately <120mmHg) shows an increased risk of all-cause mortality, higher variability shows an increased risk of death at all levels of SBP (Figure 1), independent of the slope of the BP. This analysis suggests that different types of SBP variability (trend-dependent and trend-independent) may be distinguished in dialysis patients, each with an independent relation to mortality.

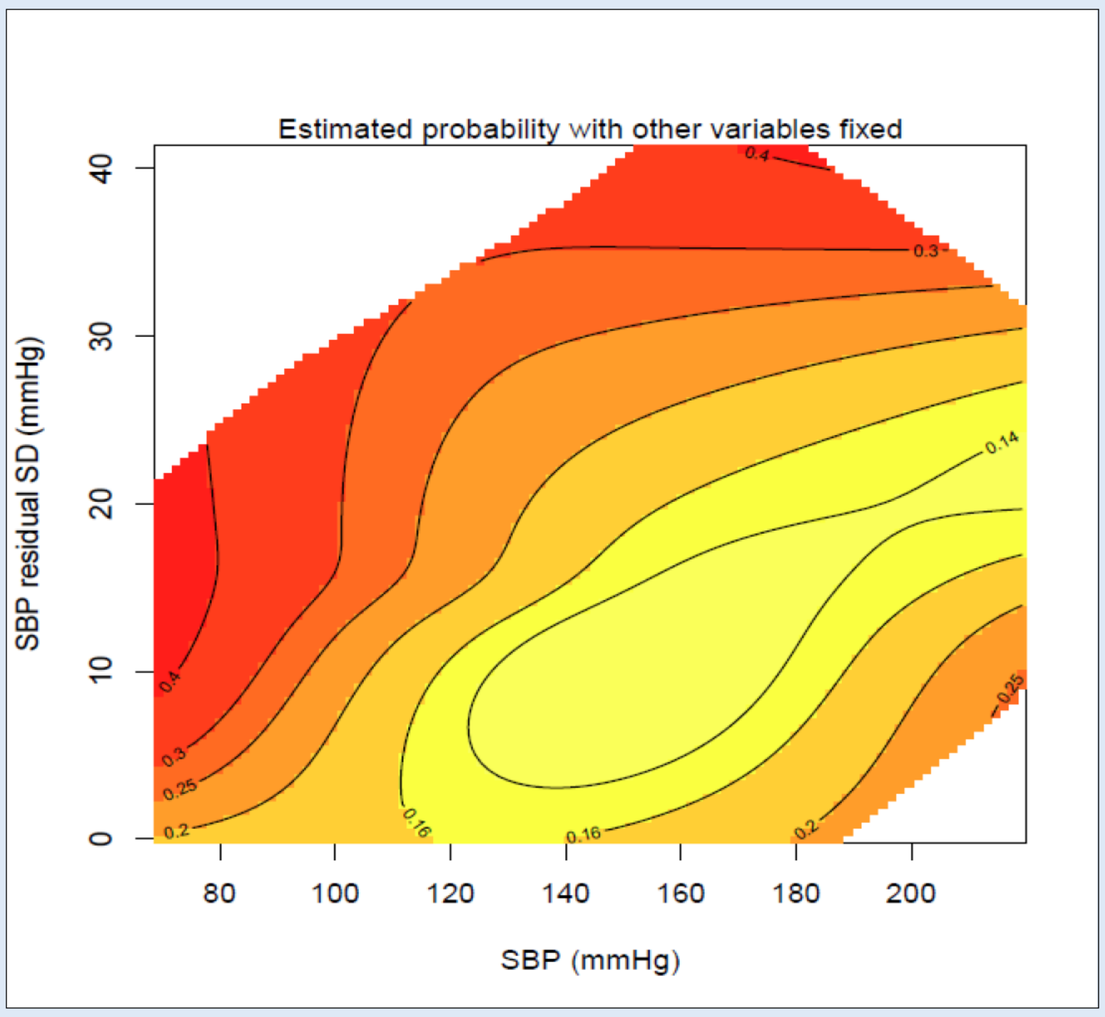

Figure 1: Estimated probability of death in the second year on HD as estimated by semi-parametric logistic regression using smoothing spline ANOVA models plotted as bivariate spline fits of SBP residuals SD and SBP. Yellow indicates a low risk of death, while red indicated a higher risk of death.

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L7) Dialysis. Epidemiology, outcome research, health services research.
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DOI: 10.3252/pso.eu.52era.2015
ePosters supported by F. Hoffmann- La Roche Ltd.
52 ERA EDTA CONGRESS London 2015
PosterSessionOnline.com