

# NOVEL METHODS OF PRESENTING BLOOD PRESSURE PATTERNS IN HEMODIALYSIS PATIENTS

Dugan Maddux<sup>1</sup>, MD, Danqing Xu<sup>2</sup>, Len Usvyat<sup>1</sup>, PhD, Frank van der Sande<sup>3</sup>, MD, PhD, Peter Kotanko<sup>4</sup>, MD, Yuedong Wang<sup>2</sup>, PhD, Jeroen Kooman<sup>3</sup>, MD, and Franklin W. Maddux<sup>1</sup>, MD, FACP

<sup>1</sup>Fresenius Medical Care North America, Waltham, MA, United States, <sup>2</sup>University of California-Santa Barbara, Santa Barbara, CA, United States

<sup>3</sup>Maastricht University Medical Centre, Maastricht, Netherlands, <sup>4</sup>Renal Research Institute, New York, NY, United States

## INTRODUCTION

- Pre-dialysis systolic blood pressure (preSBP) in incident hemodialysis (HD) patients is well documented to be associated with patient outcomes.<sup>1,2,3</sup>
- Low preSBP has been most commonly reported to be predictive of higher rates of mortality.<sup>1,2,3</sup>
- No studies have analyzed blood pressure (BP) patterns in weekly intervals from the start of dialysis and delineated a method to show that those patterns are associated with differing short-term outcomes.
- We present visualization of low (preSBP <110 mmHg) and normal to high (preSBP ≥110) patterns in the first 3 weeks of dialysis and mortality risk in the following week.

## METHODS

- Incident in-center HD patients at Fresenius Medical Care North America clinics who initiated hemodialysis between January 1, 2004 and December 31, 2010 in an outpatient setting and survived and continued outpatient dialysis more than 7 days were studied.
- During each week from the start of dialysis, we computed mean preSBP and divided patients into preSBP <110 mmHg ("Low" or "L") and preSBP ≥110 mmHg ("High" or "H") groups in each of the first 3 weeks of dialysis.
- There were 8 possible combinations of consecutive preSBP measurements, such as, HHH (week 1: ≥110, week 2: ≥110, week 3: ≥110), HHL, HLH, etc.
- We assessed survival in the following week using univariate logistic regression analysis based on the group of H/L preSBP measurements.
- Groups of H/L preSBP measurements were clustered by minimizing Euclidean Distance based on the relative "risk" to identify patterns of preSBP groups associated with outcomes.

## RESULTS

- We studied 50,525 patients.
- Patients with preSBP ≥110 mmHg (HHH) in each of the first 3 weeks of dialysis served as a reference group.
- Figure 1 demonstrates preSBP groups with H preSBP shown as black and L preSBP shown as white (time is shown from left to right).
  - Odds ratio of death is shown at the bottom of each graph.
  - Highest odds ratios were observed in patients with primarily L preSBP.

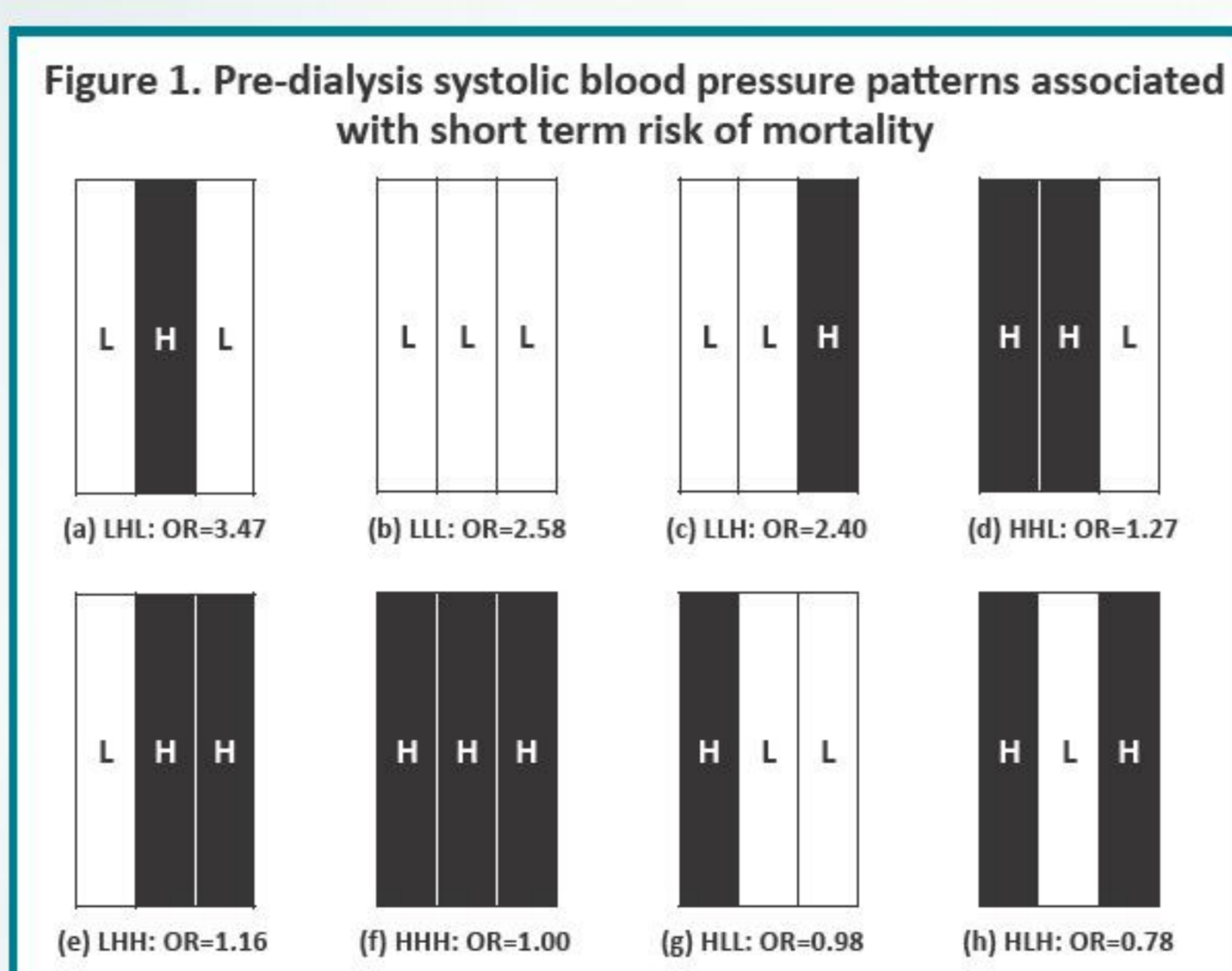


Figure 1. Groups of preSBP and odds ratio of death in the following week (groups (a) and (b) with p-value <0.05; all other s N.S.)

- Figure 2 shows clusters of various groups of preSBP together:
  - Patients with LHL and LLL preSBP patterns had the highest odds ratio of death (3.47 and 2.58 respectively).
- Generally, patients with more H preSBP measurements had better outcomes in the following week.

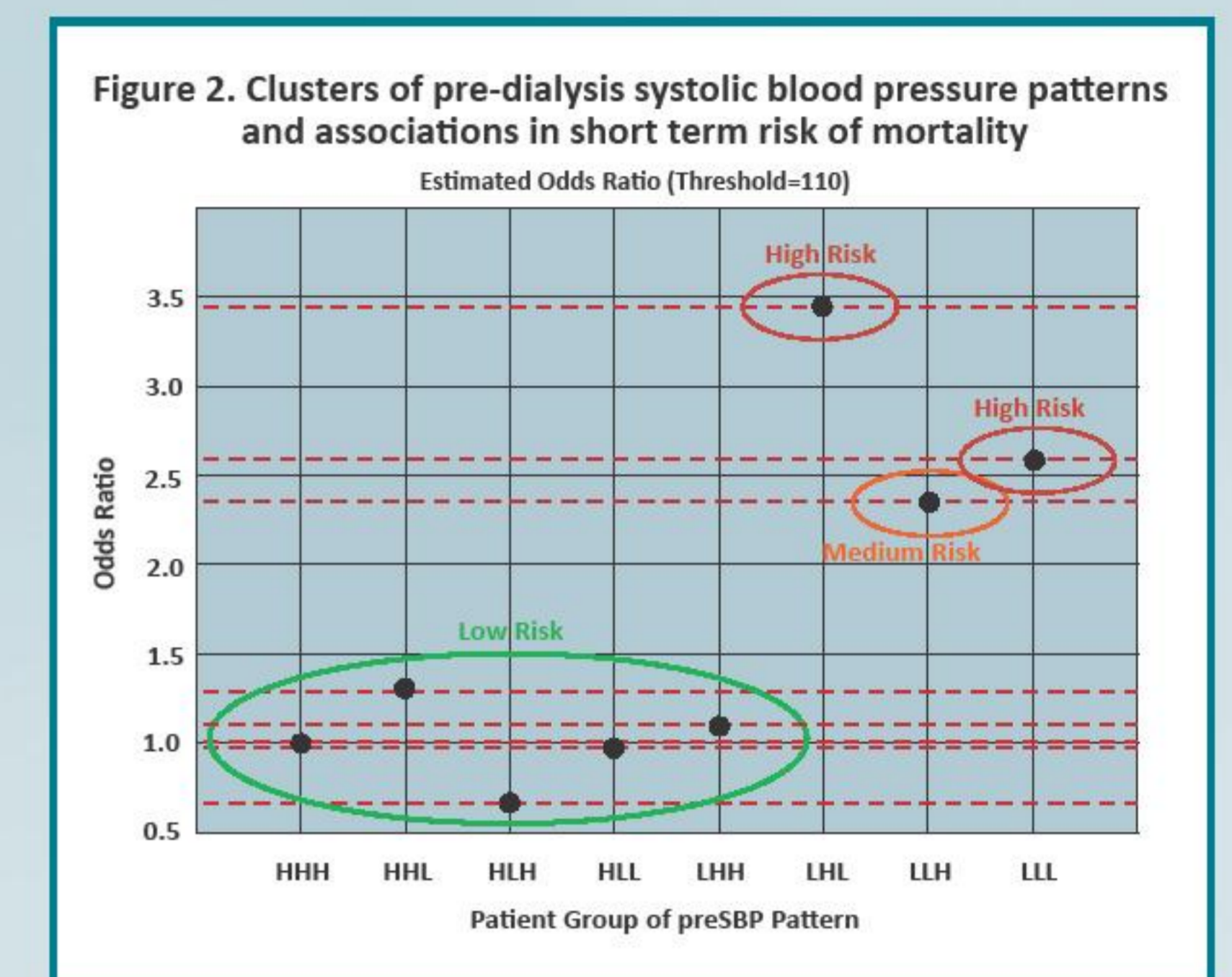


Figure 2. Clusters of preSBP patterns and associated mortality risk stratification (high risk, medium risk and low risk).

## CONCLUSIONS

- In the first weeks of HD the pattern of BP may predict short-term mortality risk.
- BP pattern visualization is difficult when observing individual BP data points.
- This is a novel method of representing BP patterns to allow identification of low BP patients at a glance.
- Weekly visualization of BP patterns may help identify incident HD patients at higher mortality risk in the following week.
- This observational study suggests that low BP patterns may be a marker for risk, but more analyses are needed to determine how patterns of preSBP may enable assessment of short-term mortality risk.

## REFERENCES

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## ACKNOWLEDGEMENTS

Thanks to all the Fresenius Medical Care North America staff who supported this research endeavor.

Dugan Maddux, MD | Dugan.Maddux@fmc-na.com | Tel: (781) 699-9000  
Fresenius Medical Care North America  
920 Winter St | Waltham, MA 02451 | United States