

New Trends in Improving Efficiency and Care Quality: Optimizing Medical Care for Peritoneal Dialysis Patients through BCM Data Visualization

Yi-Jing Song¹, Chiu-Huang Kuo¹, Shu-Hui Tseng¹, Hui-Yuan Lee¹, Chih-Hsien Wang¹, Bang-Gee Hsu¹

1 Nephrology, Hualien Tzu Chi Hospital,Buddhist, Hualien, Taiwan

P564

INTRODUCTION

Fluid management plays a crucial role in the treatment of end-stage renal disease (ESRD) patients undergoing peritoneal dialysis (PD). Excess fluid accumulation not only increases hospitalization rates but also elevates mortality risk. However, the lack of accurate real-time fluid monitoring tools in clinical settings leads to insufficient scientific basis for adjusting dialysis prescriptions. To address this issue, we introduced the Body Composition Monitor (BCM) for multiple measurements and utilized Microsoft Power BI to visualize large amounts of data. This approach aims to enhance the precision and timeliness of clinical decision-making, ultimately improving the overall quality of patient care.

AIM

This study aims to optimize fluid management in peritoneal dialysis patients in real-time through multiple BCM measurements combined with data visualization analysis using Power BI. By doing so, we seek to reduce the risk of complications associated with fluid overload. Additionally, the visualized data presentation is intended to enhance the efficiency and accuracy of the medical team in adjusting prescriptions and improving patient care.

RESULTS

From April 2021 to November 2023, 138 peritoneal dialysis patients underwent BCM examinations, with 408 test results. The proportions of patients with excess fluid were 19.51%, 17.57%, 19.44%, 20.22%, and 14.44%, respectively. BCM visualization charts created through Power BI included cards, tables, cross-analysis filters, and donut charts. For 17.2% (N = 38) patients with fluid overload, suggestions were made to modify dialysis prescriptions, including adjustments to dialysate concentration, dry weight, and treatment for hypoalbuminemia.

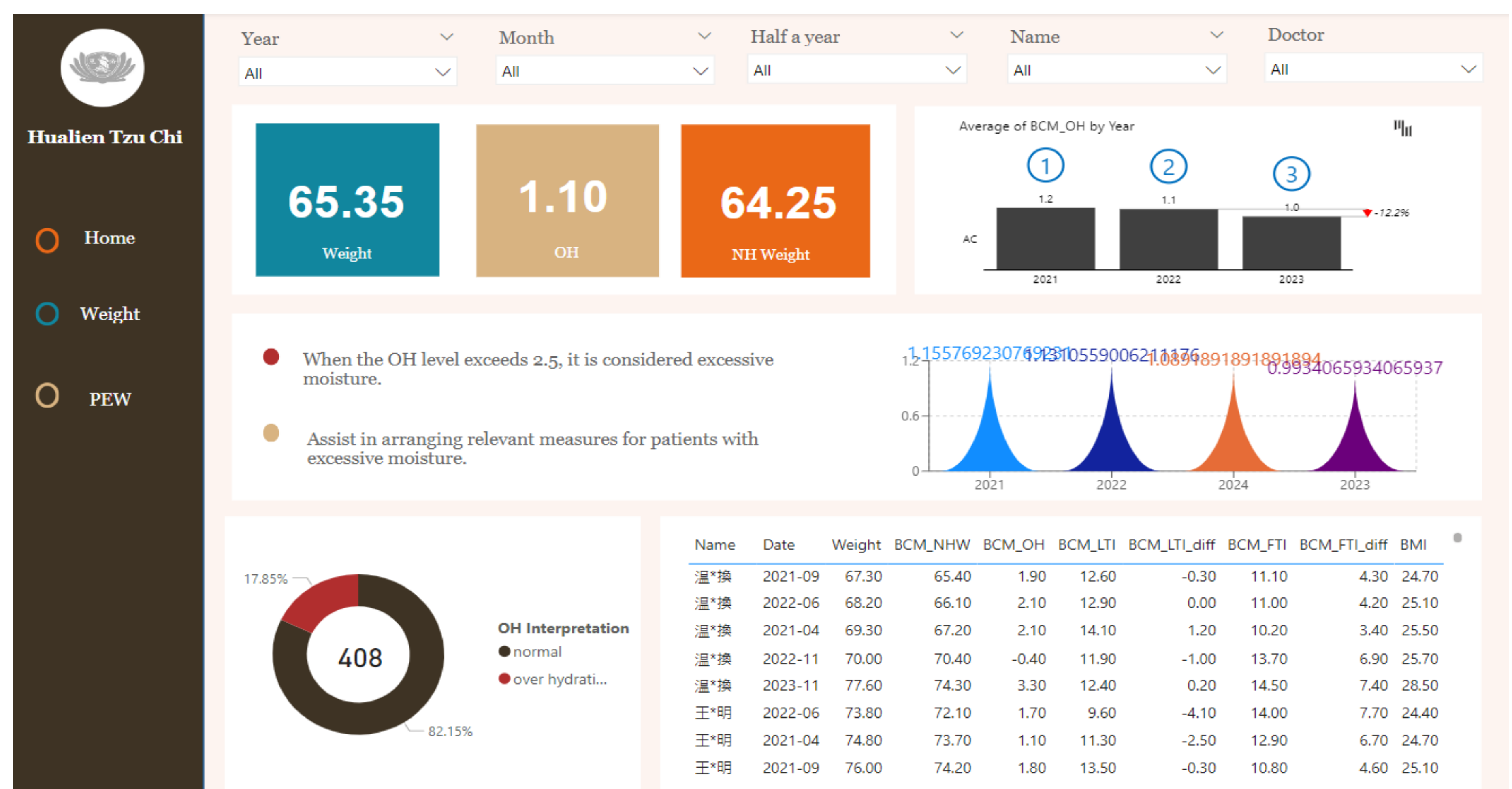


Figure. 1 BCM Dashboard: A visual presentation of data, using color to indicate patients with clinical deterioration, aiding clinical decision-making.



Figure. 2 The dashboard quickly filters detailed information of patients with poor fluid control in the first half of 2021.

METHOD

This research is a case study starting from April 2021. We conducted several BCM tests on peritoneal dialysis patients at six-month intervals to collect physiological parameters such as weight, body water, body fat percentage, and muscle quality. We adopted the hospital's existing medical information system and combined it with Microsoft Power BI for data analysis. In addition, we utilized Chat GPT to establish Data Analysis Expressions (DAX) to realize the visualization of big data.

CONCLUSIONS

The visualization of BCM examination results allows the medical team to promptly identify abnormal fluid status, adjust treatment plans in a timely manner, and thereby reduce patients' risk for complications. For administrators, it allows the real-time monitoring of anomalies and the formulation of overall quality improvement plans.

ACKNOWLEDGEMENT

We sincerely thank Hualien Tzu Chi Hospital for their support. We are also grateful for the assistance from colleagues at the Artificial Intelligence Development Center and Dr. Chiu-Huang Kuo for his valuable help in data collection and information guidance. The constructive feedback provided throughout the process has been greatly appreciated. We would also like to extend our special thanks to our nephrology department leaders for their unwavering support and encouragement.

REFERENCES

1. Abudiyab, N. A., & Alanazi, A. T. (2022). Visualization techniques in healthcare applications: A narrative review. *Cureus*, 14(11), e31355. <https://doi.org/10.7759/cureus.31355>
2. Law, M. C., Kwan, B. C.-H., Fung, J. S.-F., Chow, K. M., Ng, J. K. C., Pang, W.-F., Cheng, P. M.-S., Leung, C. B., Li, P. K.-T., & Szeto, C. C. (2019). The efficacy of managing fluid overload in chronic peritoneal dialysis patients by a structured nurse-led intervention protocol. *BMC Nephrology*, 20, 454. <https://doi.org/10.1186/s12882-019-1596-3>
3. Wu, T.-K., Chen, H.-B., Chen, C.-H., Tseng, T.-Y., & Lim, P.-S. (2021). Bioimpedance spectroscopy and fluid management in dialysis patients: From laboratory to clinic. *Tungs' Medical Journal*, 15(S), 13–23. <https://doi.org/10.3966/20713592202109150S003>

CONTACT INFORMATION

Ms. Yi-Jing Song

Buddhist Tzu Chi Medical Foundation Hualien
Tzu Chi Hospital - Nephrology Department

Email: t223607480@gmail.com

Phone: +886-3-856-1825 ext. 12128