

Sharing Experiences in Handling Water Abnormalities for Hemodialysis in the Intensive Care Unit of a Regional Hospital

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INTRODUCTION

According to the Taiwan Society of Nephrology's guidelines for the assessment of hemodialysis and peritoneal dialysis operations, it is recommended that each sampling point of the RO system be tested at least once a month, and the dialysate of all dialysis machines be tested at least quarterly. Referring to the standards established by Association for the Advancement of Medical Instrument (AAMI) in 2014, the colony count should be less than 100 CFU/mL, and if the colony count exceeds 50 CFU/mL, corrective action should be taken immediately. In February and August of 2023, abnormal results were observed in the RO water quality monitoring in our hospital's cardiac intensive care unit. We formed a cross-functional team to conduct root cause analysis, implement corrective actions, evaluate, and develop effective management strategies.

AIM

This study aims to improve the water quality management of reverse osmosis (RO) water treatment systems, ensuring that the water quality meets the standards set by the Taiwan Society of Nephrology and the Association for the Advancement of Medical Instrumentation (AAMI) 2014 guidelines. By optimizing water quality monitoring and management measures, this study strives to enhance the reliability and efficiency of the water treatment system, thereby ensuring the health and safety of patients.

METHOD

Root Cause Analysis:

- Disinfection Operations Issue:** The disinfection operations of the RO water treatment system were conducted by an external contractor on holidays. This included adding disinfectants to the water storage tank and flushing the outlets in the ICU. However, the process lacked proper execution records.
- Drainage System Issue:** The RO outlet at Bed 9 in the Cardiac ICU was equipped with a timer-controlled drainage system. However, it was found that three drainage system switches were malfunctioning, and improper operation by nursing staff resulted in the drainage system not functioning correctly. Additionally, the outlets were only flushed once per day.

Corrective Actions:

- Execution Record Form:** An execution record form will be established. After the contractor initiates the flushing of the outlets on-site, ICU nursing staff must verify and sign the execution record form.
- Repairs and Training:** Immediate repairs of the drainage system switches will be carried out, and nursing staff will be trained on the correct operation of the drainage system. Reminder cards will be created and posted near the RO pipeline to remind nursing staff to flush the outlets as scheduled.
- Increased Flushing Frequency:** The flushing frequency of the drainage system will be increased from once per day to twice per day.
- Regular Inspections:** A regular inspection and maintenance system for the drainage system will be established in collaboration with the engineering department to ensure that any abnormalities are promptly detected and addressed.



Fig1. The device of the RO water drainage system

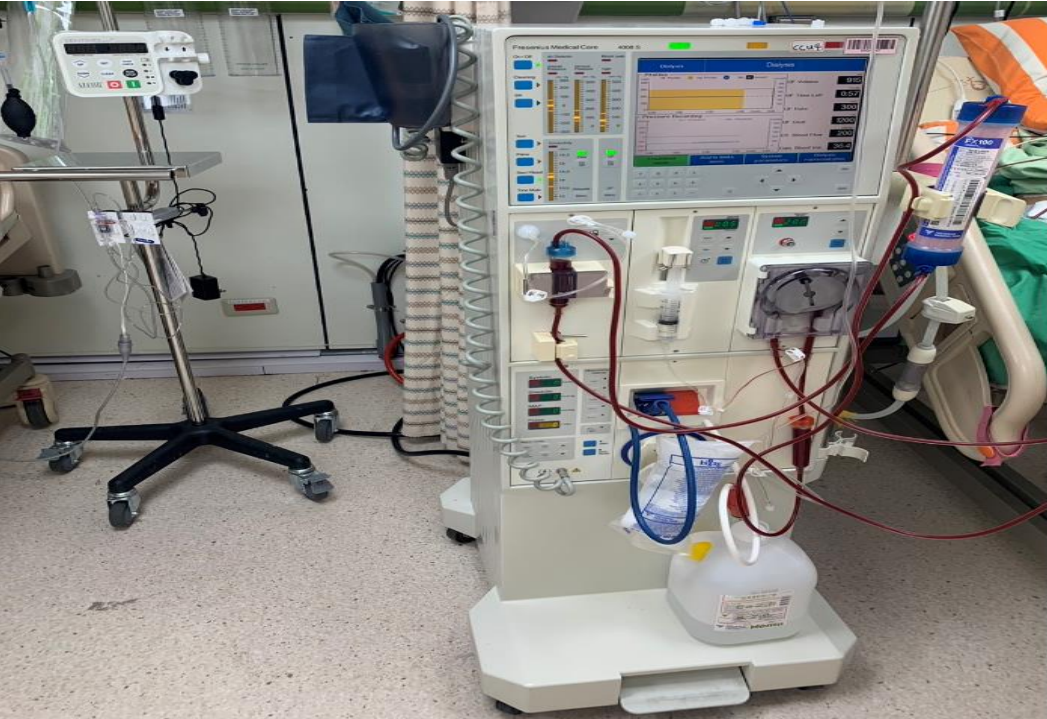


Fig2. Hemodialysis machine



Fig3. Conduct education and training in the intensive care unit (ICU)

RESULTS

For the 27 dialysis beds in our hospital's Medical ICU, Surgical ICU, and Cardiac ICU, quarterly audits of drainage system operation and RO water quality monitoring results from 2023 to 2024 were conducted:

- Inspection showed that all drainage devices are functioning normally, with a 100% success rate.
- RO water quality testing pass rate is 100%.

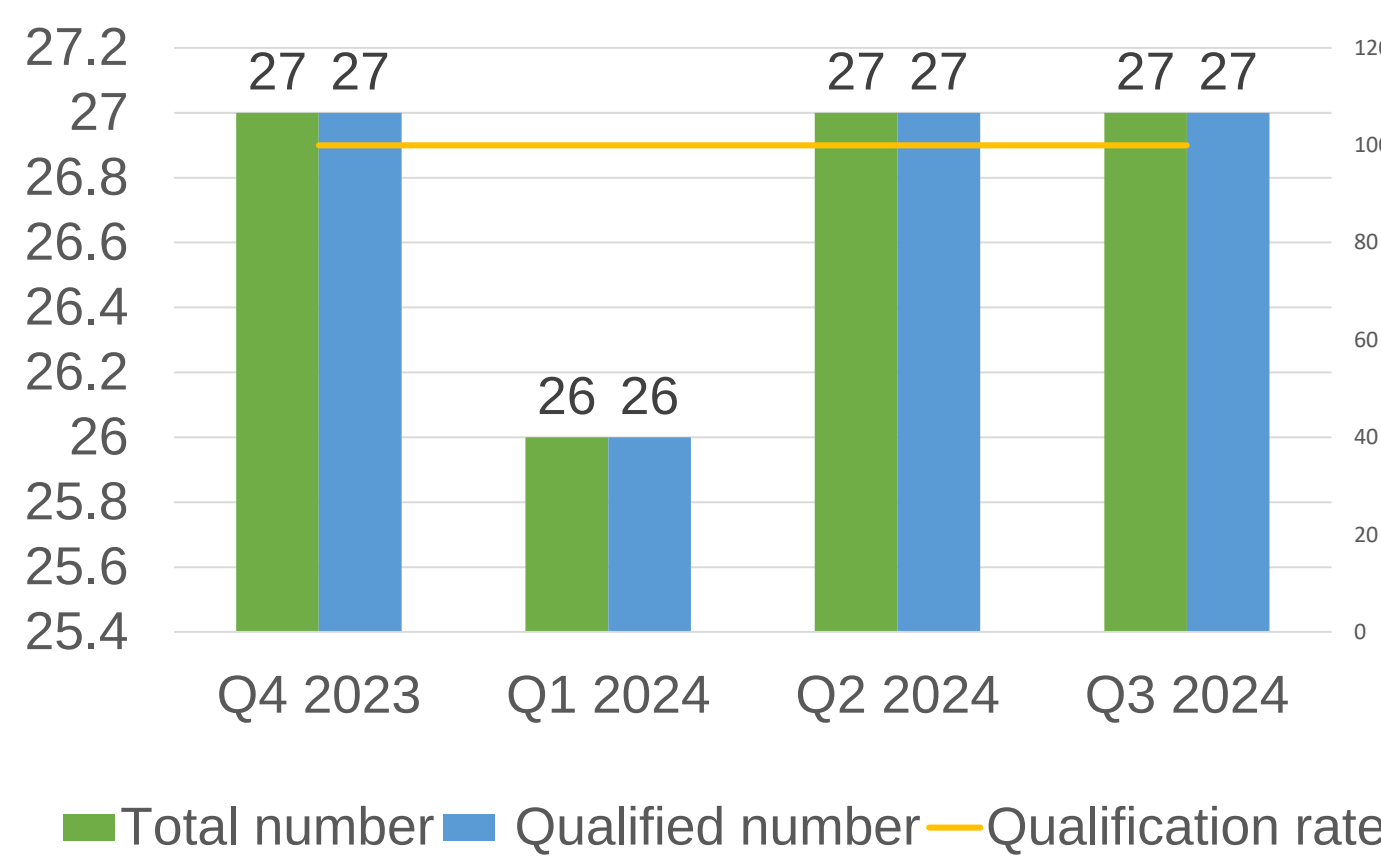


Fig4. Audit results of the drainage devices functionality

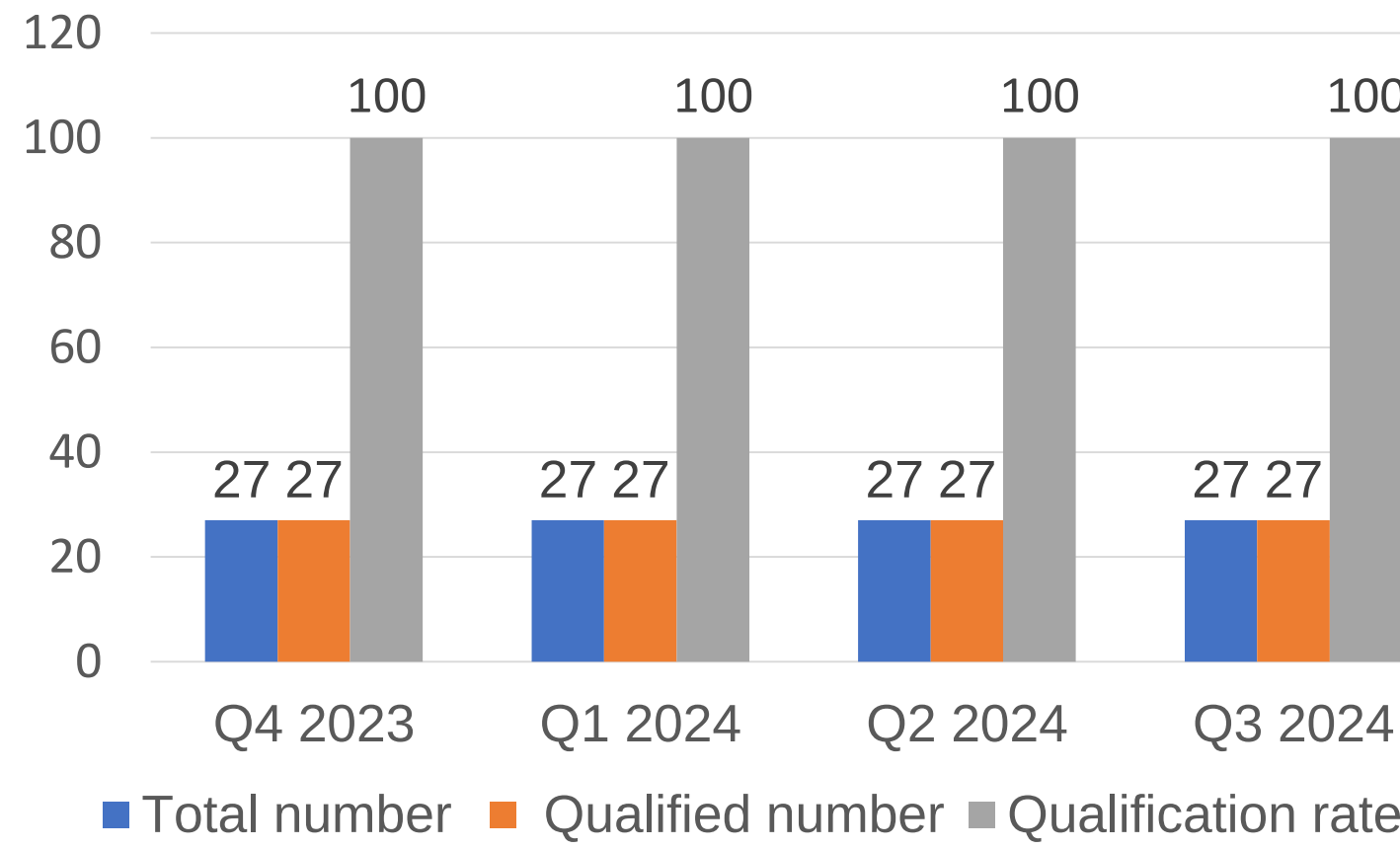


Fig5. Results of RO water quality testing

CONCLUSIONS

Through optimization of the system and strengthening monitoring during holidays, particularly for projects outsourced to external vendors, an effective equipment management plan was established. Posting reminder cards helped nursing staff in correctly operating the drainage equipment. Installing timers on drainage devices and ensuring their proper operation, as well as increasing the frequency of flushing, contributed to reducing scale buildup and microorganisms in the RO water system. The implementation of corrective actions resulted in significant improvements, ensuring that RO water quality met standards and providing patients with safer, higher-quality dialysis treatment. We will standardize the corrective action process, continue to monitor key indicators, improve related processes, and ensure the quality of RO water supply in the intensive care units and dialysis rooms.

ACKNOWLEDGEMENT

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REFERENCES

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