

An Interdisciplinary Approach to Combatting Aeromonas Bloodstream Infections in Dialysis Wall Boxes

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Aim Statement

Using a multidisciplinary team approach, the goal of this project was to identify and mitigate engineering, environmental, and nursing factors that may have contributed to hospital-acquired, CRRT-related bloodstream infections in a Transplant/Surgical ICU in 2023

Background

Aeromonas is a bacteria normally found in the GI tract and in aquatic environments. In humans, this bacteria can cause a variety of infections including bloodstream infections (BSIs). Immunocompromised patients, especially those with hepatobiliary disease are at higher risk of developing Aeromonas BSIs. Dialysis wall boxes have previously been associated with gram-negative BSIs including Aeromonas.

Figure 1. ICU room. Dialysis wall boxes (red box) are frames recessed into the wall that house drainage lines to discard effluent (i.e. spent dialysate or waste) into the sanitary sewer system.



Baseline Conditions

- A retrospective review identified 16 patients cared for in the Transplant/Surgical ICU between January 2020 – December 2023 that developed an Aeromonas bloodstream infection.
- Of these 16 patient, 16/16 were receiving continuous renal replacement therapy (CRRT) via central venous dialysis catheter, 15/16 had severe hepatobiliary disease, and 1/16 had a kidney transplant and was on immunosuppressant medications.
- Environmental testing previously performed failed to identify a definitive source of Aeromonas.

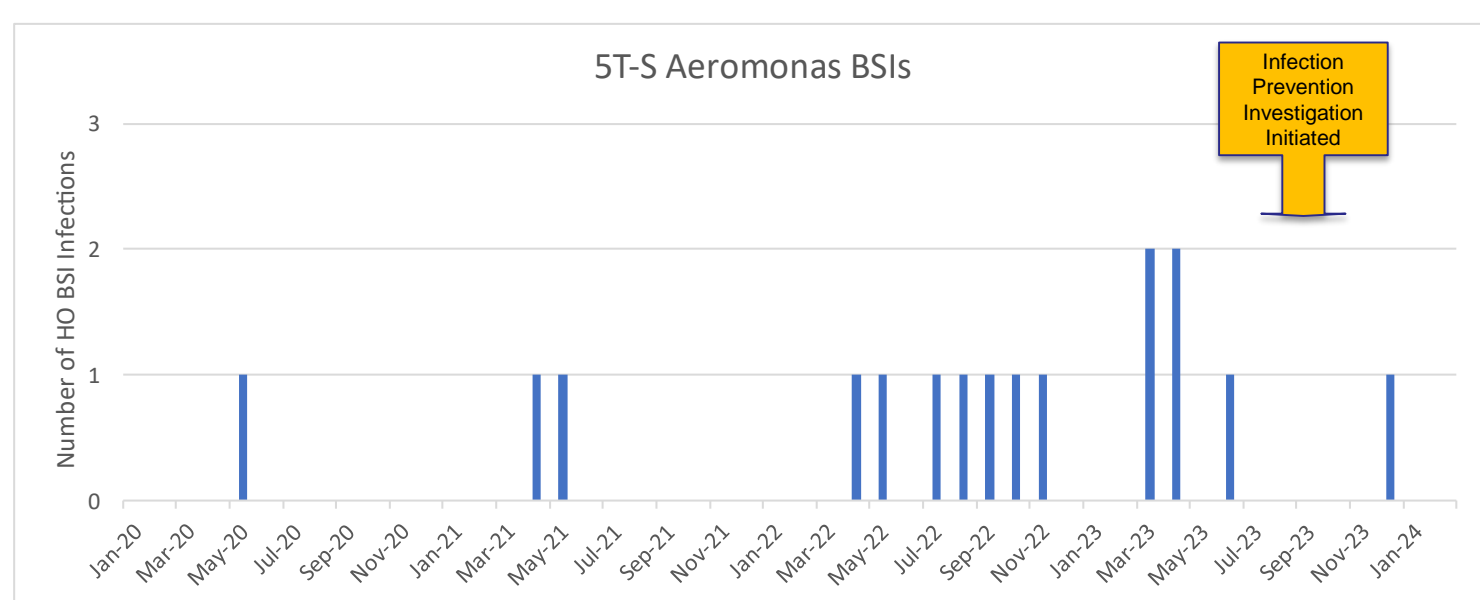


Figure 2. Number of Aeromonas bloodstream infections between January 2020 – December 2023.

Analysis

An initial investigation initiated by Infection Prevention in April 2023 revealed the following:

- Tape residue in drain boxes increases risk of biofilm growth.
- Effluent tubing not always placed at 12-18" depth.
- No established wall box and drain cleaning protocol.
- No hand hygiene reminder near wall boxes.



Figure 3. (left) Dialysis wall box with door opened and visible tape and adhesive residue and fold-down drip tray up. (right) Top view of wall box with effluent tubing threaded down drain and secured by staff with tape.

A nursing and medical team review in January 2024 added the following:

- CRRT set-up and take down protocols were not aligned with manufacturer's best practice. Effluent tubing not routinely changed q72 hours. Effluent bag not changed during recirculation protocol.

Measures

- Incidence of Aeromonas BSI per month
- Wall box drain cleaning frequency and compliance
- CRRT wall box weekly inspection

Actions/Tests of Change

August 2023

- All tape residue removed from dialysis wall boxes, tape use discouraged.
- Double grommets installed by Facilities Management to secure effluent drain lines without use of tape.
- Hand hygiene reminders placed above every wall box.

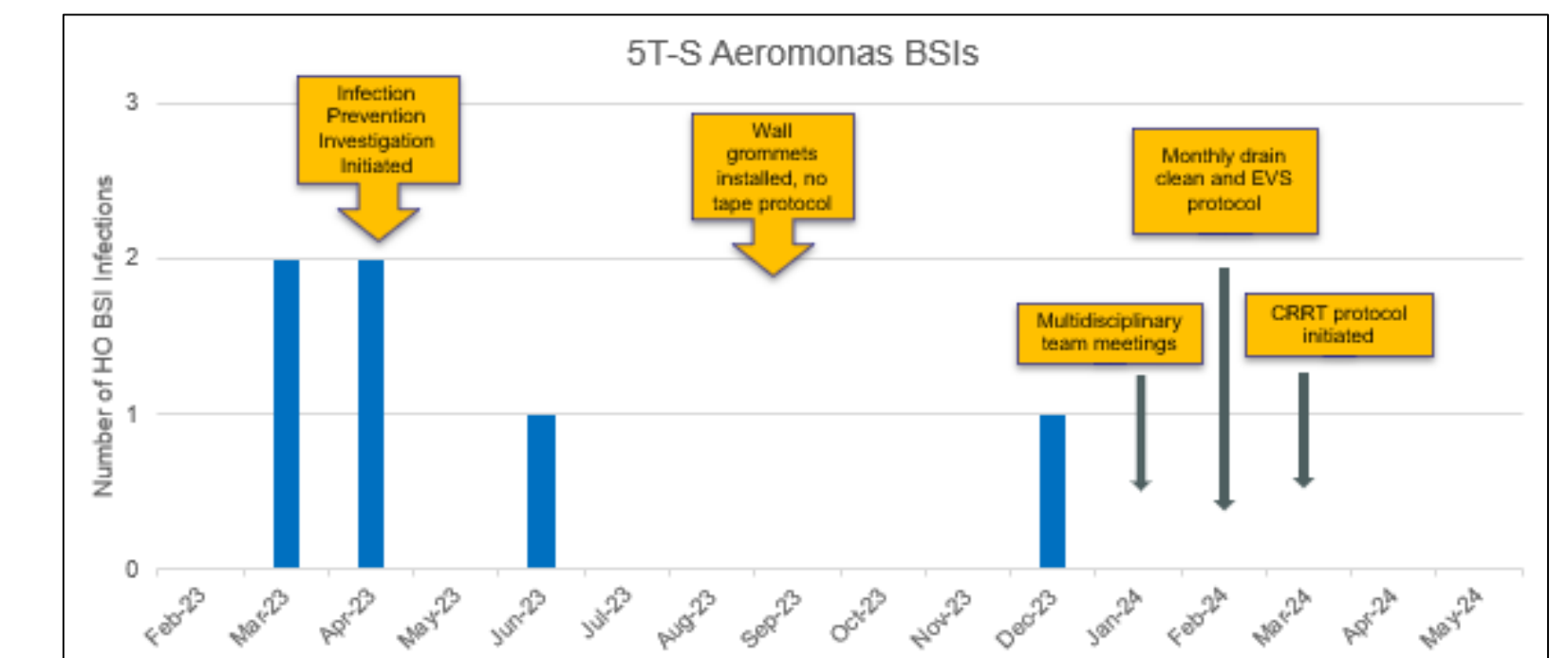


Figure 4. Reconfigured dialysis wall box with double grommets.

January 2024 - formal multidisciplinary team approach

- Assembled leaders from Infection Prevention, Nursing, Transplant, Environmental Services (EVS)
- Consensus protocols developed include:
 - Orkin enzymatic drain cleaning of all dialysis wall box drains once per month
 - EVS established standard operating procedure to wipe down interior and exterior of wall boxes upon room terminal clean
 - Install visual cues for cutting and inserting tubing correctly (12-18").
 - CRRT set-up and take-down protocol revised according to manufacturer's guidelines
 - Detailed CRRT protocol written, shorthand protocol fastened to CRRT machine for easy reference.

Results



- April '23:** Infection Prevention investigation initiated
- August '23:** Double grommets installed in every dialysis wall box, no tape protocol begins
- Jan '24:** Multidisciplinary task force begins meeting
- Feb '24:** Monthly Orkin enzymatic drain cleaning and EVS wall box cleaning protocols begins
- March '24:** New CRRT set-up and take-down protocol enacted

Reflection/Follow-up

- This project required open dialogue and willingness from all parties for cross-discipline collaboration.
- The Hospital Transplant Service Line (HSL) structure facilitated collaboration and rapid protocol changes.
- Although measurement of our primary outcome (incidence of Aeromonas BSIs after tests of change) is still ongoing, the multidisciplinary collaboration and rapid development of multifaceted interventions was noteworthy.
- The next steps are to monitor compliance with tests of change and incidence of hospital-acquired Aeromonas BSIs.
- There is opportunity to reduce other hospital-acquired, non-Aeromonas BSIs that may be transmitted through CRRT as well as share best practices with other units that use dialysis wall boxes.

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