

# Development, implementation and follow up of hemodialysis Catheter related blood stream infection (CRBSI) protocol, a single center experience

Mohamed Essam (1, 4)\*, Marwa Meheissen (2), Alyaa Elghitany (3), Mahmoud Abdelghany (1, 4), Ahmed Elkeraie (1, 5)

(1)Nephrology department, Kidney and Urology Center, Alexandria, Egypt. (2) Microbiology Department, Faculty of Medicine, Alexandria University, Egypt. (3) Clinical pharmacy department, Kidney and Urology Center, Alexandria, Egypt. (4)Quality department, kidney and Urology Center, Alexandria, Egypt. (5) Nephrology Department, Faculty of Medicine, Alexandria University, Egypt.



## BACKGROUND

Intravascular hemodialysis catheters play a central role in management of patients with renal impairment. Catheter related blood stream infection (CRBSI) is one of the major complications of intravascular catheters. CRBSI is associated with increased morbidity, mortality and health care cost. The objective of our work was to develop a management protocol for proper diagnosis and treatment of such condition.

## METHODS

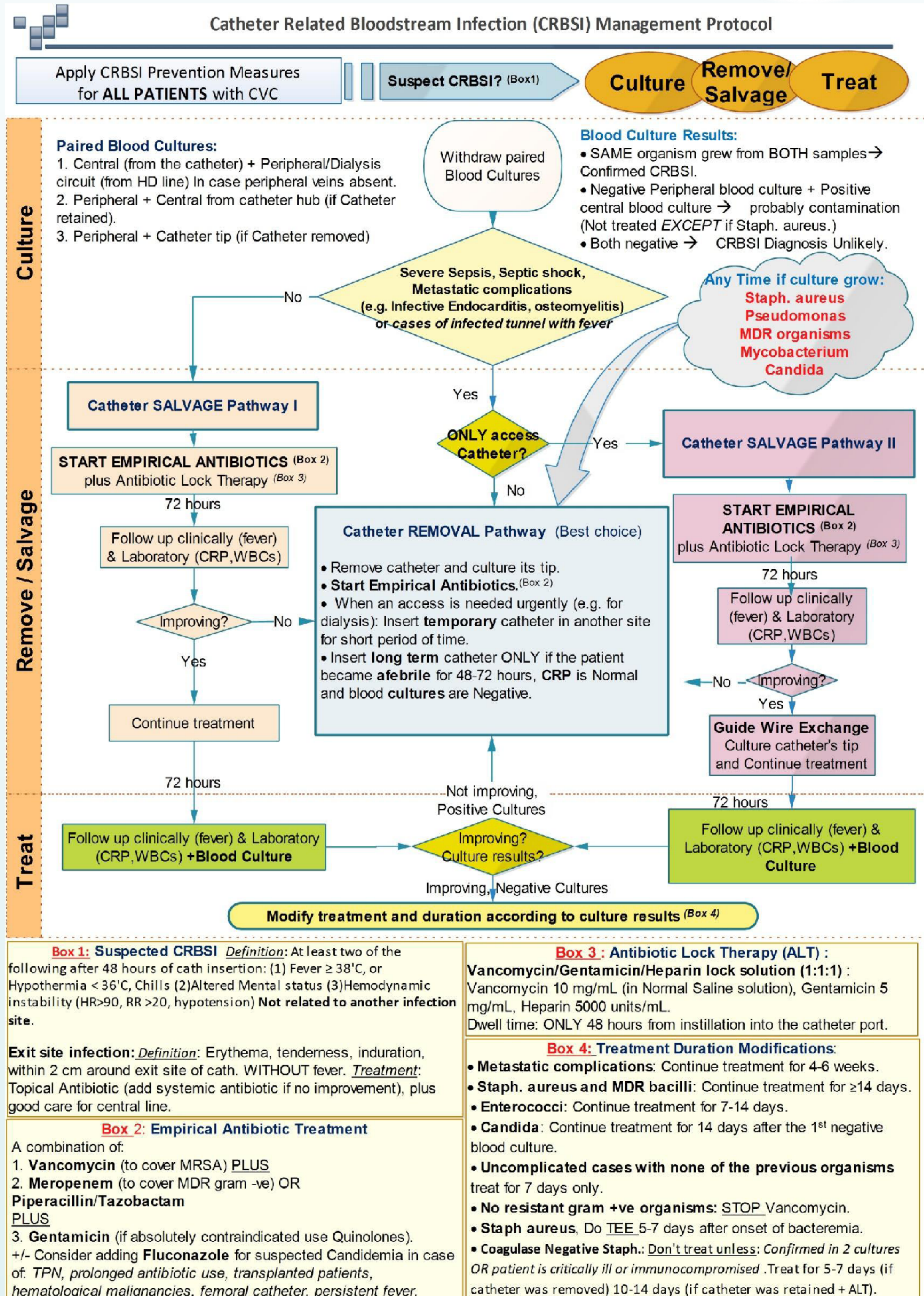
We reviewed healthcare records for all CRBSI cases in our center in 2014, the diagnosis and management protocol that was implemented by our staff. We subsequently revised results of all blood cultures drawn for suspected CRBSI in 2014 to identify most common isolated organisms and their susceptibility profile. We then reviewed all major guidelines discussing CRBSI prevention, diagnosis and management in the literature. We developed CRBSI management protocol, taking into consideration our own collected data, with the cooperation of nephrology, microbiology, clinical pharmacy and quality improvement department. Finally, we compared data of CRBSI management and patients' outcomes before (2014) and after (2015) protocol implementation.

## RESULTS

We developed a protocol for proper management of CRBSI cases (Figure 1). Comparison of data between 2014 (before protocol implementation) & 2015 (after protocol implementation) is tabulated in table 1. Clinical and laboratory improvement after protocol implementation: Symptoms started to improve mostly within 48 hours of treatment. Fever disappeared completely on the 3rd day in 90% of the cases. Mean WBCs decreased from 20.5 x 10<sup>9</sup>/L (on the day on admission) to 12.2 x 10<sup>9</sup>/L (after 48 hours) to 9.96 x 10<sup>9</sup>/L (after 96 hours). Mean C - Reactive Protein (CRP) decreased from 123.5 mg/L (on the day of diagnosis) to 86.16 mg/L (after 48 hours) to 52.6 mg/L (after 96 hours). Mean hospital stay/ episode of CRBSI decreased from 15.6 days/episode (in 2014) to 7.3 days/episode (in 2015). Only one case died during hospitalization due to associated multi-organ failure.

Table 1. Difference between CRBSI management before (2014) and after protocol implementation (2015).

	2014	2015
<b>Diagnosis of CRBSI</b>	Based mainly on clinical expert opinion. Blood culture withdrawal in rare occasions.	Based on clinical & laboratory criteria. Paired blood cultures usually obtained
<b>Culture first</b>	Empirical antibiotics were usually given before blood cultures withdrawal.	Empiric antibiotics were given after withdrawal of paired blood cultures in 90% of cases.
<b>Empirical Antibiotic treatment</b>	Vancomycin was the most common antibiotic used.	Implemented as per protocol. Protocol was violated by individual consultant early in 2015, which was corrected afterwards with thorough discussion.
<b>Withdraw of Blood Cultures</b>	When cultures were ordered, only catheter tip was cultured after catheter removal without corresponding peripheral blood culture, or peripheral blood cultures after start of empiric treatment due to sub-optimal response to therapy.	66 cultures were withdrawn for suspected CRBSI episodes: 46/66, paired blood cultures (69.66%) 11/66, central culture only (16.66%) 9/66, peripheral only (13.66%)
<b>Culture results</b>	85 Blood and catheter tip culture results revealed 68 cases (80%) no growth (explained by culture withdrawal after treatment failure or after start of antibiotic treatment), 11 cases (12.9%) gram negative (G-ve) organisms and 6 cases (7.1%) gram positive (G+ve) organisms. The most common G-ve organisms were E.coli (30%) and Klebsiella (15.4%). Methicillin-resistant Staphylococcus aureus (MRSA) represented 40% of G+ve infections.	Results revealed 16 cases, G+ve organisms (24.2%) 7 cases with G-ve organisms (10.6%) 43 cases, No growth (65.2%) Still E.coli was the most G-ve organism (21.7%). MRSA represented 25% of G+ve organisms.
<b>Antibiogram</b>	G+ve organisms were best sensitive to Vancomycin, Teicoplanin and Linezolid in 100% of cases. While G-ve organisms were best sensitive to Imipenem, Meropenem in 100% of cases, and to Piperacillin/Tazobactam in 80% of cases.	
<b>Response to therapy</b>	Was not adequately monitored.	Marvelous improvement discussed below. Only one case died due to associated multi-organ failure (MOF).
<b>Mean hospital stay / episode of CRBSI</b>	15.6 days/episode.	7.3 days/episode.



## CONCLUSIONS

Conclusion: Adopting and adapting international guidelines per local data is useful for both patient and disease related outcomes. A local protocol is, therefore, needed for proper prevention, management and follow up of patients with CRBSI. Results of blood cultures have to be reviewed periodically to have a comprehensive idea about causative organisms and their antibiogram. Implementation and follow up of such a condition with subsequent modification will help to supply good care for these patients and will surely decrease morbidity and mortality of such condition.

Correspondence:

m\_elrgal@hotmail.com  
+2 0100 503 8467

