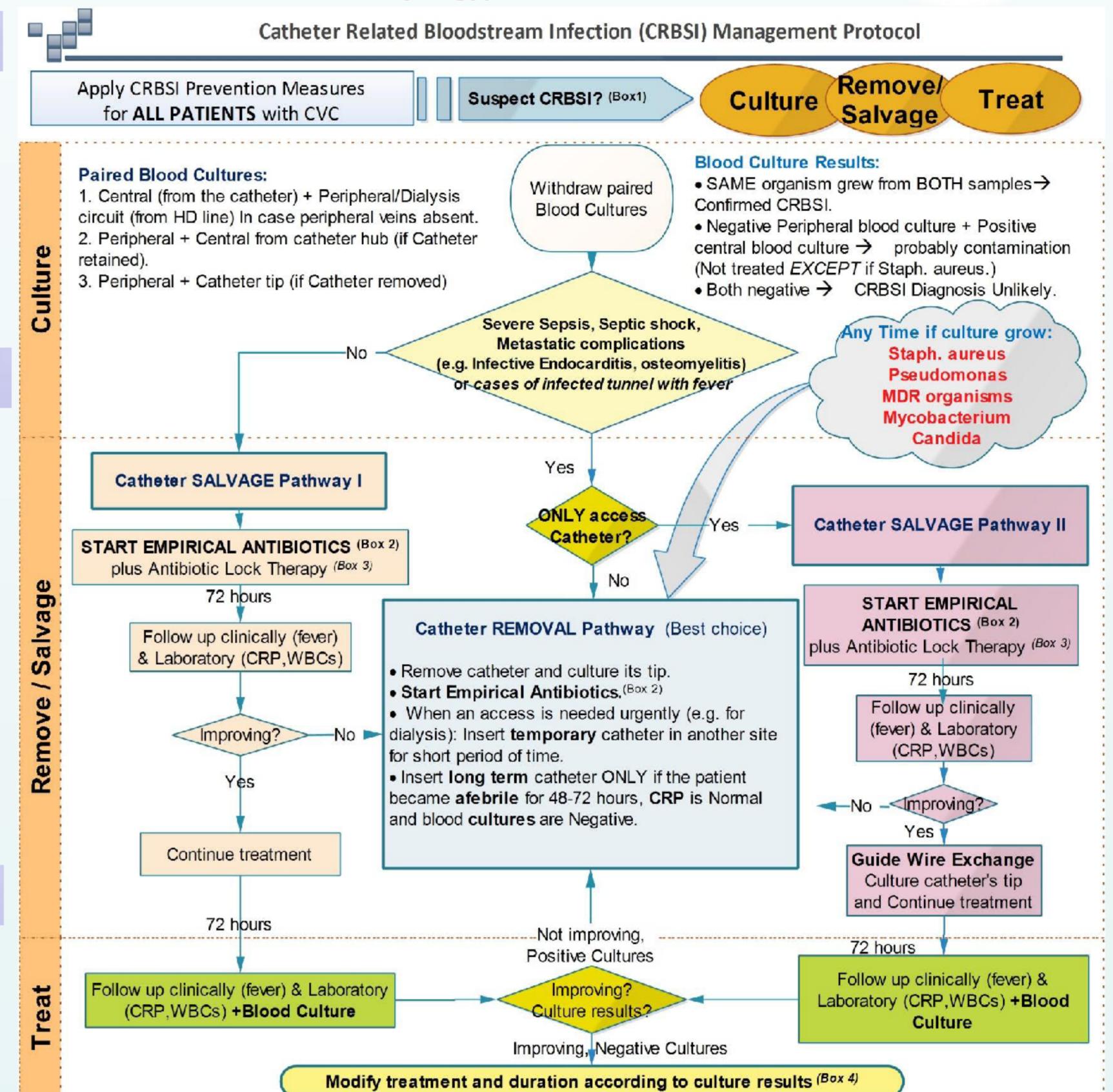
Development, implementation and follow up of hemodialysis Catheter related blood stream infection (CRBSI) protocol, a single center experience

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.



Box 3 : Antibiotic Lock Therapy (ALT) :

Box 1: Suspected CRBSI Definition: At least two of the

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 table1. 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 109/L (on the day or admission) to 12.2 x 109/L (after 48 hours) to 9.96 x 109/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. <i>Table 1. Difference between CRBSI management before (2014) and after</i> <i>protocol implementation (2015).</i>			Hypothermia < 36'C, Chills (2)Altered Mental status (3)Hemodynamic instability (HR>90, RR >20, hypotension) Not related to another infection site. Exit site infection: <u>Definition</u> : Erythema, tenderness, induration, within 2 cm around exit site of cath. WITHOUT fever. <u>Treatment</u> : Topical Antibiotic (add systemic antibiotic if no improvement), plus good care for central line. Box 2: Empirical Antibiotic Treatment A combination of: 1. Vancomycin (to cover MRSA) PLUS 2. Meropenem (to cover MDR gram -ve) OR Piperacillin/Tazobactam PLUS 3. Gentamicin (if absolutely contraindicated use Quinolones). +/- Consider adding Fluconazole for suspected Candidemia in case of. TPN, prolonged antibiotic use, transplanted patients,	 Box 3: Antibiotic Lock Therapy (ALT): Vancomycin/Gentamicin/Heparin lock solution (1:1:1): Vancomycin 10 mg/mL (in Normal Saline solution), Gentamicin 5 mg/mL, Heparin 5000 units/mL. Dwell time: ONLY 48 hours from instillation into the catheter port. Box 4: Treatment Duration Modifications: Metastatic complications: Continue treatment for 4-6 weeks. Staph. aureus and MDR bacilli: Continue treatment for ≥14 days. Enterococci: Continue treatment for 7-14 days. Candida: Continue treatment for 14 days after the 1st negative blood culture. Uncomplicated cases with none of the previous organisms treat for 7 days only. No resistant gram +ve organisms: STOP Vancomycin. Staph aureus, Do TEE 5-7 days after onset of bacteremia. Coagulase Negative Staph.: Don't treat unless: Confirmed in 2 cultures OR patient is critically ill or immunocompromised .Treat for 5-7 days (if catheter was removed) 10-14 days (if catheter was retained + ALT). 	
	2014	Deed	2015		CONCLUSIONS
-	Based mainly on clinical expert opinion.		on clinical & laboratory criteria. Paired blood cult	ures	
CRBSI Culture first	Blood culture withdrawal in rare occasions. Empirical antibiotics were usually given before blood cultures	usually obtained Empiric antibiotics were given after withdrawal of paired blood			Conclusion: Adopting and
Culture mist	withdrawal.	cultures in 90% of cases.			adapting international guidelines per local data is
Empirical	Vancomycin was the most common antibiotic used.	Implemented as per protocol. Protocol was violated by			useful for both patient and
Antibiotic		individual consultant early in 2015, which was corrected			disease related outcomes. A
treatment		afterwards with thorough discussion.			local protocol is, therefore,
Withdraw of	When cultures were ordered, only catheter tip was cultured	66 cultures were withdrawn for suspected CRBSI episodes: 46/66, paired blood cultures (69.66%) 11/66, central culture only (16.66%)			needed for proper prevention, management and
Blood Cultures	after catheter removal without corresponding peripheral blood				
	culture, or peripheral blood cultures after start of empiric treatment due to sub-optimal response to therapy.		eripheral only (13.66%)		follow up of patients with
Culture results			ts revealed		CRBSI. Results of blood cultures have to be reviewed
Vulture results	(80%) no growth (explained by culture withdrawal after	16 cases, G+ve organisms (24.2%)			
	treatment failure or after start of antibiotic treatment), 11 cases				periodically to have a
	(12.9%) gram negative (G-ve) organisms and 6 cases (7.1%)		es, No growth (65.2%)		comprehensive idea about
	gram positive (G+ve) organisms. The most common G-ve	Still E.coli was the most G-ve organism (21.7%). MRSA			causative organisms and
	organisms were E.coli (30%) and Klebsiella (15.4%).	represe	ented 25% of G+ve organisms.		their antibiogram. Implementation and follow up
	Methicillin-resistant Staphylococcus aureus (MRSA)				of such a condition with
	represented 40% of G+ve infections.				subsequent modification will
_	G+ve organisms were best sensitive to Vancomycin, Teicoplanin and Linezolid in 100% of cases. While G-ve organisms were			swere	help to supply good care for
		eropenem in 100% of cases, and to Piperacillin/Tazobactam in 80% of cases.			these natients and will surely
Response to	Was not adequately monitored.	Marvelous improvement discussed below. Only one case died		decrease morbidity and	
therapy Moon boonital	15.6 days/anicada	due to associated multi-organ failure (MOF). 7.3 days/episode.		mortality of such condition.	
stay / episode	15.6 days/episode.	1.5 day	s/episode.		① Correspondence:
of CRBSI					m_elrgal@hotmail.com
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