

Incidence and Etiology of Hemodialysis Catheter Related Blood Stream Infections at a Tertiary Care Hospital in Mumbai: A 5 Year Review

Dear Sir,

Blood stream infections (BSI's) can cause significant morbidity in patients undergoing hemodialysis through catheters. This study aims to fill the knowledge gaps on the incidence, etiology, and antimicrobial susceptibility of hemodialysis catheter related BSI's (CRBSI) in Indian patients.

This is a retrospective cohort study among patients undergoing regular hemodialysis through catheters at the dialysis unit of a private tertiary care hospital in Mumbai, from 2014 to 2018. CDC guidelines for preventing intravascular catheter-related infections were followed.^[1] For patients with suspected blood stream infection a set of cultures were collected from the catheter, and if possible, from a peripheral venipuncture. BacTAlert3D (Biomérieux Ltd) system was used for blood culture while identification and sensitivity testing was done using Vitek compact (Biomérieux Ltd). A bloodstream infection was defined as a positive culture from the catheter with/without a positive peripheral venipuncture sample along with symptoms and signs of a blood stream infection and no other focus for fever. Standard treatment guidelines for management of CRBSI's were followed. The outcome of the infections in terms death were noted. Following detection of CRBSIs, an audit was done to ascertain the possible cause of the infection and training and surveillance was enhanced in the unit. The incidence of infection was expressed as no of episodes per 1000 catheter days. The number of catheter days was obtained by multiplying the average number of patients with catheters undergoing dialysis every year in the unit with the number of days in that calendar year.

The dialysis unit at the study site is a 37-bedded unit. On an average one out of three patients undergoing dialysis had catheters [Table 1]. There were a total of 109,929 catheter days of follow-up in the study period. 20% of patients had temporary percutaneous catheters, while 80% had permanent tunneled catheters. There were 40 episodes of CRBSI of which 20 occurred in those with temporary catheters and 20 in those with permanent catheters. The overall CRBSI rate was 0.36/1000 catheter

days. The variation in the yearly rate is depicted in Table 1.

The age group of the patients with BSI varied from 45 years to 86 years. 42 organisms were isolated from 40 episodes of infections (two infections were due to two organisms each). Of these, 25 (60%) were gram positive, 16 (38%) were gram negative and 1 (2%) was *Candida*. Of the 25 gram positive isolates, 10 were *S.aureus* [7 methicillin sensitive *S.aureus* (MSSA) and 3 methicillin resistant *S.aureus* (MRSA)], 11 were Coagulase Negative Staphylococci (CONS) (1 methicillin sensitive and 10 methicillin resistant), 3 were Enterococci and one *Kokuria kristina*. Of the 16 gram negative isolates, 11 were enterobacteriaceae (2 *E. coli*, 2 *Klebsiella*, 3 *Enterobacter*, 3 *Serratia* and 1 *Proteus*), 4 non-lactose fermenters (3 *Acinetobacter* and 1 *Pseudomonas*) and one *Ralstonia*. The average susceptibility of gram negative isolates to amikacin was 62%, ciprofloxacin 68%, beta lactam-beta lactamase inhibitor (BL-BLI) combinations was 80%, while to the carbapenems was 87.5%. The single isolate of *Candida* was *C.parapsilosis* and it was fluconazole susceptible. 4 patients with CRBSI died with a crude mortality of 10%.

The incidence rate of CRBSI reported in this study is substantially lower than that reported earlier in an Indian study (5.37-6.5 per 1000 catheter days) as well as from older international studies (3.5-5/1000 catheter days).^[2] In fact, the rate reported in this study approximates rates reported from developed countries; a recent prospective study from Alberta, Canada reported this rate as 0.19/1000 catheter days.^[3] Understandably enough, the incidence of CRBSI in study patients with temporary catheters was higher than those with permanent catheters.

The microbial etiology of CRBSI in the current study showed predominance of gram positive organisms like most Indian studies.^[2] While most of the *S.aureus* isolates were methicillin sensitive, the vast majority of the CONS were methicillin resistant. The gram negative isolates displayed significantly less antimicrobial resistance as compared to gram negative isolates causing CRBSI in adult ICU patients with percutaneous CVC at the same

Table 1: Incidence of CRBSI from 2014 to 2018

	2014	2015	2016	2017	2018	Total
Average number of patients undergoing dialysis	197	210	208	185	190	
Average number of patients with catheters undergoing dialysis	60	61	64	59	57	
Total number of catheter days	21900	22265	23424	21535	20805	109929
No of CRBSI	9	6	8	13	4	40
Incidence of CRBSI/1000 catheter days	0.41	0.27	0.34	0.6	0.2	0.36

centre (30% susceptibility to carbapenems and 25% to BL-BLI combinations in 2018, unpublished data). Global data is discordant. At the same time, an Irish study reported 84% infections to be due to staphylococcus (61% CONS, 23% *S.aureus*), a study from Saudi Arabia reported 60% of infections due to gram negative organisms.^[4,5]

The study helped us to benchmark us against global standards and illustrates that it is possible to keep the CRBSI rates low with good compliance to the BSI prevention bundle. Knowledge of etiologic agents and susceptibility helped us in designing empiric regimes for suspected CRBSI. However, there is a need to explore the role of other preventive strategies, including intranasal mupirocin, catheter lock solutions and hub devices to further reduce the burden of CRBSI in hemodialysis patients at our centre.

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Conflicts of interest

There are no conflicts of interest.

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