



Infections in patients on short-term hemodialysis with catheters: incidence, associated factors, and microbiological aspects



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Background and Objective

Mortality in patients on dialysis treatment is 6.5–7.9 times greater than in the general population. In elderly patients on dialysis, mortality due to infection is two times higher than in elderly people who are not on dialysis. Bloodstream infection (BSI) is the leading cause of hospitalization and the second most common cause of death among patients on hemodialysis.

Given the high reported incidence of infection complications in patients on hemodialysis, as well as the morbidity and mortality related to these events, the present study aimed to evaluate the incidence and possible risk factors for catheter-related infections in patients undergoing dialysis treatment and to characterize the susceptibility profile of the corresponding microorganisms isolated.

Methods

This was a prospective cohort study, carried out in a hemodialysis center of a tertiary-care public affiliated hospital in Brazil during 2014. We included 200 patients with acute kidney injury, without a permanent venous access and with indication of hemodialysis. All venous catheters were inserted by nephrologists, following the institutional protocol. Patients were followed during the entire hemodialysis period before obtaining a functional arteriovenous fistula, or until they were forwarded to another service. Catheters were removed in the following situations: malfunction, presence of erythema with or without purulent secretion, bacterial infection, or fever without another probable source of infection.

Infection episodes were defined according to the criteria established by the Centers for Disease Control and Prevention (CDC). All collected data were analyzed using the Statistical Package for Social Sciences (SPSS) software. To analyze the data, we used the Student's *t*-test, the chi-square or Two-tailed Fisher's exact test.

Results and Discussion

The demographic data of the 200 patients evaluated in this study are shown in Table 1.

Table 1. Demographic and clinical characteristics of patients on hemodialysis with and without catheter infections during 1 year of follow-up. Ribeirão Preto, São Paulo, Brazil, 2014

	With infection N %	Without infection N %	<i>p</i>
Patients (%)	43 (22%)	157 (78%)	-
Male sex (%)	24 (56%)	81 (52%)	0.37
Mean age (years) (standard deviation)	60 (19)	56 (18)	0.32
Education			
Primary school incomplete	14 (33%)	49 (31%)	0.71
Primary school complete	22 (52%)	76 (49%)	0.38
High school incomplete	1 (2%)	5 (3%)	0.96
High school diploma	4 (9%)	22 (14%)	0.63
University complete	2 (4%)	5 (3%)	0.93
Ethnic background			
Caucasian	32 (74%)	116 (73%)	0.79
Afro-American	11 (26%)	39 (25%)	0.87
Asiatic	-	2 (2%)	-
HIV-infected	3 (7%)	11 (7%)	1
HCV-infected	4 (9.5%)	4 (2.5%)	0.61
Diabetes mellitus	146 (73%)	54 (27%)	0.0001

A total of 55 infection episodes related to hemodialysis catheters were detected in 43 (22%) patients. Of these, 38 (69%) were BSI, 36 (65%) were confirmed by laboratory findings and 17 (31%) were local infections. Thirty-two patients (75%) had a femoral access. In total, 6,240 hemodialysis sessions were performed, and the rate of primary BSI and local infection was 6.1 episodes and 2.7 episodes per 1,000 patients on daily dialysis, respectively. In a univariate analysis, diabetes was significantly associated with the development of infection. The results regarding the microorganisms identified and the sensitivity profile are shown in Table 2.

Figure 2. Microorganisms identified in blood cultures collected from patients who had laboratorial confirmed bloodstream infections

Microorganisms	Total of positive blood cultures
Carbapenem-susceptible <i>K. pneumoniae</i> , <i>P. aeruginosa</i> , or <i>A. baumannii</i>	8
Carbapenem-resistant <i>K. pneumoniae</i> , <i>P. aeruginosa</i> , or <i>A. baumannii</i>	9
polymyxin-resistant <i>K. pneumoniae</i> , <i>P. aeruginosa</i> , or <i>A. baumannii</i>	1
vancomycin-susceptible <i>Staphylococcus</i> spp.	6
vancomycin-resistant <i>Staphylococcus</i> spp.	10
Azole-susceptible <i>Candida albicans</i>	1

Conclusion

In conclusion, we identified a high incidence of catheter-related infections in patients with acute kidney injury, and diabetes mellitus was identified as a relevant risk factor for that, highlighting the need of special prevention efforts to be taken among this population.