

Survey about infection at the site of a double-lumen catheter insertion

Levantamento sobre a infecção na inserção do cateter de duplo lúmen

Inventario sobre la infección en la inserción del cateter de doble lúmen

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ABSTRACT

Objective: The purpose of this study was to identify the infection rate, etiologic agent, infectious complications and the double-lumen catheter permanence in one same period in alternating years. **Methods:** This retrospective study was carried out in the Center of Hemodialysis of the Hospital de Base de São José do Rio Preto-SP. All patients who presented infection in the double-lumen catheter insertion site within the period of the survey were included. **Results:** It was reported that of the 80 patients undergoing hemodialysis treatment in the first period, from January to June 2002, 21% of the patients were using catheter. Three years later, 186 patients were in the same conditions, and of these, 10.7% was being treated with catheter therapy. The bloodstream infections were reduced by 9.4% in the last period. Bacteremia was the main prevailing infectious complication. The *Staphylococcus aureus* was the most prevalent etiologic agent and the average double-lumen catheter permanence time was of 43 days in both periods of the study. **Conclusion:** This study revealed that there was a significant improvement as for the infection indexes in that population.

Keywords: Renal dialysis/adverse effects; Infection; *Staphylococcus aureus*; Catheters, indwelling

RESUMO

Objetivo: Identificar o índice de infecção, o agente etiológico, as complicações infecciosas e o tempo de permanência do cateter de duplo lúmen em um mesmo período em anos alternados. **Métodos:** Trata-se de um estudo retrospectivo realizado no Centro de Hemodiálise do Hospital de Base de São José do Rio Preto-SP, e foram incluídos todos os pacientes com infecção no local de inserção do cateter de duplo lúmen. **Resultados:** Dos 80 pacientes em tratamento hemodialítico no primeiro período de janeiro a junho de 2002, 21% eram portadores de cateter e três anos depois dos 186 pacientes nas mesmas condições, 10,7% apresentavam terapia por cateter. Houve diminuição de infecções da corrente sanguínea de 9,4% no último período. A complicação infecciosa mais freqüente foi a bacteremia, e o agente etiológico mais encontrado o *Staphylococcus aureus*, o tempo médio de permanência do cateter foi de 43 dias nos dois períodos avaliados. **Conclusão:** Este estudo demonstrou que houve melhora significativa quanto aos índices de infecção nessa população.

Descritores: Diálise renal/efeitos adversos; Infecção; *Staphylococcus aureus*; Catéteres de demora

RESUMEN

Objetivo: Identificar el índice de infección, el agente etiológico, las complicaciones infecciosas y el tiempo de permanencia del catéter de doble lumen en un mismo período en años alternos. **Métodos:** Se trata de un estudio retrospectivo realizado en el Centro de Hemodiálisis del Hospital de Base de São José de Rio Preto-SP, y fueron incluidos todos los pacientes con infección en el lugar de inserción del catéter de doble lumen. **Resultados:** De los 80 pacientes en tratamiento hemodialítico en el primer período de enero a junio del 2002, el 21% eran portadores de catéter y tres años después de los 186 pacientes en las mismas condiciones, el 10,7% presentaban terapia por catéter. Hubo disminución de infecciones de la corriente sanguínea del 9,4% en el último período. La complicación infecciosa más frecuente fue la bacteremia, y el agente etiológico más encontrado el *Staphylococcus aureus*, el tiempo promedio de permanencia del catéter fue de 43 días en los dos períodos evaluados. **Conclusión:** En este estudio se demostró que hubo mejora significativa en cuanto a los índices de infección en esa población.

Descriptores: Diálisis renal/efectos adversos; Infección; *Staphylococcus aureus*; Catéteres de demora

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INTRODUCTION

In the last decades, in the nephrology area, it was observed that a rising development of new biomaterials and technologies, which have directly repercussions in the treatment of people with acute chronic renal (ACR)⁽¹⁾.

Currently, it is estimated that 13% of the patients with renal failure are regularly treated with temporary or permanent catheters⁽²⁾.

The use of the temporary Double-lumen catheter brings many benefits like: practicality, deployment quickness, allowing its immediate use, and it is painless during the dialysis session⁽³⁾. However, the low sanguineous flux and the dialysis inefficiency can be associated to the inadequate location of the catheter beak or the central circulation deficit⁽⁴⁾.

The interest for the study was aroused by the observation of the rising number of patients with infection in the double-lumen catheter's insertion point, decurrent of the long permanence of the used curative. The challenge is the improvement of the assistance to the acute or chronic renal failure patient that uses the dialysis, aiming to rise the life quality and expectancy⁽⁵⁾. For this objective to be accomplished, is primordial the reduction of the number of infections that strikes those clients, that generates the necessity of care in the manipulation of those catheters and the control of the permanence time⁽⁶⁾.

In Brazil exists about 50 thousand patients with renal failure on dialysis program, and the life quality and even the survival depends of the venous access performance⁽⁷⁾.

Often, the permanence of the double-lumen catheter for prolonged time is associated to venous thrombosis, to infection and to complications that obliges the obtainment of a new access or that prevention measures occurs⁽⁸⁾.

The patients subjected to dialysis are more susceptible to infectious process because of the punctures and the catheters and prosthesis. Infection occurrence is more frequent in ARF patients, constituting the main hospitalization cause and the second death cause in this population⁽⁹⁻¹⁰⁾.

In order to the catheters constitutes a weapon in the fight against the disease, the assistance practice in the renal therapy service must be based in a set of rigorously established activities, among then the epidemiologic vigilance of those infections⁽¹¹⁾.

Based on the above exposed, the objectives of this study were to evaluate the infection rate, etiological agent and the permanence time of the double-lumen catheter used in the dialysis, on the period of January to June, in two different years.

METHODS

The retrospective analysis was realized in two periods:

January to June in two different years (G1-2002 and G2-2005). The procedure was made by means of a revision of the Epidemiologic Vigilance files (investigation and notification) of the Nosocomial Infection Control Center of the Dialysis of the Base Hospital of São José do Rio Preto, in the cited periods.

It was included in this study, all the double-lumen catheter patients that showed any type of infection in the insertion point and that were notified by the Nosocomial Infection Control Center in the mentioned periods, amount to, on G1: 110 patients cared for in the Nephrology Unit, 80 in hemodialysis treatment and 20 using double-lumen catheter. On G2 were included approximately 400 cared for patients, 186 in hemodialysis treatment and a mean of 20 patients that used double-lumen catheter.

The data were collected researching the Epidemiologic Vigilance of the hemodialysis CCIH files.

The study was approved by the Ethics in Research Committee of the Medical Faculty of São José do Rio Preto-SP. To the results analysis was realized a proper codification of each one of the variables contained in the data collection instrument and was elaborated a database in which the data was expressed in absolute and relative numbers.

RESULTS

In view of the referential and methods used in the data collection, the results are presented and compared, regarding the respective discussions in the two researched periods.

Table 1 – Distribution of infection occurrence numbers on patients, in groups 1 and 2, bearers of double-lumen catheter, respectively on the period of January to June, 2002 and 2005, in São José do Rio Preto, in the year of 2006

Month	G1		G2	
	n	%	n	%
January	6	16.7	6	20.7
February	8	22.2	2	6.9
March	5	13.9	5	17.2
April	6	16.7	4	13.8
May	7	19.4	5	17.2
June	4	11.1	7	24.2
Total	36	100.0	29	100.0

Relating the infection occurrence data in double-lumen in the proposed period, it was verified in Table 1 that there was a decrease in the number of infections, in view that in the researched Hemodialysis Center G1, it was identified 36 patients bearers of double-lumen catheter

with infection and in the G2 this number was reduced to 29 patients, according to the researched periods.

Table 2 – Patient distribution in the groups 1 and 2, according to infectious complication type, respectively in the periods of January to June of 2002 and 2005, in São José do Rio Preto, in the year of 2006

Infectious complications	G1		G2	
	n	%	n	%
Bacteremia	22	61.1	15	51.7
Hyperthermia	11	30.6	12	41.4
Others	3	8.3	2	6.9
Total	36	100.0	29	100.0

According to the table 2, it was observed that the bacteremia rate prevalence in both the research years was of 22 (61.1%) in G1 and 15 (51.7%) in G2. Of the 36 patients in G1, 11 (30.6%) showed hyperthermia episodes and, in G2, 12 (41.4%) of the 29 patients.

It was registered data referring to vertigo, convulsive crises, isolated tremors and hypotension, that were included in the “others” item of the infectious complications, to facilitate the obtained data visualization.

Table 3 – Distribution of etiological agents found in the blood culture of patients using Double-lumen catheter with infection, according to groups 1 and 2, in the period of January to June of 2002 and 2005 in São José do Rio Preto in the year 2006

Etiological agents	G1		G2	
	n	%	n	%
<i>S. aureus</i>	18	50.0	11	37.9
Negative <i>S. coagulase</i>	10	27.8	11	37.9
Others	8	22.2	7	24.2
Total	36	100.0	29	100.0

Like can be observed in Table 3, in the blood culture of the 36 patients bearers of Double-lumen catheter in the G1, on 18 (50%) were found focus of *Staphylococcus aureus*, on 10 (27.8%) were found focus of negative *S. coagulase* and on 8 (22.2%), others etiological agents. In the G2, were found focus of *S. aureus* on 11 (37.9%) of 29 of the patient's blood cultures, 11 (37.9%) of negative *S. coagulase* and on 7 (24.1%), focus of others infectious agents.

The catheter permanence time was of 7 to 30 days, both to the 12 patients of the G1 (33.3%) and to the 11 patients of the G2 (37.9%).

DISCUSSION

The bacteremia rate in patients bearers of catheter is of approximately 4% to 18%, responsible for at least

8 thousand annual cases of sepsis and others infections related to the catheter⁽⁹⁾.

The bacteremia, in most cases, presents a corporal temperature elevation, however there are cases in which there is only the hyperthermia resulting in a infectious complication not associated to bacteremia⁽¹⁰⁾. The same authors describes that are necessary some measures to avoid infection, like the hand's adequate disinfection, aseptic techniques in the catheter insertion and realization of contamination-free curatives.

The etiological *Staphylococcus aureus* is resident of the skin natural flora, a primordial factor of its prevalence in the catheter insertion's infection⁽²⁾.

Relating the infectious complications with the permanence time of the double-lumen catheter, we observed the prevalence of complication in the period of 30 to 60 days of catheter insertion. In the G1, 17 patients (47.2%) used the catheter for a period of 30 to 60 days and, in the G2, 13 in the same time period (44.8%). The average catheter permanence time is of three to four weeks, being this the necessary time to the venous-arterial fistula maturation⁽¹⁰⁻¹²⁾.

Some studies⁽¹²⁻¹⁴⁾ affirms that the most part of the patients that remains with the catheter after 30 days, are more vulnerable to infection, many times subjected to antibiotic therapy.

Currently, it was highlighted that the infection rate in the health services constitutes one of the main assistance quality indicators. Certainly, the health professional does not voluntarily contaminate his clientele, but the inattention to the basic principles of the infection chain can have drastic consequences⁽¹⁵⁾.

The professionals that manipulates the double-lumen catheter needs to have total domain of the risk factors and the infection's prevention, involving the patient in this process, since reports consider that the transmission of microorganisms through the health staff's hands is the most important way to exogenous infections, considering that the pathogen is introduced in a susceptible area, mainly by a invasive procedure⁽¹⁶⁾.

This way, with the integration and effort of the medical and nursing staff, the infection rate in the double-lumen catheter insertion can decrease each month, emphasizing the importance of well-prepared professionals and committed with the nosocomial infection control⁽¹⁷⁾.

CONCLUSION

The realized study compared data related to the infection rate, to the etiological agent and to the patient bearers of double-lumen catheter permanence time that uses the hemodialysis treatment of the Base Hospital of São José do Rio Preto in two periods.

It was observed that, in this study, there was

significant improvement in the infection rates in this population. It was important to highlight that there was in the G1 standardization by the CCIH of the implantation and curative of the double-lumen catheter.

The nursing actions embody the participation in the implantation, in the vigilance, in the control and in the verification of the catheter maintenance. Its embody, too, educative actions with the nursing staff and patient orientations, including the necessity of documenting the

implanted actions and observations in the contact with the patient, through notes to accompany its evolution.

This way, is important to have conscious, capable, updated professionals, capacitated to be self-critical and to the teamwork performance, aiming to interfere positively in his environment, to benefit the collectivity. We believe that the infection control in the health services depends, undoubtedly, of the exercise of citizenship and, therefore, is an obligation to us all.

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