Management of totally implanted catheter in patients with cancer: an integrative review

Manejo do cateter venoso central totalmente implantado em pacientes oncológicos: revisão integrativa

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ABSTRACT

Totally implanted catheter, which is effective in deceasing complications related to peripheral intravenous therapy, is widely used in patients with cancer. Thus, the goal of this study was to identify the nursing actions regarding the manipulation and management of totally implanted catheter in patients with cancer. An integrative literature review was conducted. A final sample of 15 articles was evaluated. Findings indicated that nursing actions are directed to the catheter dwelling time, the catheter-related complications, the manipulation and management of the catheter, the patients' perception of the catheter, and the education of patients regarding the catheter care. These findings show the complexities of nursing actions regarding the management of totally implanted catheters. In addition, the findings can be useful for professionals who do not work in oncology who may need to apply this knowledge in their clinical practice.

Keywords: Catheterization, central venous; Maintenance; Nursing care

RESUMO

O cateter totalmente implantado é amplamente utilizado durante o tratamento de pacientes com câncer e é capaz de minimizar complicações decorrentes da terapia intravenosa periférica. Assim, buscou-se identificar os cuidados de enfermagem relacionados ao manuseio de cateter totalmente implantado nesses pacientes. Para tanto, realizou-se revisão integrativa da literatura que resultou na análise de 15 artigos. O conhecimento produzido está direcionado para o tempo de permanência do cateter, complicações inerentes ao uso, manuseio do dispositivo, percepção do paciente em relação ao cateter e informações ao paciente. Além de demonstrar a complexidade da assistência de enfermagem no manuseio desses dispositivos, os achados podem auxiliar, igualmente, os profissionais que não atuam em oncologia, na aplicação de conhecimentos na prática clínica.

Descritores: Cateterismo venoso central; Manutenção; Cuidados de enfermagem

RESUMEN

El catéter totalmente implantado es ampliamente utilizado durante el tratamiento de pacientes con cáncer y es capaz de minimizar las complicaciones consecuentes de la terapia intravenosa periférica. Así, en este trabajo, se buscó identificar los cuidados de enfermería relacionados a la manipulación del catéter totalmente implantado en esos pacientes. Para tal efecto, se realizó una revisión integrativa de la literatura dando como resultado el análisis de 15 artículos. El conocimiento producido está orientado hacia el tiempo de permanencia del catetér, complicaciones inherentes al uso, manipulación del dispositivo, informaciones y percepción del paciente en relación al catéter. Aparte de demostrar la complejidad de la asistencia de enfermería en la manipulación de esos dispositivos, los hallazgos pueden auxiliar, igualmente, a los profesionales que no actúan en oncología, en la aplicación de conocimientos en la práctica clínica.

Descriptores: Cateterismo venoso central; Mantenimiento; Atención de enfermería

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INTRODUCTION

Researches on oncology have continuously evolved, and yet, surgery, chemotherapy and radiotherapy are the key treatment alternatives thus far. The most appropriate therapy will depend on the kind of tumor, clinical stage, and patients' physical condition[1-3], being chemotherapy the most frequent option.

Chemotherapy administration requires, normally, various venous insertions during the therapy, which added to irritating and/or vesicant characteristics of each drug, can lead to vascular fragility and vascular stiffness, affecting visualizing and effectively inserting the vein, which favors extravasation. Within this context, it is worthwhile pinpoint the extreme importance of the selection of safe and trustable vascular access for cancer treatment[4].

Implanted central venous catheter (CVC-I) have been used since 1983, and became essential for treating cancer patients[5]. It allows the infusion of chemotherapeutic agents, parenteral nutrition, collecting blood samples for lab tests[6-7]. The device is composed by a catheter (made of silicon or polyurethane) and a port (silicon covered insertion septum titan camera) surgically implanted. The device access is made by inserting a non-cutting needle (Huber needle) through the skin over the port, and best practice requires cleaning with physiological solution and heparinization*, taking place monthly[4-5].

Some complications occur from the use of CVCs, such as infection, obstruction, infiltration or extravasion, among others[8]. In some cases those events may be treated, but catheter removal can not always be avoided.

Handling this kind of catheter requires technical and scientific knowledge. Its application is not characterized as being on nurses' exclusive accountability by the Federal Council of Nursing. However, articles 17th and 18th from the Nursing Professionals Ethics Code establishes[9] that nursing practices considered exclusively on nurses' responsibility are the ones of higher complexity, those requiring specific scientific knowledge that allow for taking immediate, assertive decisions. Being so, it may be inferred that CVC-I will strictly be handled by a specialized nurse.

With that said, the objective of the present study is to identify nursing care practices while dealing with CVC-I in cancer patients.

METHODS

The study is an integrative review of the literature trying to answer the proposed question that follows: "What has been the literature proposition on nursing care related to handling CVC implanted in cancer patients?"

Research was developed from December 2007 to January 2008, using varied data bases such as PUBMED, LILACS, EMBASE, COCHRANE and CINAHL, and search key-words were: implanted catheter, implantable device and nursing care. The issuing date of the articles was not considered for the search.

The search includes articles focusing on the use of catheter implanted in cancer patients, published in English, Portuguese or Spanish; not considering such articles design or issuing period. Exclusion criteria relate to articles not available on-line or at national libraries.

After reading each of the articles, data gathering registration[10] was produced, including article identification, type, content and level of evidence.

To determine the level of evidence, a hierarchy system of evidences was applied, which is composed of seven levels: Level 1- Systemic review or meta-analysis of relevant clinical randomized trials; Level 2 – evidence found in at least one randomized clinical well designed trial; Level 3 – Well designed clinical trials, without randomization; Level 4 – Study of control cases and cohort studies; Level 5 – Systemic review of descriptive studies, and qualitative studies; Level 6 – Solely descriptive or qualitative study; and Level 7 – Opinion Leaders or Specialized Committees.

From PUBMED, 15 articles were identified for analysis; from LILACS, 6 articles, but not eligible for analysis. Out of the 8 articles from COCHRANE, none has fit the requirements for inclusion in this study. CINAHL identified two articles, but not eligible either; and finally, EMBASE contributed with four articles, but those had been previously identified from the 15 PUBMED articles.

Key exclusion criteria refer to patients profile, which mostly related to chronic renal failure patients using venous catheter for hemodialytic treatment, or using it for parenteral nutrition.

Data results include five themes, to know: device permanence time, usage-inherent complications, prevention and treatment, device handling, patients perception in reference to the catheter, and patient guidance.

RESULTS

All 15 selected articles[12-26] were published in the period from 1988 to 2007, with the great majority being published in the 90s. Referring to the study type, 5 (33.3%) were *guidelines*[20-24], 4 (26.7%) literature revision[15-17,19], 2 (13.3%) retrospective study[12,13], 1 (6.6%) prospective study[25], 1 (6.7%) exploratory study[14], 1 (6.7%) case study[18] and 1 (6.7%) experiment report[26]. Therefore, referring to evidence level, three (20%) articles were classified as level 4, seven (46.7%) level 6, and five (33.3%) as level 7.

* Procedure performed to prevent catheter obstruction during the period when device was not being used.

Regarding themes approach, 3 (13.7%) articles about catheter permanence time, 7 (31.8%) about usage inherent complications: prevention and treatment; 7 (31.8%) device handling, 3 (13.7%) patients perception of the catheter; and 2 (9%) patient guidance.

Device permanence time

The average time with implanted CVC, if considering a sample of children with cancer, is 227 days[12]. For an adult's sample, the time has been highly variable, which is shown in studies identifying an average ranging from 153 to 432 days, respectively[13-14].

Usage-inherent complications: prevention and treatment

This category considers: infection, obstruction, extravasion, exteriorization of the port, and other complications mentioned across the 7 analysed studies.

Infection

Infection is the most frequent complication from using a catheter. It can start at the subcutaneous chamber, where the port is placed, or along the subcutaneous duct where the catheter is inserted, with the risk of sepsis for patients, given the catheter direct connection to the central circulation[15]. The best practice to prevent this is using sterilization technique while handling the CVC; besides respecting established change time for needles, devices and connections[15-16].

Infection index reports 0.65/1000 days of permanence with the catheter, being catheter[14] removal rate of 28%. Another study where 71 implanted catheters were analysed, infection was present 23 times, causing removal of eight devices[12]. An additional study[13], shows infection as the cause of 3% of catheter removal.

The recommended treatment in case of CVC infection, requires infection confirmation through the comparison of the blood sample from the catheter and from another vein[16]. Only after the identification of the site of infection and related micro-organism, the correct antibiotics treatment will be prescribed by the responsible physician. In case of the patient not responding to the therapy, the removal of the catheter can be recommended.

Obstruction

Catheter obstruction is reported to occur from thrombotic complications, fibrinolytic process or drugs precipitation[15]. Reported best practice to prevent from catheter obstruction cases consists of regular cleaning with a 20ml of saline solution, alternated by two or three administration of drugs, and after the use of the device, followed by heparinization, whose solution final concentration should be 100UI/ml[15-16].

The study of monitoring 32 individuals identified 10 cases (18.75%) of obstructions being treated with urocinase[13]. However, results of another study reports being rare the cases of obstruction, presenting good response to the use of streptokinase and urocinase[12]. In relation to the catheter removal due to obstruction complication, results show a rate of 28%[14].

If an obstruction is confirmed, the therapy best applied is the fibrinolytic as the only possible solution, laying on each institution to determine the best fribinolytic to apply, the therapeutic dose and the desobstruction technique[16].

Extravasation

Most frequent reported causes of extravasation involve fibrinolytic or thrombotic processes around the catheter septum and fracture of the device, being responsible respectively for 1% to 2% and more than 2% of cases[17]. Other possible causes can be needle ineffective insertion into the port; needle misplacement due to changes of position and frequent handling, as well as disconnection of the catheter and the port. Moreover, the rate of recurrent extravasation varies between 0.3% and 4.7%, which can even be higher depending on underreporting of cases.

As extravasation cause is multifactor, prevention measures focus on controlling such factors. Results show the fully and effective insertion of a Huber needle and using the right size as good practices to prevent extravasation due to incomplete needle insertion into port. Needle misplacement can be avoided through a well-fixed strap on the skin which will also protect the needle, preventing from any traction of the catheter connections. Regarding extravasation due to catheter fracture, only those due to high pressure from small caliber syringes (1ml to 3ml) can be avoided. Therefore, during procedures with the implanted CVC, the use of a +5ml caliber syringes is recommended.

Other practices of preventing extravasation include the frequent monitoring of the site of insertion, confirming the venous return before starting the infusion of medicines, besides asking patients to avoid touching the site of insertion and pulling devices connected to the catheter[15].

Port exteriorization

Port exteriorization is not a complication frequently found; while unknown[18], can be concluded it rarely occurs. The event consists of lesion of the skin over the port, and the structures around the device, mainly due to dehiscence of the surgical insertion, the frequency the site has been inserted, or the loss of tissue available over the port that may originate from a dramatic lost of

weight.

Other complications

Other complications inherent to the use of implanted CVC are the ones such as venous thromboses, phlebitis, port's catheter misplacement, and catheter migration[13,15]. Besides all possible complications, implanted CVC is a safe vascular access and provides more comfort for patients, being either implanted in the chest or forearm.

The catheter post-implantation phase requires nurses' attention being focused on signs of bleeding or fluids, bruises or seroma formation around the insertion site. The nurse is responsible for identifying any uncommon evidence during the device handling, including also analyzing the skin conditions surrounding the catheter insertion and blood flow[19].

Device handling

The seven analysed articles in this category describes the anti-sepsia of the skin, port insertion, maintenance procedures, and other nursing care.

Anti-sepsia of skin

Preparing the skin is fundamental to prevent infection. Three PVP-I alcoholic applications, in spiral movements on the skin over the port, followed by three application of alcohol 70% also in spiral movements on the skin[13]. Different specialists recommend the preparation of the skin must take two alcohol 70% applications in spiral movements on the skin, followed by alcoholic PVP-I[20-21]. Yet it is emphasized the necessity of the skin to get dried up before insertion. Part of analysed studies show the use of alcohol PVP-I, in three applications[22-23].

Port insertion

The use of sterilized material while handling the catheter is essential, and this was also identified in other studies. Referring to the needle, it is recommended the use only of a non-cutting Hubber type for port insertion, if otherwise the silicon septum can be fissured. It also indicates the needle insertion angle must be at 90º and be inserted through the silicon septum until feeling it had touched the bottom of the port[13,20,22-23]. One aspect to be considered refers to alternating the point of insertion, to avoid skin lesions over the port. Changing needles during long infusions shall happen every two or three weeks[13,19].

Furthermore, it highlights the importance of checking the needle for integrity, and signs of occlusion or coagulation[24].

Site maintenance

Making site anti-sepsia is one of nurse's[19] responsibilities. Right after insertion, the site and the whole needle should be covered with transparent strap allowing for monitoring[13,20-23]. In cases of long infusions, the average of anti-sepsia procedures ranges from three to five days[13,22].

Additional nursing care

Nursing care includes pre and post surgical assistance, anti-sepsia and device handling, administration of medicine and permeability maintenance[19]. Both the health professional and patient are responsible for catheter maintenance, to achieve the therapeutic objectives and device permanence time.

Patients' perception related to the catheter

Most common claims involve the discomfort during the insertion of needle and the change of corporeal image caused by the implantation of the device[25]. Anxiety associated to painful insertion was also reported, and the difference is perceived when the procedure is made by an oncologyst nurse, as being less painful. Analysed articles say anxiety can be reduced through the administration of topic anesthetic, composed by lydocaine 2.5% associated to prilocaine 2.5% that will reduce pain during the catheter insertion[26].

Besides the discomfort described above, patients and families have demonstrated good acceptance rate of implanted catheter[12].

Patients' guidance

Patients and families guidance should be provided yet in the pre-surgical phase, including information related to the catheter itself, implantation method, necessary maintenance care and possible complications, such as infection, phlebitis, pain and formation of seroma on the insertion site[19]. Water sports activities are not allowed before the surgical insertion is fully healed due to the risk of infection[12]. During the time patients have the catheter implanted, sports activities / or other activities that can impact the implanted region should be avoided.

DISCUSSION

Although the inherent complications of using implanted catheter, the device is considered safe and the most comfortable for patients. The average of permanence with the implanted CVC ranges from 153 to 432 days[12-14], being reported by recent studies a variation ranging from 90 to 1020 days[27-28].

Identified complications show infection followed by obstruction as the most occurred. It is reported an infection rate average from 0.7 to 12.6/1.000 days of catheter permanence, and obstruction rate from 8 to

79%[29-31].

Strategies from preventing implanted CVC complications include avoiding obstruction, through using a saline solution for cleaning, followed by positive pressure application[32-33].

The treatment for infection and obstruction is made through antibiotic and fibrinolytic therapies, respectively[15-16]. Additionally, good results with the utilization of antibiotic therapy in lock have been reported, in which the selected antibiotic is inserted in through the catheter with a volume that fills its whole extension, from 6 to 12 hours[30].

Advantages for utilizing implanted CVC are balanced to the risk of additional infectious complications. Sterilization and anti-spesia techniques are considered important interventions to prevent against infection. Recent studies mention chlorexedine as preferred, given the incidence of infections be 50% lower, when compared to PVP-I, due to the stronger residual action, restricting skin[34-36] re-colonization.

Referring patients perception related to the catheter, besides the corporeal image after the device implantation, patients present good acceptance of the catheter, with positive challenge facing attitude[25-26].

A practice for ensuring long permanence with the implanted CVC consists of orienting patients and family members about self treatment ability. The adequate catheter selection is fundamental, considering factors of self-image, acceptance rate, ability for self-treatment, and others[37].

The analysed articles presented evidence level rate ranging from 4 to 7, with qualitative, descriptive methods, and literature revision as key criteria. Results of such studies are not considered as "strong evidence" by the Evidence-based Practice, and thus, contribution is very little for clinical guidelines.

FINAL CONSIDERATIONS

All findings presented in this study confirm the complexity which involves nursing care relating to implanted CVC handling, moreover with cancer patients. Such devices' insertion have been an increasing practice in cancer specialized hospitals, where safe vascular access is essential for ensuring patients therapy success.

However, limitations due to serious complications, related to the use of implanted CVC, can critically result in death. Thus, a correct technique is fundamental while handling such devices, avoiding infection and obstruction, as well as the capability to identify, prevent and treat possible complications should be considered good clinical practices that contribute for improving the device life cycle and its user's life quality. Nurses are responsible for catheter maintaining-related procedures, to prevent early removal, delayed therapy and consequent increase of hospital costs.

Although the growing number of implanted catheter, it is not possible to say catheter daily handling as part of nurses routine outside specialized hospitals. Therefore, results of this study can help such professionals on identifying the knowledge produced on handling implanted CVC, so they can be incorporated as clinical practice.

LIMITATIONS

Limitations for the present study refers to the variability of nursing care related to catheter handling implanted in cancer patients, and the still incipient level of evidence of articles approaching the theme, whose dedicated methods do not support the execution of a meta-analysis. It is necessary to develop studies with approaches that can provide strong evidences to subside the design of clinical practice guidelines.

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