

Incidents related to the Hickman[®] catheter: identification of damages

Incidentes relacionados ao cateter de Hickman[®]: identificação de dano
Incidentes relacionados con el catéter de Hickman[®]: identificación del daño

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ABSTRACT

Objective: to identify damages resulting from incidents with the Hickman[®] catheter. **Method:** descriptive, retrospective, qualitative approach. The source of data were the notifications of incidents that occurred between January 2012 and May 2015, as well as the information available on the medical records of patients involved in incidents with the Hickman[®] catheter. **Results:** the incidents related to the Hickman[®] catheter with the greatest impact on patient care were obstruction, fracture and traction. All incidents caused damage to patients, in a greater or lesser degree, in the dimensions of physical damage and subjective damage. **Final considerations:** damage or potential risk of damage was present in all incidents analyzed. The need to revise cleaning and obstruction protocols for the maintenance of the permeability of Hickman[®] catheters was demonstrated.

Descriptors: Central Venous Catheters; Patient Safety; Damage to Patient; Hematopoietic Stem Cell Transplantation; Nursing Care.

RESUMO

Objetivo: identificar a ocorrência de danos nos incidentes relacionados ao cateter de Hickman[®]. **Método:** pesquisa descritiva, retrospectiva, de abordagem qualitativa. Como fonte dos dados, foram utilizadas as fichas de notificação de incidentes ocorridos entre janeiro de 2012 e maio de 2015, além de informações dos prontuários dos pacientes envolvidos com incidentes relacionados ao cateter de Hickman[®]. **Resultados:** os incidentes, relacionados ao cateter de Hickman[®], de maior impacto para a assistência ao paciente foram a obstrução, fratura e tração. Todos os incidentes geraram dano aos pacientes, de maior ou menor grau, nas dimensões de dano físico e danos subjetivos. **Considerações finais:** dano ou risco potencial para dano esteve presente em todos os incidentes analisados. Evidenciou-se a necessidade de revisar os protocolos de lavagem e bloqueio para a manutenção da permeabilidade do cateter de Hickman[®].

Descritores: Cateteres Venosos Centrais; Segurança do Paciente; Dano ao Paciente; Transplante de Células-Tronco Hematopoéticas; Cuidados de Enfermagem.

RESUMEN

Objetivo: identificar el acaecimiento de daños en incidentes relacionados con el catéter de Hickman[®]. **Método:** investigación descriptiva, retrospectiva, de abordaje cualitativo. Como fuente de datos, se utilizaron fichas de notificación de incidentes ocurridos entre enero de 2012 y mayo de 2015, además de informaciones relatadas en los prontuarios de los pacientes involucrados en los incidentes relacionados con el catéter de Hickman[®]. **Resultados:** los incidentes de impacto más importantes en la atención al paciente, relacionados con el catéter de Hickman[®], fueron la obstrucción, la fractura y la tracción. Todos los incidentes generaron, en mayor o menor grado, daños a los pacientes en las dimensiones física y subjetiva. **Consideraciones finales:** se encontraba presente en todos los incidentes analizados, el daño en sí mismo o el riesgo potencial para el daño. Quedó en evidencia la necesidad de revisar los protocolos de lavado y bloqueo del catéter de Hickman[®] para el mantenimiento de su permeabilidad.

Descriptor: Catéter Venoso Central; Seguridad del Paciente; Daño al Paciente; Trasplante de Células Madre Hematopoyéticas; Cuidados de Enfermería.

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INTRODUCTION

The evolution of scientific knowledge and the development of new technologies have brought changes to the quality of health care. However, the complexity of the current procedures and treatments increases the possibility of care-related injuries⁽¹⁾, requiring scientific knowledge from nurses in order to improve health care outcomes and enhance innovative technologies⁽²⁾.

Central venous catheter (CVC), a technology that is increasingly present in health care settings, has been essential to severe patients who require complex treatments, such as Hematopoietic Stem Cell Transplantation (HSCT). This therapeutic modality has the objective of restoring the bone marrow function, correcting quantitative and qualitative flaws of the bone marrow through the intravenous infusion of healthy Hematopoietic Stem Cells (HSC), which are capable of reconstituting the hematopoietic and immunological systems⁽³⁾.

The HSCT is composed of several phases and requires an extended period of hospitalization. In the pre-transplantation phase, the first step taken is the insertion of a CVC⁽⁴⁾. The daily care of these patients is related to the conditioning period and include bacterial, viral and fungal prophylaxis and high doses of chemotherapy and/or radiotherapy, followed by the transplantation itself, i.e. the infusion of HSCs until the graft is recovered⁽⁵⁾.

Considering the venous fragility caused by HSCT or by the patient's initial disease and due to the need for simultaneous infusion of incompatible solutions and for adequate parenteral treatment, a CVC is essential⁽⁶⁻⁷⁾. The Hickman® long-term central venous catheter (LTCVC) has been extensively used in HSCT units. Available with one, two or three lumens, it is a venous device with a polyester cuff (Dracon®), inserted near the ostium. It stimulates adherence to subcutaneous tissue, providing better fixation and preventing the migration of microorganisms⁽⁶⁻⁸⁾.

In patients undergoing HSCT, a proper use and maintenance of this device is essential for the care, since it is used for actions indispensable for the treatment, such as the simultaneous infusion of numerous medications, blood components and Hematopoietic Stem Cells (HSC), and a daily blood collection for laboratory tests. However, despite all these benefits, the use of the Hickman® catheter is not free of complications and/or incidents, such as infection, obstruction, cuff erosion through skin, fracture or rupture of the catheter⁽⁹⁾.

An incident is defined as an event or occurrence that is usually unexpected and undesirable⁽¹⁰⁾, and may or may not result in health damage. Incidents are classified as: near miss - almost an incident; no harm incident - characterized by an error that reaches the patient, but does not result in any harm; and harmful incident or adverse event - an error that causes health damage and/or death of the patient⁽¹¹⁾. Damage can be defined as impairment of body structure or function, including illness, injury, suffering, death, disability or dysfunction, and may be physical, social or psychological⁽¹²⁾.

Approximately 30% of CVCs are removed early due to complications, exposing the patient to damage or risk of damage, either by discontinuing the venous therapy or by the need to insert a new catheter⁽¹³⁻¹⁴⁾. A retrospective study that analyzed 57 charts of transplanted patients found that among the CVCs that were removed, 5.1% were due to obstruction⁽¹⁵⁾. The occlusion of a CVC is a relevant concern of health professionals,

since this complication often requires the suspension of therapy and exposure of the patient to a new invasive procedure⁽¹⁶⁾.

In the HSCT service, which is the scenario of this research, the use of the Hickman® catheter has been providing adequate intravenous therapy. However, incidents related to this device, such as obstruction, fracture and catheter traction, are still present. In the period from January 2012 to May 2015, 18 incidents related to the Hickman® catheter were reported: obstruction, fracture, infection and catheter traction, which were considered harmless to the patient.

Considering this reality, the guiding question of this research was: did the incidents related to the management of the Hickman® catheter in a HSCT unit result in harm to the patient?

The research is justified because the identification of the incidents related to the management of the Hickman® catheter in an HSCT unit and of the possible damages to the patients can contribute to reassess the management actions of this device. Nurses must ensure safety and quality in the CVC manipulation, minimizing or avoiding the risk of incidents, since complications do exist and often require replacement of the catheter⁽¹⁵⁾. It should be emphasized that guaranteeing patient safety in health care, which is a basic principle of a quality care⁽¹⁷⁾, has been a challenge for nurses. Patient safety is understood as reducing the risk of unnecessary harm associated with health care to an acceptable minimum⁽¹²⁾.

OBJECTIVE

To identify damages resulting from incidents with the Hickman® catheter in patients undergoing HSCT.

METHOD

Ethical aspects

This research is linked to a macroproject entitled "Nursing Actions in Essential Care in Hematopoietic Stem Cell Transplantation". It was approved by the Research Ethics Committee of the Federal University of Paraná, and followed the recommendations of Resolution 466/2012, which addresses research involving human beings.

Theoretical-methodological framework and type of study

This is a descriptive, retrospective, qualitative approach based on the theoretical-methodological framework of Michael Tillot and Bardin.

For the categorization of the data, the components "physical damage" and "subjective damage" were chosen, considering that damage to health generates impairment of structure or function of the body, whether in the physical, social or psychological domain. The previously defined categories were delay in drug therapy, delay in transfusion therapy, need for peripheral venipuncture, insertion of new CVC, and emotional distress. After analyzing and interpreting the data, subcategories related to the five predefined categories emerged.

Study scenario

The research was conducted in a Bone Marrow Transplant Service of a teaching hospital located in the southern region of Brazil.

Data collection and organization

Data was collected from the notifications of incidents that occurred in the Bone Marrow Transplantation Service between January 2012 and May 2015 and from the information available in the medical records of patients who were involved in incidents related to the Hickman Catheter®. Data were obtained in three stages:

1ststage– identification of incidents related to the Hickman® catheter occurred between January 2012 and May 2015, available in the records of the Patient Safety and Surveillance Sector;

2ndstage– search for the patients’ charts for information related to the occurrences after the Hickman® catheter incident and until the use of the catheter was feasible, either by repair of the incident or by insertion of a new catheter;

3rdstage– analysis of the data to identify damages related to incidents with the Hickman® catheter.

Data analysis

The data were analyzed using the technique of content analysis proposed by Bardin (2010) and based on the records of occurrences related to the Hickman® catheter incident available in the medical records, considering the objective proposed.

RESULTS

Of the 1090 records of incidents that occurred in the Bone Marrow Transplant Service from January 2012 to May 2015, 18 were related to the Hickman® catheter: obstruction, fracture, infection, and catheter traction.

The incidents with the highest impact on patient care, as shown in Figure 1, were: catheter obstruction, with three cases in 2012, four in 2014 and two in the period from January to May 2015; fractures, which had one occurrence in 2012 and 2015 and two in 2013 and 2014; and traction, with one occurrence in the years 2013, 2014 and 2015.

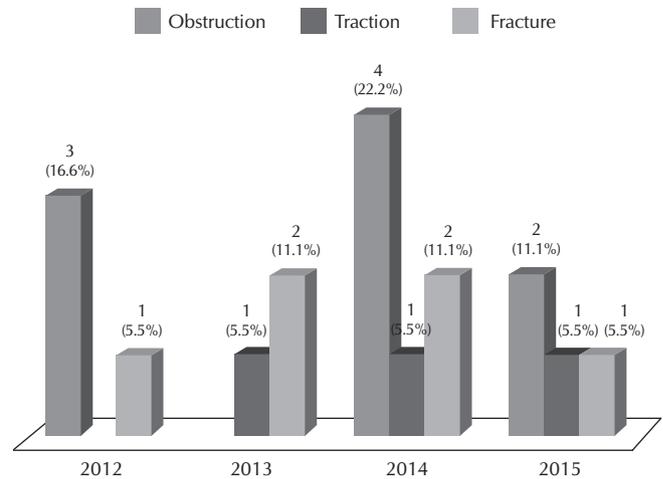


Figure 1 – Incidents related to the Hickman® catheter with higher impact, from 2012 to 2015

These incidents were repaired and thus were not classified as Adverse Events (AD) by the Patient safety and vigilance department of the hospital where this research took place, according to the adverse events official notification. However, it is believed that there was impairment in treatment anyway. Therefore, the medical records were analyzed to identify the occurrence of damage to the patient.

The collection of information in the medical records allowed the identification of 22 damages to the treatment, considering that there were incidents that presented more than one damage. The damages identified were subcategorized in the pre-established categories (Chart 1).

In the physical damage dimension, the category “delay in drug therapy” corresponded to 42% of incidents, followed by “need for peripheral venous puncture” in 32% of the cases, need for “insertion of new CVC” in 21% and “delay in transfusion therapy” in 5% (Figure 2).

Chart 1 – Subcategories related to the categories of physical and subjective damage

Dimension	Category	Subcategory
Physical Damage	Delay in drug therapy (42%)	Pain due to delay in analgesic therapy Nausea/vomiting due to delay in antiemetic therapy Delay in hydration plan
	Need for peripheral venipuncture (32%)	Need for blood collection due to the lack of a central catheter Need for administration of drugs in situations where it was not possible to wait for viability of the central catheter Procedural pain
	Insertion of new CVC (21%)	Fasting Delay in the oral medication due to the necessity of fasting for the procedure Need for transfusion of blood components (red blood cells and/or platelet concentrate) before or after the procedure Exposure of the patient to an invasive procedure Exposure of the patient to anesthetic procedure Exposure to imaging examination (x-ray or computed tomography with contrast) Exposure to environments unsafe for immunosuppressed patients (elevator, corridors, surgical center, exam rooms) Procedural pain Rehospitalization for insertion of new catheter
	Delay in transfusion therapy (5%)	Delay in the transfusion of red blood cells concentrate Delay in the transfusion of platelets Delay in the infusion of hematopoietic stem cells
Subjective Damage	Emotional distress (100%)	Anxiety Insecurity Fear

Note: CVC - Central venous catheter.

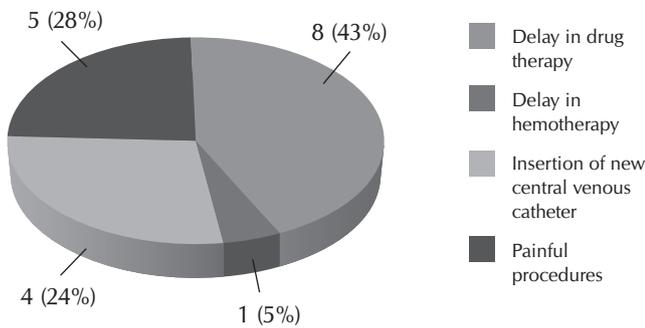


Figure 2 – Physical damage caused by incidents with the Hickman® catheter: distribution by categories

The delay in drug therapy caused pain in patients due to delayed analgesic therapy and nausea and/or vomiting due to delay in the antiemetic therapy, as well as a delay in the hydration plan. Patients undergoing HSCT receive numerous medications to prevent and treat infections, alleviate pain and fever, and prevent nausea and vomiting, among others. The delay in the infusion of drugs is considered an important harm to the patient, since the medications have their dose calculated considering the serum level and the time of action. Disregarding the interval between doses may reduce the effectiveness of the drug.

Hydration with 0.9% saline and replacement of electrolytes and vitamins are prescribed daily. When there is a complication with the catheter, the delay in the hydration plane is frequent and may lead to renal overload, alterations in the cellular metabolism and consequent damage to the treatment. Acute pain may be present, since opioid analgesic is often included in the hydration plan, infused for 24 hours.

The delay in the transfusion therapy, in this research, was related to the infusion of hematopoietic stem cells and blood components. The transplanted patients need numerous transfusions during the period of hospitalization in order to remain healthy until bone marrow recovery. The lack of these transfusions leads to signs and symptoms, such as indisposition, fatigue, low oxygen saturation and dizziness, which are related to insufficient red blood cells and risk of bleeding in the case of low platelet count. In one of the 18 incidents analyzed, infusion of hematopoietic stem cells was delayed, which may have caused damage to the viability of these cells and reduced the probability of spinal attachment.

The need for peripheral venous puncture was due to incidents that impeded the use of the Hickman® catheter, both for infusion of solutions and medications or for daily blood samples for laboratory tests. This procedure caused avoidable pain and/or discomfort and exposed the patient to risks of bleeding and infection.

The emotional damages are subjective damages that were present in 100% of the cases analyzed. It should be noted that the patient, at the time of admission to the HSCT, is advised on the importance of the catheter and the need to watch over it along with the nursing team. When an incident occurs with the catheter, the patient experiences anxiety, fear, apprehension. These feelings increase stress and may

compromise the relationship of trust between the patient and the caregivers.

DISCUSSION

Among the incidents identified in this study, the greatest impact on patient care is caused by catheter obstruction, followed by fracture and traction. These results are similar to a narrative review study in which CVC occlusion was responsible for 14 to 36% of catheter-related complications within one to two years of its insertion⁽¹⁹⁾. Another study involving 50,000 patients on intravenous therapy confirmed that loss of permeability of the catheter is responsible for the largest number of interruptions in intravenous therapy, accounting for 43% of incidents⁽²⁰⁾. On the other hand, other researchers, who assessed the complications of CVCs in patients transplanted with HSC in a specialized service, concluded that fever/bacteremia was the most present complication⁽⁷⁾.

Obstruction or occlusion of a venous catheter is defined as the inability to infuse solutions into the lumen of a catheter, to draw blood from the catheter, or both⁽²¹⁾. CVC obstruction and infection were the most frequent incidents according to a systematic review published in 2014⁽²²⁾. In this study, the frequency of obstruction was higher than of infection. This finding may be related to the rigor in the management of the catheter by the nursing team, since the patient undergoing HSCT presents a high risk of infection due to the immunosuppression resulting from the conditioning regimen. It should be noted that the need to infuse innumerable intravenous medications and blood components in this therapeutic modality requires constant handling of the catheter lumens, increasing the likelihood of CVC contamination.

Frequent manipulation of the CVC lumens also increases the risk of errors, such as leaving the clamp closed after using the lumen, keeping the infusion pump off after switching medications, administering incompatible drugs simultaneously, or cleaning the lumen improperly.

The concern with incidents involving the Hickman® catheter is related to the fact that the obstruction of a CVC often requires the suspension of the therapy, increasing hospitalization time, generating costs for the institution⁽¹⁴⁾, and possibly causing harm to the patient's health. In a study with patients undergoing HSCT, about 20% of the catheters were replaced during the critical period of the treatment, which exposed the patient to a new surgical procedure under unfavorable clinical conditions⁽²³⁾.

In this research, it was possible to identify losses due to the need to insert a new CVC, such as: fasting for the surgical procedure, which also led to hunger and stress, mainly among pediatric patients; delay in the administration of oral medications; prescription of blood components in order to reduce the risk of hemorrhage or for volume replacement in cases of significant bleeding during the procedure; procedural pain. The patients affected by this damage had to undergo anesthesia and imaging examination, such as x-rays and computed tomography. In addition, they were exposed to environments used by many people and therefore not safe

for immunosuppressed patients, such as elevators, corridors and waiting rooms for imaging examinations.

Study limitations

The limitations of this research are related to a possible underreport of incidents with the Hickman® catheter by the health team and to the small number of studies directly related to this venous device, even though it is widely used in the HSCT services.

Contributions to the area of nursing

The results obtained can encourage reflection among nurses on the possible damages to the patient caused by an incident with the Hickman® catheter. In addition, addressing this topic may encourage further research to establish strategies to minimize the occurrence of incidents and elaborate specific protocols for the care with this type of central venous device.

FINAL CONSIDERATIONS

Damage or potential risk of damage was present in all incidents analyzed. Damages in the treatment were identified, including delay in the infusion of medication and in hydration, exposure to repeated peripheral venous punctures and implantation of a new CVC. It is assumed that these damages can lead to loss of confidence in the relationship patient/health care team.

In the scenario of this research, the Hickman® catheter is exclusively manipulated by the nursing team, which facilitates the promotion of in-service education actions to reduce incidents with the catheter.

Protocols that address catheter cleaning and obstruction should be revised, and more detailed studies on good practices for the maintenance of the Hickman® catheter permeability should be conducted in order to maintain catheter permeability and ensure safe treatment of the patient undergoing HSCT.

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