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EXPERIENCE RELATE

ACTIONS IMPLEMENTED IN THE PREPARATION AND ENDOVENOUS ADMINISTRATION OF HEPARIN: ADVERSE EVENT REPORT

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ABSTRACT

Objective: to report an adverse event in the preparation and endovenous administration of heparin and actions implemented by the health team. **Methods:** this is an experience report on the actions implemented after analyzing an adverse event in the preparation and administration of heparin in a patient admitted to a University Hospital in southern Brazil. Data were collected from the patient's medical records, minutes of meetings of the teams involved, and the action plan of the measures instituted after an event that occurred in November 2017. Results were analyzed in a descriptive manner and the project was approved by the Research Ethics Committee. **Results:** the actions carried out included the review of routines and protocols related to the calculation of dose, preparation, and endovenous administration of heparin. There was inclusion as a high-alert medication and double checking. Institutional-level guidelines and alerts were also released to all members of the nursing team. **Conclusion:** the experience contributed to highlight the need to monitor incidents and their impacts, find strategies to reduce them through process reviews and implementation of actions in care practice aiming at greater safety in the preparation and endovenous administration of heparin.

Keywords: Medication errors. Patient safety. Endovenous administration. Care of the nurse. Risk management.

INTRODUCTION

Patient safety is an increasing challenge in health care institutions worldwide[1]. A study points out that the occurrence of incidents results in severe damage to patients, in addition to an increase in hospital stay[2].

The World Health Organization (WHO) defines that incidents are any event or circumstance that could have resulted, or resulted, in unnecessary harm to the patient, being classified asreportable circumstance, near error, harmless incident and incident with damage (adverse event)[3]. Incidents involving medications are a major cause of preventable damage to health systems worldwide. They are due to individual factors such as lack of attention, long working hours, deficient training and little professional experience or systemic failures such as environmental problems, shortages of professionals, failures in communication, inadequate products and difficulties in institutional policies involving prescription, dispensing and administration of the drug[3,4].

In the United States, 44,000 to 98,000 patients die annually due to medication errors, with an estimated cost of 17 to 29 billion dollars[5]. In Brazil, a study with 735 patients identified a prevalence of 48% of incidents related to medications[6].

The National Patient Safety Program and National Ordinances establish the development of institutional protocols with the objective of monitoring and preventing damage in health care[3]. WHO launched the third global challenge, which consists of a 50% reduction in medication events in five years[7]. However, the involvement of administrators in activities related to patients' safety is still low[8].

One of the main medications involved in adverse events is heparin, which has an anticoagulant function and can cause serious risks to patients when not administered correctly.

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International studies show the importance of evaluating the process of administering this drug and raising awareness among care teams through educational strategies in order to minimize the risk of incidents with heparin[9,10].

Thus, the realization of this study is relevant because it describes the identification, report, and analysis of an adverse event with heparin. It is hoped that this experience will serve as an alert for the implementation of permanent education strategies to support the health team to identify risks in the pharmacological process, in addition to fostering a culture of safety among patients, teams and health institutions. Given the above, this study aims to report an adverse event in the preparation and endovenousadministration of heparin and actions implemented by the health team.

METHODS

This is an experience report that addresses an adverse event in the preparation and endovenousadministration of heparin and actions implemented at the Institution. The event took place with a patient admitted to a clinical-surgical unit of a University Hospital in southern Brazil in November 2017.

The professionals involved in the analysis of the event and in the proposed actions were nursing technicians, nurses and medical staff from the sector in which the incident occurred, nursing leaders and heads and members of the multidisciplinary team that make up the Risk Management and the Safe Medication Use Group.

After the identification of the adverse event, the patient received specific care and the assistance team made a report to the Patient Safety Center through a form in the electronic system, which specifies the data of the patient and the professionals involved, as well as the detailed description of the event. Subsequently, the whole team involvedparticipated in four meetings in which causes and contributing factors that corroborated the outcome were identified and analyzed. Meetings were structured using the London Protocol, which is used in the investigation and analysis of clinical events as the working methodology of Risk Management at the institution. Institutional protocols were also reviewed and points of improvement identified, as well as an action plan for the prevention of adverse events related to the administration of heparin and high-alert/high-risk medication was developed. All actions were based on the suggestions of professionals who work directly with assistance and specialists from the Safe Medication Use Group responsible for the inherent processes, which meet periodically at the institution and are constantly updated seeking to implement guidelines proposed by the National Program Patient Safety and National Ordinances.

Data collected came from the patient's prescription in electronic medical records, from the records of the analysis and assessment of the adverse event, from the minutes of meetings with the teams involved and from the action plan of the measures instituted. The analysis of the results was performed in a descriptive manner and supported by the scientific literature. The results were organized in boxes for better visualization of the implemented actions.

The project complied with the ethical precepts of the Resolution of the National Health Council number 510/2016[11], and it was approved by the Institution's Research Ethics Committee under number 12-0228 and CAAE 2691712400005327. The researchers signed a term of commitment to use institutionaldata.

RESULTS

Patient for seven days in need of prophylaxis by hepatic veno-occlusion, with a prescription of 6,000 IU of heparin in 100ml of 0.9% saline, to be administered in 24 hours. The presentation of unfractionated heparin at the institution is 5,000 IU/ml, in a 5 ml vial, thus, to contemplate the prescription of 6,000 IU, 1.2 ml of heparin from a vial was necessary.

On the 11th day of hospitalization, the patient continued with the same heparin prescription, however, one of the preparations contained the wrong dose of 30,000 IU in 100ml of 0.9% saline. The calculation performed by the nursing technician considered that each vial had 5,000 IU of heparin, thus using an entire vial, that is, 25,000 IU and another 1 ml of another vial, totaling 30,000 IU or 6 ml of heparin. The reasoning performed in the preparation of the medication can be seen in Box 1.

Box 1. Presentation of the correct and wrong calculation of heparin.

6,000 IU prescription with heparin presentation → 5,000 IU/ml	
Correct calculation	**Calculation with wrong reasoning**
1 vial contains 25,000 IU in 5ml 1ml = 5000 IU X = 6.000 IU X = 1.2 ml of heparin, that is, 6,000 IU	1 vial contains 5.000 IUin 5ml 5 ml = 5000 IU X = 6000 IU X = 6 ml which is equivalent to 30,000 IU

Source: Prepared by the authors, Porto Alegre/RS, 2017.

The mistake in reading and interpreting the presentation of heparin contributed to the adverse event, in addition to the daily dispensing of a vial of heparin by the pharmacy without reversing the leftovers, contrary to the established routine, contributed to the access of more than one vial of the medication. The professional's calculation was assessed visually by the nurse without checking the drug concentration. In the identification label of patient's medicationappeared 6 ml of heparin instead of 6,000 IU, which also was not noticed among professionals when changing shifts. The patient received the medication for approximately 20 hours, and the mistake was only identified when the patient presented bleeding in the oral cavity.

After the event was identified, the report was made to the hospital's Risk Management via electronic system. The immediate action of the Head of Nursing of the area was to embrace family members and the care teamof the unit, especially the people involved.

The patient, who already presented a worse clinical picture due to metabolic acidosis and liver failure, was transferred to the intensive care unit to correct the bleeding and start hemodialysis, but he progressed to death. In view of the situation, the patient's family members were communicated and embraced by the Risk Management of the institution that provided the disclosure. Initially, a representative of the institution contacted the family members to communicate that something had not happened as planned, apologizing and communicating how the fact would be analyzed; on this occasion emotional, social and psychological support was also offered. The family members were informed that the institution would provide the patient with all the necessary support to minimize the damage, also providing a direct contact available to the family for clarification. At another time, after analyzing the event, a disclosure was made to the family members with explanations and clarification of doubts.

Box 2: Synthesis of institutional routines and care for the preparation and administration of drugs aimed at preventing incidents.

Banning the borrowing of medications between patient drawers in the absence or delay of a current medical prescription.
Checking the medication to be administered and the infusion pump schedule each shift, which is the responsibility of the nursing technicians and nurses.
Performing the check of the care performed of the patients' prescriptions each shift. Nurses and nursing technicians jointly check the records in the medical records.
Consulting the clinical pharmacist, medical team, nurse or colleague in case of doubts in the preparation and administration of medications.
To intensify routine of reversal of medications and reiterate the ban on unit stocks.
The calculation of medications must be performed by the nursing technician and validated by nurses through a new calculation based on the prescription and concentration of the medication.
The nursing technician must be on duty and remain during his shift with medical and nursing prescriptions for conferences and checks.

Source: Standard Operational Protocol for institutional drug administration routines, Porto Alegre/RS, 2017.

A meeting was also held with all professionals at the unit in order to hear suggestions for improvements in the patients'medication process. Subsequently, a written alert (Box 2) was sent to all teams of the institution's Nursing Services, which included the strengthening of institutional routines in nursing care and existing measures for the administration of medications including heparin, aiming at incident prevention.

Subsequently, another meeting was held between the Risk Management, the nursing technicians, doctors and nurses involved in the incident, a multidisciplinary team that makes up the Safe Medication Use Groupand representatives of the leaders of the nursing area to analyze and evaluate the event and identify the causes and contributing factors, as well as plan actions to reduce new events with this characteristic.

Subsequently, another meeting was held between the Risk Management, the nursing technicians, doctors and nurses involved in the incident, a multidisciplinary team that makes up the Safe Medication Use Groupand representatives of the leaders of the nursing area to analyze and evaluate the event and identify the causes and contributing factors, as well as plan actions to reduce new events with this characteristic.

Then, there was a meeting with the heads of the institution's nursing group to review and update the action plan to define strategies for improving the medicalization process. The actions proposed by the teams involved in the analysis are shown in Box 3.

Box 3: Actions implemented at the institution to prevent incidents with the endovenoususe of heparin.

Dispensing of heparin diluted by the pharmacy in the concentration of 50 IU/ml 100 ml for full anticoagulation and creation of a protocol for prescription and specific care.
Inclusion of unfractionated heparin as a high-alert medication and identification with yellow label, typical of these medications.
Implementation of the double check in the administration of heparin for full anticoagulation.
Reinforcement in the registration of the heparin solution in patient controls at each shift change (6 hours), according to the institutional routine for administration and control of the heparin solution.
Reinforcement in the control and registration of infusions performed each shift with checking of the label and concentration of the solution with the medical prescription.
Other initiatives implemented by the Institution for the safe use of medications
The instrument "temporary transfer of care" was instituted to be used in the movement of patients between areas of the institution, which contains the main information in relation to patient care.
The start time of the medical prescription at the institution was restructured, changing from two to just one schedule, in the late afternoon (19h), avoiding that the patient does not have a current prescription in the transfer of patients between the areas. This initiative reduced delays and avoided the borrowing of drugs between patients' drawers.
The electronic dispensing system for medications and materials was established, reducing stocks and favoring greater control and safety in the use of medications in the institution.
Creation of the research and development project "Safe Zones for the preparation and administration of medications" aiming to isolate the area of preparation of medications.

Source: Action plan for the measures established in theinstitution, Porto Alegre/RS, 2017.

Actions aimed at safety in the endovenoususe of heparin were disclosed and implemented in all units of the institution. in addition to disclose such actions, it was also suggested, in the meeting with leaders, the disclosure of incidents at the institutional level, the training of the teams from each event and the strengthening of partnerships between the Patient Safety Center, the Permanent Education Service and the Social Communication. These strategies sought to contribute to the development of a safety culture among professionals.

DISCUSSION

The reported case reveals that the work processes require constant updates aiming at a safe care for patients, safety for the team and qualification of health care. Studies point to the importance of a set of actions and complex

efforts in the performance of continuous improvements in the medication process[7,8]. Incidents like the one described, however, still occur and should serve as a warning to institutions to encourage the implementation of safe and permanently revised care protocols.

Disclosure of an adverse event requires honesty, transparency and respect from the Institution with the patient and family. This process includes the contribution not only for the patient and his family, but also for the professionals involved. In this sense, the realization of disclosure guarantees patients and their families the right to access all information about their health[12]. In addition, the encouragement to report incidents and the embracement of the team were measures that added trust and transparency among the assistance teams to continue reporting incidents.

Studies indicate that the low number of reports is linked to the difficulty of communication, the need to identify the professional and fear, which are still present in situations of errors and failures. However, the creation of awareness and permanent education strategies, including interprofessional ones, can stimulate the collaboration of professionals regarding reports and promotion of patients'safety[1,13].

It is worth highlighting the importance of fostering a culture of non-punishment and encouraging the report of incidents, identification of contributing and latent factors, implementation of improvements and safety barriers in work processes. Active listening, embracement, and training the team through problematizing situations in reality strengthen bonds to trace joint decisions based on evidence, in the search for safe results in the care of patients and the assistance team, which is in line with the literature[9].

The inclusion of heparin as a high-alert medication calls attention to the need to increase care in its use, as it is a potentially dangerous drug. Likewise, dispensing in bags prepared by the pharmacy and standardized at a concentration of 50 IU/ml in 100 ml is intended to contribute to reducing the risk of errors. The review of the medication administration process, as well as the creation of a protocol standardized the actions performed by the medical and nursing teams, contributing to the safety in the care provided. These strategies implemented by the institution are also in line with what is proposed in the literature[14].

In addition to the concern with instituting protocols for the use of high-risk medications, it is necessary to identify other factors that interfere with the medication process. Thus, the time of the medical prescription for the beginning of the night was changed, reducing the delays in administering medications, implanting the care transfer process and creating a safe area, in which the nursing technician should not be interrupted during the preparation of the medications.

In this perspective, a study carried out in a teaching hospital shows that the majority of incidents occurred coincide with the administration of medications scheduled every eight hours, that is, schedules when there is a greater concentration of medications[15]. Thus, it is necessary to create alternatives for organizing the work process that best fits the numerous demands of the nursing team, with the determination of deadline of prescriptions being one of them.

It is worth mentioning that the error has a multifactorial origin and, therefore, it is necessary to evaluate the entire complex system that is the hospital environment, including circumstances where it occurred. Taking the adverse event as an example, we can perceive failures in safety barriers at various times: the form of heparin prescription that was different from the one commonly used in the institution; the wrong reasoning for performing the calculation and which was validated by the nurse without paying attention to the concentration; the absence of checking the installed solution; the pharmacy dispensing process and breaking the routine for reversing medications. Corroborating the data in this report, a documentary research analyzed incidents with medications and showed that the inability to perform calculations by the nursing team, especially recent graduates and the complexity often involved, requires double independent checking, and if the doubt persists the help of another professional more qualified in this area is important[16].

The improvement in communication and the implementation of safety measures during the medication use process should be prioritized by

health professionals, since, gradually, these processes become more complex. It is necessary to create security measures in order to prevent poor working conditions, lack of training and professional updating programs. Also, human factors, such as the lack of attention in handling the medication, overload of activities and communication failures, are causes of potential errors that may affect the patients[2,17].

Risks inherent in the system must be managed in order to prevent anticipated failures, which are assessed for the severity of the damage they may cause. Another important aspect is the awareness of health professionals about the seriousness of the topic, in addition to the need to establish a systemic safety culture that promotes the sharing of lessons arising from previous incidents, with a view to developing action plans that prevent them[18]. In this context, the reported experience caused the issue to be problematized by the health care teams, an essential activity for the continuous improvement of the quality and safety of patients of health institutions.

CONCLUSION

The analysis of what happened and the actions implemented after the adverse event sought to alert professionals about the complexity involved in medication processes, as well as to suggest preventive and qualification strategies for care processes, so that events like this are not part of the institutional history and the patient safety policy is a priority in the institution and in other professional practice settings.

The presentation of this case emphasizes that the prevention of incidents is based on continuous actions, such as revisions of protocols for prescription, dispensing, preparation and administration of medications. The experience of this event together with the team was extremely relevant and highlighted the importance of transparent and objective communication between teams and leaders in order to encourage the report of incidents without judgments, in addition to providing an opportunity for learning when discussing the facts that occurred and seek ways of improvement through training, which is why this report was presented with a focus on the actions implemented.

The limitation of this study is that it reports only one case. Thus, it is suggested that more robust studies be carried out to show the effects of the improvements implemented. However, the actions presented here can contribute to the prevention of other events in different scenarios involving the preparation and administration of medications. Thus, the need to monitor incidents, their prevalence and impact, as well as find and disseminate strategies to reduce them, is highlighted.

AÇÕES IMPLEMENTADAS NO PREPARO E ADMINISTRAÇÃO DE HEPARINA ENDOVENOSA: RELATO DE EVENTO ADVERSO

RESUMO

Objetivo: relatar evento adverso no preparo e administração de heparina endovenosa e ações implementadas pela equipe de saúde. **Métodos:** trata-se de relato de experiência sobre as ações implementadas após análise de evento adverso no preparo e administração de heparina em paciente internado em um Hospital Universitário do Sul do Brasil. Os dados foram coletados nos registros do prontuário do paciente, atas de reuniões das equipes envolvidase do plano de ação das medidas instituídas após evento ocorrido em novembro de 2017. A análise dos resultados foi realizada de forma descritiva e o projeto aprovado por Comitê de Ética em Pesquisa. **Resultados:** as ações realizadas incluíram a revisão de rotinas e protocolos relacionados ao cálculo de dose, preparo e administração daheparina endovenosa. Houve ainclusão como medicamento de alta vigilância e realização da dupla checagem. Também foram divulgadas orientações e alertas em nível institucional para todos os membros da equipe de enfermagem. **Conclusão:** a experiência contribuiu para evidenciar a necessidade de monitorar incidentes e seus impactos, encontrar estratégias para reduzi-los por meio de revisões nos processos e implementação de ações naprática assistencial visando maior segurançano preparo e administração de heparina endovenosa.

Palavras-chave: Erros de Medicação. Segurança do Paciente. Administração Intravenosa. Cuidados de Enfermagem. Gestão de Riscos.

ACCIONES IMPLEMENTADAS EN LA PREPARACIÓN Y ADMINISTRACIÓN DE HEPARINA ENDOVENOSA: RELATO DE EVENTO ADVERSO

RESUMEN

Objetivo: relatar evento adverso en la preparación y administración de heparina endovenosa y acciones implementadas por el equipo de salud. **Métodos:** se trata de un relato de experiencia sobre las acciones implementadas tras el análisis de evento adverso en la preparacióny administración de heparina en paciente ingresado en un Hospital Universitario del Sur de Brasil. Los datos fueronrecolectados en los registros médicos del paciente, actas de reuniones de los equipos involucrados y del plan de acción de las medidas instituidas tras el evento ocurrido en noviembre de 2017. El análisis de los resultados fue realizado de forma descriptiva yel proyecto aprobado por Comité de Ética en Investigación. **Resultados:** las acciones realizadas incluyeron la revisión de rutinas ylos protocolos relacionados al cálculo de dosis, preparacióny administración de heparina endovenosa. Hubola inclusión como medicamento de alta vigilancia sanitaria y la realización del doble chequeo. También fueron divulgadas orientaciones y alertas a nivel institucional para todos los miembros del equipo de enfermería. **Conclusión:** la experiencia contribuye para evidenciar la necesidad de monitorear incidentes y sus impactos, encontrar estrategias para reducirlos por medio de revisiones en los procesos y la implementación de acciones en la práctica asistencial con el objetivo de una mayor seguridaden la preparacióny administración de heparina endovenosa.

Palabras clave: Errores de medicación. Seguridad del paciente. Administración intravenosa. Atención de Enfermería. Gestión de riesgos.

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