

REPERCUSSION OF AN EDUCATIONAL INTERVENTION ON THE KNOWLEDGE OF THE NURSING TEAM REGARDING THE USE OF EXTERNAL VENTRICULAR DRAINS IN PEDIATRICS

REPERCUSSÃO DE INTERVENÇÃO EDUCATIVA NO CONHECIMENTO DA EQUIPE DE ENFERMAGEM SOBRE OS CUIDADOS NO USO DA DERIVAÇÃO VENTRICULAR EXTERNA EM PEDIATRIA

REPERCUSIÓN DE LA INTERVENCIÓN EDUCATIVA EN EL CONOCIMIENTO DEL PERSONAL DE ENFERMERÍA SOBRE CUIDADOS EN EL MANEJO DEL DRENAJE VENTRICULAR EXTERNO EN PEDIATRÍA

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ABSTRACT

Objective: this study aimed to analyze the repercussion of an educational intervention on the theoretical knowledge of the Nursing team regarding the use of external ventricular drains in Pediatrics. This is an uncontrolled intervention study, with a before and after study design. **Method:** a pre- and post-test was applied to collect information on the nurses' knowledge regarding the care of pediatric patients with external ventricular drains. Between the pre- and post-test, an educational intervention was performed using clinical simulation as a teaching strategy. 41 nursing professionals participated in the study. The professionals were more assertive after the educational intervention, especially regarding the use of an aseptic technique for emptying the collection bag ($p=0.021$). Correlation analyses in the pre-test revealed that the greatest number of errors was not correlated to any of the socio-demographic variables. However, in the post-test, a significant correlation was identified between the number of errors and the participants' age ($\rho=0.340$; $p=0.015$); years since graduation ($\rho=0.414$; $p=0.004$); and years of professional experience in the unit ($\rho=0.428$; $p=0.004$). Therefore, the result shows that older professionals, with more years of professional experience in the unit did not take that much advantage of the educational intervention, presenting greater number of errors. The educational intervention using the clinical simulation strategy enabled an increase in the knowledge of the participants, and can be used in continuing education, improving assistance quality.

Keywords: Pediatric Nursing; Ventriculostomy; Cerebrospinal Fluid Shunts; Nursing Care; Education, Continuing.

RESUMO

Objetivo: este estudo objetivou analisar a repercussão de intervenção educativa no conhecimento teórico da equipe de Enfermagem sobre os cuidados no uso da derivação ventricular externa em Pediatria. Trata-se de estudo de intervenção não controlado, com delineamento do tipo antes e depois. **Método:** procedeu-se à aplicação de pré e pós-teste para a coleta de informações sobre os conhecimentos dos profissionais sobre os cuidados aos pacientes pediátricos com derivação ventricular externa. Entre o pré e o pós-teste realizou-se intervenção educativa usando-se a simulação clínica como estratégia de ensino. Participaram do estudo 41 profissionais de Enfermagem. Constatou-se mais assertividade após a intervenção educativa, principalmente na questão que versa sobre o uso da técnica asséptica para esvaziamento da bolsa coletora ($p=0,021$). As análises de correlação no pré-teste revelaram que o maior número de erros não esteve correlacionado a qualquer das variáveis sociodemográficas. Contudo, no pós-teste, identificou-se correlação significativa entre o número de erros com a idade dos profissionais ($\rho=0,340$; $p=0,015$); tempo de formação dos profissionais ($\rho=0,414$; $p=0,004$); e tempo de atuação na unidade ($\rho=0,428$; $p=0,004$). O resultado sinaliza, portanto, que profissionais com idades mais elevadas, mais tempo de

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profissão e de atuação na unidade tiveram menos aproveitamento da intervenção educativa, apresentando maior número de erros. A intervenção educativa usando a estratégia da simulação clínica possibilitou incremento no conhecimento dos participantes, podendo ser utilizado para a educação permanente, melhorando a qualidade da assistência. Palavras-chave: Enfermagem Pediátrica; Ventriculostomia; Derivações do Líquido Cefalorraquidiano; Cuidados de Enfermagem; Educação Continuada.

RESUMEN

Objetivo: analizar la repercusión de la intervención educativa en el conocimiento teórico del personal de enfermería sobre cuidados en el manejo del drenaje ventricular externo en pediatría. Estudio de intervención no controlado, con diseño antes – después. Método: se aplicó la prueba antes y después para la recogida de datos sobre el conocimiento de los profesionales acerca de los cuidados de pacientes pediátricos con drenaje ventricular externo. Entre las pruebas antes y después se realizó la intervención educativa con simulación clínica como estrategia de enseñanza. En el estudio participaron 41 profesionales de enfermería. Se constató más asertividad después de la intervención educativa, principalmente en lo referente al uso de la técnica aséptica para realizar el vaciado de la bolsa recolectora ($p=0,021$). Los análisis de correlación de la prueba anterior revelaron no haber ninguna correlación entre la cantidad de errores y alguna de las variables sociodemográficas. Sin embargo, en la prueba posterior se identificó la correlación significativa entre la cantidad de errores y la edad de los profesionales ($\rho=0,340$; $p=0,015$); el tiempo de graduación ($\rho=0,414$; $p=0,004$); y el tiempo de trabajo en la unidad ($\rho=0,428$; $p=0,004$). El resultado indica que los profesionales con más edad, más tiempo de profesión y de trabajo en la unidad aprovecharon menos la intervención educativa y que cometieron más errores. La intervención educativa usando la estrategia de la simulación clínica ha permitido aumentar el conocimiento de los participantes y podría adoptarse en la educación permanente con miras a mejorar la calidad asistencial.

Palabras clave: Enfermería Pediátrica; Ventriculostomia; Derivaciones del Líquido Cefalorraquídeo; Atención de Enfermería; Educación Continua.

INTRODUCTION

External ventricular drains (EVD) have an important therapeutic role in Pediatrics. They consist of a closed drainage system that drains the cerebrospinal fluid and helps to measure the intracranial pressure (ICP) in children with intracranial hypertension (ICH).¹ It is an emergency procedure required in cases in which there are disturbances of cerebrospinal fluid flow, subarachnoid, intraventricular or intraparenchymal hemorrhages. In these cases, the EVD drainage valve is implanted in one of the brain ventricles, using a surgical technique, in order to collect the excessive cerebrospinal fluid and conduct it through a polyvinyl chloride (PVC) tube to an external drainage bag.^{1,2}

The use of EVD may lead to mechanical, functional and infectious complications, such as system obstruction, catheter associated infection, meningitis, ventriculitis, intraventricular bleed-

ing, hypo or hyper-drainage, as well as incidents such as disconnection and contamination of the system, folds with no drainage and system crash.³ However, the infectious complications associated with EVD have prevailed in the different health scenarios.⁴ Breakdown of protective barriers during the insertion of the EVD drainage valve is believed to make the child who uses the device more susceptible to healthcare-associated infections (HAIs).⁵

A retrospective study with 46 children submitted to EVD placement revealed that 28% of them ($n=13$) presented complications, the most frequent being related to infectious causes (69%, $n=9$) and malfunctioning of the drainage valve (31%, $n=4$).⁶ Others have shown that the main complications related to EVD are related to nursing care, as well as to their level of knowledge.^{7,8}

Nursing care for the pediatric patient with EVD includes planning and implementing specific care throughout the insertion, maintenance, handling and monitoring of the device. Several care actions are taken, such as monitoring the signs and symptoms of intracranial hypertension, routine supervision and control of the entire EVD system and the incision, early identification of leaks, in addition to those for evaluation and systematic recording of the characteristics of the cerebrospinal fluid drained by the valve – color, appearance and quantity – so as to mention some examples.⁹

Although nursing care of children with EVD is relatively simple, it is identified in the literature that gaps in manipulating, handling and monitoring the device have contributed to the lack of early detection of complications and the presence of adverse events that result in physical, social and/or psychological harm, threatening the health and safety of pediatric patients. These findings have been related by the authors to the fragility of the team's knowledge about good practices in the care of pediatric patients with EVD.^{3,7,8} In addition, there is shortage of studies that show conclusive evidence on the professionals' knowledge about this topic, as well as on the repercussion of educational interventions in the knowledge of the nursing team, with a view to a more effective and safer care for pediatric patients with EVD.

Considering the preventable risks to which pediatric patients with EVD are exposed, it is essential to carry out studies that contribute to the improvement of care and safety of these patients.

OBJECTIVE

To analyze the repercussion of an educational intervention on the theoretical knowledge of the nursing team regarding the use of external ventricular drains in Pediatrics.

METHOD

The study was developed in accordance with the ethical precepts of Resolution No. 466/12 of the *Conselho Nacional de Saúde* (CNS) of the *Ministério da Saúde* (BR), previously

approved by the Research Ethics Committee of the *Universidade Federal de Minas Gerais* and the studied hospital under CAAE No. 51621115.7.0000.5129. All participants registered their consent to participate in the study through the Free and Informed Consent (FIC).

It is a quasi-experimental study, with a single non-equivalent group and a before-and-after-study design.

The study was carried out in a large municipal hospital of *Belo Horizonte, Minas Gerais*, from March to July 2016.

Professionals of the pediatric nursing teams and the Pediatric Intensive Care Unit (ICU) were recruited for the study. Inclusion criteria were: age > 18 years old; effective employment bond with the institution; and participating in all stages of the research (pre-test, educational intervention and post-test). Professionals who were on vacations or leave during the study period were excluded. During the study period, the nursing team had 56 eligible professionals. Of this total, five were excluded from the first stage (pre-test) for being on vacation and three for medical leave. Thus, the pre-test was applied to 48 professionals. Of these, 41 participated in the subsequent stages (educational intervention and post-test), and they were the sample of the study.

To collect data on nurses' theoretical knowledge about good practices in the care of pediatric patients with EVD, an instrument was created composed of 10 closed-ended questions containing four alternatives, with only one correct option. They were created based on available scientific evidence and addressed the indications and main complications of the use of the device, the necessary care during dressing changes, disinfection, emptying the collection bag and the correct positioning of the EVD system. Before its application to the study participants, the instrument was analyzed by three experts in the field, who verified the clarity and relevance of the content of the proposed questions. Subsequently, this questionnaire was applied to five nurses from another similar pediatric unit, who were not part of the population of this study, in order to identify difficulties in understanding the statements of the questions. Subsequently, the questionnaire was adjusted according to the approval of specialists and professionals.

The nurses participating in the research were informed on how to complete the instrument, which occurred in two moments: before and after an educational intervention.

After the entire group answered the instrument (pre-test), the educational intervention was initiated, which consisted of a theoretical and practical activity applied to the clinic, using clinical simulation as a teaching strategy. Clinical simulation is an active teaching strategy intended to stimulate critical thinking and decision making in situations and/or environments close to reality.⁸

For the simulation, a case of a child with EVD was created, and the nurses should, based on the case, develop specific care for this child.

After the simulation, the nurses and the research team discussed and reflected on the activity, focusing on the main care for the child with EVD. The fragilities, difficulties and potentials were evaluated, and there was a discussion on the possibilities of the participants applying the knowledge addressed in the care practice. Immediately after this moment, all participants received again the research instrument for self-completion (post-test).

Fifteen clinical simulation sessions were performed, so that all nurses from the selected sectors could participate in the activity.

To determine the answers of the instrument, there was a conceptual classification of the proposed knowledge variables, using as reference a previous study with similar purposes. Thus, the percentage of correct answers was classified as follows, namely: questions with 100% accuracy, excellent; from 90 to 99%, very good; from 80 to 89%, good; 70 to 79%, regular; from 60 to 69%, low; and from 50 to 59%, very low.⁹

The information collected was analyzed through the Statistical Package for the Social Sciences (SPSS) program, version 19.0 (SPSS for Windows, Chicago, USA). A descriptive analysis of socio-demographic data was performed using, where appropriate, median (and minimum and maximum values) or relative frequency. Normality tests were performed, which showed that they were non-parametric variables, indicating the need to perform non-parametric tests, such as the Wilcoxon test. The McNemar test was used to analyze the categorical variables.

Spearman's rank correlation test was applied to verify the correlation between pre- and post-test answers and the socio-demographic characteristics of the sample. In all analyses, a significance level of 5% ($p < 0.05$) was considered.

RESULTS

Of the 41 participants, seven were nurses and 34 were nursing assistants, with a median age of 38 years old (between 24 and 62 years old) and female predominance ($n=40$, 97.6%). It was observed that a little more than half of the participants were in the pediatric hospital unit ($n=21$, 51.2%) and the others in the pediatric ICU ($n=20$, 48.8%).

Of the professionals working in these sectors, 11 had training both as nurse assistant and nurse ($n=11$, 26.8%). However, when questioned about the position held at the institution, 82.9% ($n=34$) worked as nursing assistants and 17.1% ($n=7$) as nurses.

The median time since graduation was 12 years, and the time spent in each of the investigated units varied: the professionals working in the pediatric hospital unit had a median of nine years in the unit, while the median in the pediatric ICU was seven years.

Most participants ($n=35$; 75.5%) reported not having participated in trainings on EVD in the year preceding this study.

When asked who they turned to when they had doubts about the care given to children with EVD, the majority (69.9%, n=30) of the participants reported having turned to the nurses of those units or to colleagues with longer professional experience.

The data on the professionals' knowledge regarding the care of pediatric patients with EVD is shown in Table 1.

Regarding the results of the tests applied after the educational intervention, a higher percentage of correct answers was found for most of the questions investigated, especially regarding the question about the use of aseptic technique in the emptying of the EVD collection bag (p=0.021). However, for the items of adverse events, hand hygiene, change of position, positioning of the system and emptying of the EVD bag, no improvement in knowledge was identified even after the educational intervention.

The correlation analyses in the pre-test revealed that the greatest number of errors was not correlated to any of the socio-demographic variables. However, in the post-test, a significant correlation was identified between the number of errors and the participant's age (rho=0.340; p=0.015); years since graduation (rho=0.414; p=0.004); and years of professional experience in the unit (rho=0.428; p=0.004).

DISCUSSION

Data found in this study shows that there was an increase in the professionals' knowledge after the educational intervention, especially regarding the adequate management of the EVD collection bag. An improvement in the classification of the answers in the questions about the main complications of the use of EVD and dressing change was evidenced, reaching, after the educa-

tional intervention, the classification of "very good". It is believed that this improvement can contribute to the adoption of safer practices by these professionals, avoiding complications of different magnitudes, especially in the case of pediatric population.⁷

The educational intervention using clinical simulation as a teaching strategy had a positive effect on the knowledge of the professionals who participated in this research, which can be observed by the increase in the number of questions answered correctly after the intervention. It is believed that the use of clinical simulation may have contributed to this, as it consists of a teaching strategy that is not restricted to the teaching of theoretical or practical contents in isolation but, on the contrary, enables the learner to analyze, synthesize and make decisions regarding the different aspects involved in healthcare.¹⁰

In addition, adopting a bundle or a set of actions to reduce EVD-related infections could contribute to improved care for these children. A study conducted in Florida found that the rate of infection related to the use of EVD decreased from 9.2% to zero with the use of the specific *bundle* of good practices in the care of patients with EVD.¹¹

Recommended conducts in the bundle specific for patients with EVD include the use of sterile technique in the insertion of the device and implementation of maximum protection barriers (cap, mask, sterile gloves, cape, surgical drapes covering the patient's head and body and preparation of the skin using antiseptic for three minutes). It is recommended in the bundle that the maximum protection barriers should also be present in the collection bag drainage process and in the exchange of occlusive dressing every 72 hours. Early withdrawal of EVD is part of these recommendations, in addition to daily monitoring and implementation of educational interventions in the care team.^{11,12}

Table 1 - Answers paired to the questions about the professionals' knowledge on nursing care regarding EVD before and after the educational intervention (n=41). *Belo Horizonte*, 2016

Question (topic)	Pre-test scores n(%)	Post-test scores n(%)	P-value	Pre-test classification	Post-test classification
1 - Indications of use of EVD	36(87.8)	39(95.1)	0.453#	Good	Very good
2 - Main complications	35(85.4)	37(90.2)	0.453#	Good	Very good
3 - Changing EVD dressing	35(85.4)	40 (97.6)	0.125#	Good	Very good
4 - Changing the position of the pediatric patient with EVD	37(90.2)	37(90.2)	1.000#	Very good	Very good
5 - Adverse events	34(82.9)	35(85.4)	1.000#	Good	Good
6.1 - Collection bag exchange technique	24(58.5)	34(82.9)	0.021#	Very bad	Good
6.2 - Hand hygiene	39(95.1)	39(95.1)	0.289#	Very good	Very good
6.3 - Disinfection of the collection bag	37(90.2)	41(100)	0.125#	Very good	Excellent
7 - Positioning of the EVD system	37(90.2)	40(97.6)	0.375#	Very good	Very good
8 - Emptying the EVD bag	40(97.6)	40(97.6)	1.000#	Very good	Very good
Total median (min-max)	9(6-10)	9(7-10)	0.055*		

Note: #McNemar test, *Wilcoxon test.

Most of the complications mentioned in the literature, such as infections at the catheter insertion site, disconnection or malfunction of the drainage system and its contamination could be avoided by adopting good practices in care.^{2,6,13} In this sense, it is suggested that professionals who watch children in the use of EVD are systematically monitored and that educational interventions are carried out periodically, thus enabling a successive approach to the good practices required to care for these children.

One finding that drew attention was the indication that the team turns to professionals with more years of professional experience as a reference for the clarification of doubts regarding the care of children with EVD. However, older professionals, with more time of professional experience and more time working in the unit showed worse levels of knowledge about EVD (post-test).

This result indicates the need for this group of professionals to receive special attention during the development of educational interventions. It is believed that the option for interventions based on active teaching methodologies and using participatory teaching strategies may contribute to the sensitization of these professionals to the adoption of good practices in the service.⁸

It should be emphasized that it is the responsibility of the nursing team to adopt good practices in view of the adequate functioning of EVD, which includes care with the positioning of EVD and the collection bag – adjustments in height, leveling of the system when there is a change in the position of the patient –; with the catheter insertion site – aseptically dressing change –; with the drainage system – inspection of the entire EVD system, including the catheter insertion site, to locate leaks –; and monitoring of the drained liquid – observation of the amount, color and appearance of the cerebrospinal fluid.^{6,14-16} It is believed that the mere collection of objective information, before and after developing an educational intervention, considering the analysis of its repercussion, is limiting the findings. However, it is hoped that the results presented may support reflections on the topic, as well as motivate the continuous qualification process, in service, of the professionals who watch children with EVD.

CONCLUSION

The intervention based on clinical simulation provided the professionals with the discussion and acquisition of knowledge based on scientific evidences from a critical point of view, in addition to enabling the sharing of experiences, potentialities and fragilities in the care of children with EVD.

The result evidences that older professionals, with more years of professional experience and more years working in the unit did not take that much advantage of the educational intervention, which indicates the need to rethink other interventions or methodologies, especially in this group of professionals.

The implementation of educational interventions based on active methodologies, as part of continuing education in health, as suggested by the bundle to prevent EVD infection, may contribute to the improvement of nursing care and possibly to reduce the risk of complications and adverse events related to the use of DVE in Pediatrics.

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