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ORIGINAL ARTICLE

SAFE DEVICE FOR INTRAHOSPITAL TRANSPORTATION OF NEWBORNS AND THEIR MOTHERS: EVALUATION AND USABILITY

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ABSTRACT

Objective: To evaluate the usability of the baby carrier for the safe transport of newborn infants with their mothers and the satisfaction of the mothers and the nursing team.

Method: Cross-sectional study conducted at the Obstetric Center and Inpatient Obstetric Units, in the southern region of Brazil, with 99 postpartum women and 66 nursing technicians/assistants from July to September 2018. Three semi-structured questionnaires were applied. Descriptive analysis was performed.

Results: Of the total number of nursing technicians/assistants, 40 were from the Obstetric Center and 23 from the Inpatient Obstetric Units. Ninety-five (95) postpartum women 95 perceived the device as a safety measure for the newborns. As for satisfaction, the average score of the nursing team at the Obstetric Center was 8.9; in Obstetric Admission, 9.6; and, the postpartum women obtained 9.6.

Conclusion: The use of the baby carrier obtained high ratings from the professionals and the mothers, because it prevented falls of newborns during transport. Suggestions for improvements of the device should be considered.

DESCRIPTORS: Newborn; Patient Safety; Prevention of Accidents; Risk Management; Obstetric Nursing.

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DISPOSITIVO SEGURO PARA TRANSPORTE INTRA-HOSPITALAR DO RECÉM-NASCIDO JUNTO À SUA MÃE: AVALIAÇÃO E USABILIDADE

RESUMO

bjetivo: avaliar a usabilidade do carrega-bebê para o transporte seguro do recém-nascido junto à mãe e a satisfação das puérperas e da equipe de enfermagem.

Método: estudo transversal, desenvolvido no Centro Obstétrico e na Internação Obstétrica, na região sul do Brasil, com 99 puérperas e 66 técnicos/auxiliares de enfermagem, no período de julho a setembro de 2018. Utilizou-se três questionários semiestruturados. Realizada análise descritiva.

Resultados: dos técnicos/auxiliares de enfermagem, 40 eram do Centro Obstétrico e 23 da Internação Obstétrica. 95 puérperas consideraram o dispositivo uma medida de segurança para o recém-nascido. Quanto à satisfação, a nota média da equipe de enfermagem do Centro Obstétrico foi 8,9; na Internação Obstétrica, 9,6; e, para as puérperas, 9,6.

Conclusão: a utilização do carrega-bebê foi bem avaliada pelos profissionais e pelas puérperas, considerando-se que preveniu quedas do recém-nascido durante o transporte. Devem-se considerar as sugestões de melhorias para que o dispositivo seja aprimorado.

DESCRITORES: Recém-Nascido; Segurança do Paciente; Prevenção de Acidentes; Gestão de Riscos; Enfermagem Obstétrica.

DISPOSITIVO SEGURO PARA TRANSPORTE INTRA HOSPITALARIO DEL RECIÉN NACIDO CON LA MADRE: EVALUACIÓN Y USABILIDAD

RESUMEN:

Objetivo: evaluar la usabilidad de las sillitas portátiles para el transporte seguro del recién nacido con su madre y la satisfacción de las puérperas y del equipo de enfermería.

Método: estudio transversal, que se desarrolló en el Centro Obstétrico y en la Internación Obstétrica, en región sur de Brasil, con 99 puérperas y 66 técnicos/auxiliares de enfermería, en el período de julio a septiembre de 2018. Se utilizaron tres cuestionarios semi estructurados. Se hizo análisis descriptivo.

Resultados: de los técnicos/auxiliares de enfermería, 40 eran del Centro Obstétrico y 23 de la Internación Obstétrica. 95 puérperas consideraron el dispositivo una medida de seguridad para el recién nacido. Acerca de la satisfacción, la nota promedio del equipo de enfermería del Centro Obstétrico fue 8,9; en la Internación Obstétrica, 9,6 y, para las puérperas, 9,6.

Conclusión: la utilización de la sillita portátil fue bien evaluada por los profesionales y por las puérperas, considerándose que previne caídas del recién nacido durante el transporte.

Se necesita tener en cuenta las sugerencias de mejorías para que el dispositivo sea perfeccionado.

DESCRIPTORES: Recién Nacido; Seguridad del Paciente; Prevención de Accidentes; Gestión de Riesgos; Enfermería Obstétrica.

INTRODUCTION

Brazil integrates the World Alliance for Patient Safety, established by the World Health Organization [1], which recommends that the countries pay the closest possible attention to the problem of Patient Safety. In Brazil, this topic gained prominence from 2013, with the publication of Ordinance 529/2013, which instituted the National Patient Safety Program (PNSP) aimed to contribute to the qualification of care in all health care establishments, public and private [2].

The Joint Commission International (JCI) conducts assessments of hospital institutions worldwide, focusing on safety and risk management issues. In order to achieve accreditation standards, Brazilian hospitals develop strategies to improve the quality of care, including efficient actions for patient safety [3], which is consistent with the PNSP [2].

Fall prevention is one of the several safety measures proposed by the PNSP [2]. The causes of falls have been carefully analyzed, in order to identify the circumstances involved and determine the risk factors. It is also understood that hospitalization itself is a risk factor for falls [4].

Under this approach, prevention becomes a key factor for resolving the health actions developed, with the purpose of ensuring that health institutions are reliable and comply with quality standards[5]. Thus, measures should be adopted regardless of whether a fall has occurred or not, as some situations and risks are predictable and preventable. It is necessary to analyze each possible accident and then plan and implement preventive actions to prevent its occurrence [6,7].

The identification of patients at risk of falling is the starting point for the adoption of efficient and specific actions targeted to individuals with different needs, such as, for example, newborns (NB). There are few studies on imminent signs or risk factors for falls of infants in the postpartum period [8]. This has prompted hospitals to develop their own strategies to reduce and prevent newborn falls [9].

A hospital in southern Brazil detected this situation and developed a device for the intra-hospital transport of newborns with their mothers, called baby carriers, as a fall prevention strategy. The baby carrier is a piece of cloth shaped to the mother's body by means of straps. In this artifact, the infant is placed in a sort of big pocket, which is adjusted by means of straps, to prevent falls, allowing the safe transport of the newborn [10].

The prototype of the device was created in May 2016 and was implemented as an institutional protocol in July of the same year. The baby carrier is used to transport newborns with their mothers from the moment of discharge from the recovery room of the Obstetric Center Unit (UCO) until the arrival at the bed of the Inpatient Obstetric Unit (UIO), and is handled by the nursing technician.

Considering the relevance of implementing measures to prevent falls, the present study aimed to assess the usability of the baby carrier for the safe transport of newborn infants with their mothers and the satisfaction of postpartum women and the nursing staff.

METHOD

Cross-sectional study conducted at the Obstetric Center and Inpatient Obstetric Units of the Maternal and Child Nursing Service of Hospital de Clínicas de Porto Alegre (HCPA). The Service counts on 29 nurses, and of these, 25 are obstetric nurses. In 2018, 3,435 births were recorded, of which 1,285 were cesarean sections and 2,150 vaginal deliveries.

The study population consisted of mothers and nursing technicians/assistants

from Obstetric Center Units and Inpatient Obstetric Units responsible for the transport of mothers with their infants. The service counts on 75 nursing technicians/assistants, 46 from the Obstetric Center Units and 29 from the Inpatient Obstetric Units. The Winpepi program, version 11.43, was used to calculate the sample size of the maternal population. Considering a 95% confidence level and an absolute error margin of 10%, in order to maximize the variance, at least 96 women in the postpartum period were required to compose the sample and the total number of nursing technicians/assistants. Nurses from the referred units were excluded from the study, because the device is applied by nursing technicians/assistants.

Postpartum women assisted at the Obstetric Center Unit (UCO) of the hospital whose infants were in clinical conditions, that is, in hemodynamically stable conditions, whose vital signs were normal and who were discharged from the UCO with their mothers and sent to the Inpatient Obstetric Units (UIO) were included in the study. Mothers of twin newborns and nursing technicians/assistants on vacation or health/ maternity leave during the data collection period were excluded.

Three semi-structured questionnaires were applied, one for each group of participants (one for UCO nursing technicians/assistants, one for UIO nursing technicians/assistants and one for the postpartum women). The instruments had open and closed-ended questions addressing the usability of the baby carrier regarding difficulties, level of satisfaction with the use of the device and suggestions for improvement. Data were collected from July to September 2018.

The questionnaire was administered to the postpartum women by the study researcher after the end of the transport. The nursing technicians/assistants answered the questionnaire on the same day they transported the mothers/infants, after their usual work shift. Therefore, this did not interfere with the development of their work activities.

Descriptive analysis of the variables was performed with the use of the SPSS software, version 18, and data was presented in tables.

The provisions of the Brazilian legislation on research with human beings were observed. The study was approved by the Research Ethics Committee of HCPA (Protocol No. 2,636,713).

RESULTS

Sixty-six nursing technicians/assistants participated in the study, 43 from the UCO and 23 from the UIO, and 99 postpartum women. The results are presented below according to each group of participants.

Asked if they needed help to place the baby carrier on the woman's body, 42 (97.7%) participants of the group of nursing technicians/assistants of the UCO said that there was no need for help. Only one participant reported this need, because the mother had the newborn on her lap and did not have a baby crib available for her infant.

Regarding the difficulties in placing the baby carrier on the mother's body, no nursing technicians/assistants reported it. However, the importance of team assistance during this procedure was addressed. On the other hand, regarding the difficulties in placing the NB in the baby carrier, only one (2.3%) nursing technician assistant said that he/she had found had some difficulty at the time because the newborn was large.

Regarding the baby carrier being considered a safety measure, 40 (93.0%) nursing technicians/assistants said it was a device safe. Table 1 shows the reasons why the baby carrier was considered safe and unsafe. In some situations, the participants reported more than one reason.

Table 1 - Distribution of the reasons why the baby carrier is considered safe and unsafe. Obstetric Center Unit. Porto Alegre, RS, Brazil, 2018

Reasons for Safety Issues	**N**	**%**
Reasons for safety		
The NB is protected/safe	27	62.8
Prevention of falls	17	39.5
The NB is close to the mother's body	16	37.2
Safe transport	5	11.6
Mother's sense of safety	3	7
Prevents complications	3	7
Postpartum maternal fragility	1	2.3
Reasons for lack of safety		
The cradle is considered a safer measure	1	2.3
Only if the device is tied to the chair	1	2.3
The newborn may fall if the mother falls	1	2.3

Source: the authors (2019).

It was found that 24 (55.8%) nursing technicians/ assistants rated 10 satisfaction with the use of the baby carrier. The average rating was 8.93 (+1.534), minimum 5 and maximum 10. The justifications for ratings <9 are shown in Table 2.

Table 2 - Distribution of the reasons for ratings <9 by the UCO team. Porto Alegre, RS, Brazil, 2018

Justifications for the ratings	**N**	**%**
The device may be improved, in general	3	15.8
String is of poor quality	3	15.8
It is a safe device	2	10.5
It is only safe if there are no complications	2	10.5
Inappropriate size	2	10.5
The closure of the bag needs to be improved	1	5.3
No opening for breastfeeding	1	5.3
Safe newborn	1	5.3
Does not consider it safe	1	5.3

Source: the authors (2019).

As for the suggestions for improvements for the baby carrier, 23 (53.5%) nursing technicians/assistants did not suggest any improvement because they believe the device achieved the desired results. However, 20 (46.5%) participants suggested improvements, which are shown in Table 3.

Table 3 - Suggestions for improvements for the baby carrier, UCO team. Porto Alegre, RS, Brazil, 2018

Suggestions for improvements	**N**	**%**
Use of another type of string for tying	6	22.2
More pliable string	5	18.5
Opening for breastfeeding	3	11.1
String for newborn bag made of other material	3	11.1
Better closing system for the newborn bag	3	11.1
Availability of more different sizes	2	7.4
More comfortable fabric	1	3.3
Wider strings	1	3.3
Button or Velcro closure	1	3.3
Ergonomic carrier for the mother	1	3.3
Base to tie the device to the chair	1	3.3

Source: the authors (2019).

Asked if they would recommend the use of baby carriers in other health care institutions, 42 (97.7%) nursing technicians/ assistants said yes. Only one (2.3%) participant said no because the NB may fall if the mother also falls out of the wheelchair during the transport.

As for the UIO nursing technicians/assistants, regarding the need for assistance to remove the baby carrier from the mother's body, all mentioned that it was not necessary. Asked about difficulties in such removal, 22 (95.7%) professionals did not report any difficulties, and only one (4.3%) participant mentioned that the strings were difficult to handle.

None of the nursing technicians/assistants reported any difficulties in removing the newborn from the baby carrier. However, one (4.3%) participant said that he/she was helped by one mother because the newborn was very tightly secured in the bag.

All UIO nursing technicians/assistants considered the use of the baby carrier a safety measure for the transport of newborns. The main reasons reported are shown in Table 4. It should be noted that each participant reported more than one reason.

Table 4 - Distribution of the reasons why the baby carrier is considered a safety measure. UIO. Porto Alegre, RS, Brazil, 2018

Reasons for safety issues	N	%
Related to the NB		
The newborn is safe	13	56.5
Prevents newborn falls	6	26.1
Possibility of fall without the device	4	17.4
Related to the professional		
The health worker does not need to worry during transport	3	13
Easy transport	1	4.3

Source: the authors (2019).

The level of satisfaction of health professionals with the use of the baby carrier, was rated 10 by 18 (78.3%) nursing technicians/assistants. The average rating was 9.65 (+ 0.714), with a minimum rating of 8 and a maximum of 10.

Asked about suggestions for improvements of the device, 20 (87%) participants replied they had no suggestions because they were satisfied with its use. As for the recommendations for improvements, these included modernization of the device, devices available in sizes more suitable for the women, wider strings for the newborn's bag and reducing the size of the string that holds the baby carrier to the mother.

Regarding complications in the transport of the mothers with their newborns from the UCO to the UIO, all nursing technicians/assistants said there were no complications and recommended the use of the device in other health institutions.

Finally, the findings related to the postpartum women are presented. Asked about the degree of difficulty in placing the baby carrier on their bodies 98 (99.1%) said that the device was easy to put on. Only one (0.9%) mother claimed it to be difficult, as she had to tie the device to her back. Regarding the removal of the device, 98 (99.1%) mothers considered it easy. Only one mother (0.9%) reported her difficulty untying the strings.

Regarding the placement of the newborn in the baby carrier bag, 98 (99.1%) mothers found it easy. Only one mother reported having difficulty, as the newborn moved a lot at that moment. Also, she was holding some belongings and the site to place the newborn seemed very tight. As for the removal of the device, 98 (99.1%) mothers considered it easy, and one (0.9%) considered it difficult allegedly because the string of the bag was too tight.

Asked if they considered the baby carrier a safety measure for the transport of newborns, 95 (95.4%) mothers answered yes, because it was very safe (51.5%), due to the impossibility of the newborn falling (25.2%) and the fact that it is well fastened (23.2%). However, four mothers (3.6%) answered no because although the device helped them carry the newborns, they did not found it safe, since they had to hold the infants with their arms. Two of these mothers said they found the baby carrier practical, but not safe.

Regarding satisfaction with the use of the baby carrier, 73 (73.7%) mothers rated 10 their level of satisfaction, when asked. The average rating was 9.60 (+ 0.820), with a minimum of 5 and a maximum of 10.

Regarding the suggestions for improvements mentioned by the postpartum women, 21 (21.2%) made suggestions according to Table 5, and one woman made two suggestions.

The remaining 78 (78.8%) mothers did not make suggestions because they were satisfied with the device.

Table 5 - Suggestions for improvements made by the postpartum women. Porto Alegre, RS, Brazil, 2018

Suggestions for improvements	**N**	**%**
Improvements in the bag where the NB is placed		
Bag size more suitable for newborns	2	9,5
Inner part of the bag more comfortable	1	4,7
Carrier bag in velvety fabric	1	4,7
Deeper bag for the RN	1	4,7
The device must allow that the newborn is placed in a semi-reclined position at 45 degrees	1	4,7
Infants must ride sitting in a semi-reclined position		
Front part of the bag made of hard material	1	4,7
System that allows the NB is more tightly secured in the bag	1	4,7
More comfortable fabric	1	4,7
Improvements in the tying of the device		
Allow the device to be tied at the height of the mother's neck	3	14,2
Adjust the fitting on the mother's neck	2	9,5
Two sites to tie the device on the mother's back	1	4,7
Tighter strings on the back of the mother	1	4,7
Improve the way of tying	1	4,7
Closing system not only with knots	1	4,7
Improvements in the adjustments of the strings		
More mobile and elastic strings	2	9,5
Thicker back string	1	4,7
Long strings to allow tying also in the front of the device	1	4,7

Source: the authors (2019).

Regarding complications during the transport from the UCO to the UIO, seven (7.1%) mothers reported having had complications associated with the wheelchair, such as: the wheelchair hit the door of the UIO/UCO. It also hit the lift door and lift wall. The wheelchair also rocked a lot inside the lift. The remaining 92 (92.9%) mothers reported that the transport had no complications.

Regarding the recommendation of the use of the baby carrier in other health institutions, 98 (99.1%) women said that they recommend it, and one of them (0.9) does not recommend it, claiming that it does not increase safety.

DISCUSSION

Almost all nursing technicians/assistants and postpartum women found that the baby carrier can prevent newborns from falling, providing greater safety for both the team and the mothers. The nursing team is primarily responsible for implementing safe practices in health care services and it is aware of the safety goals [11]. The development of care technology facilitates the team's work, as it streamlines processes, ensures greater precision and speed in actions, increasing the quality of care [12].

Some women found it difficult to put on and take off the carrier, as they themselves had to tie/untie the baby carrier on their bodies. It should be noted that this is a routine task of nursing technicians/assistants in health institutions. One difficulty mentioned by the professionals was the fact that the site (pocket) for the newborn is not compatible with the infant's size. In this regard, it should be said that the device was produced in three different sizes (small, medium and large), being suitable for all newborns. As for the removal of the NB from the device, a professional mentioned that she was helped by the mother, because the baby was very tightly secured. Thus, we can affirm that the choice of the size of the baby carrier, in both situations described, was not adequate.

It is essential to provide proper training on the use of the available resources, as an updated and well-trained team can make improvements to these devices [13]. The health institution where this study was conducted counts on a Risk Management Commission, which is responsible for coordinating patient safety through proactive actions related to risk situations and for promoting improvements after incident/event analysis [14].

Nurses must supervise care, since this can have a positive impact on care and on the recommendation of best practices by the nursing team [15].

Regarding the perception of nursing technicians/assistants and mothers about the use of the baby carrier, it most consider it a safety measure for newborns. No consensus has yet been reached on a program to prevent falls and there is no standardized tool to assess the risk of falls of newborns [16]. It is known that falls can cause serious injuries, as well as emotional damage to the newborn's parents [17,18]. Thus, investigating risk indicators for falls is important for the development of prevention plans and specific actions to minimize falls [4,19]. The positive evaluation of the baby carrier by the participants is an indication that the device keeps newborns safe during transport [17,18].

As for the level of satisfaction with the use of the baby carrier, it was rated 10 by most nursing technicians/assistants and postpartum women. The importance of the satisfaction of health professionals with the work process is well known, since when their expectations are met, these workers can provide better care [20].

However, suggestions for improvements were proposed, especially regarding the strings (straps) used in the tying of the baby carrier, indicating that improvement is needed. The suggestions made should be discussed in order to assess their relevance for the definition of improvements that can be implemented to improve the baby carrier. Although there were no adverse events for newborns during transport in baby carriers, this issue deserves attention, because this rare incident can cause damage. Therefore, an institution that is concerned with quality and emphasizes preventive actions and hence is recognized by society, should seek constant improvement of its material resources and work organization [3,5].

Regarding intercurrences during transport between the units, there was a contradiction between the participants. One possible explanation could be the fact that the nursing staff does not perceive a wheelchair hitting an object somewhere in the hospital as an incident. Complications during transport can pose significant risks, as there is a greater chance that falls of newborns happen in the first postpartum day due to maternal limitations [18].

Shared identification of risks can be considered the primary strategy for establishing a safety culture in the institution [21]. Managers and administrators should encourage healthcare professionals to report incidents related to patient safety, focusing on a culture of safety and non-punishment [6]. In this study, none of the incidents reported by the mothers during transportation resulted in damage to the mother-baby binomial. Moreover, there are no records of incidents during transport since the implementation of the baby carrier, which attests to the level of satisfaction with the usability of the device. A study that showed no harm to newborns after the implementation of risk prevention plans [16], and another study that reported a decrease in the incidence of falls after the adoption of preventive strategies corroborate the findings of the present study [22].

Institutional groups for discussing incidents and implementing new measures should be created [3]. There is a Patient Safety Center in the health institution where the present study was conducted. It is aimed to implement and manage quality and safety actions, collecting data that support the creation of quality processes and the mitigation of care risks. The actions developed by this Center corroborate the stipulations of Ordinance 529/2013, which established the National Patient Safety Program [2].

Only one nursing technician/assistant and one postpartum woman refused to recommend the use of the baby carrier in other institutions, because they believe the device is not yet entirely safe for the newborns. The referred health professional does not routinely participate in the transport of infants and mothers, as she performs her duties at the UCO. Therefore, this may represent a limitation to the recommendation. In contrast, all nursing technicians/ assistants at the UIO, and almost all the postpartum women, recommended the use of the baby carrier, which again demonstrates the approval of its usability. Achieving effective cultural changes requires the participation of team members in the various stages of these changes [16].

One limitation of the study is related to time, since the questionnaire was not always applied to the participants immediately after the use of the baby carrier. This may have resulted in loss of detailed information that could have been reported by the participants.

CONCLUSION

The use of the baby carrier received high ratings from the nursing technicians/ assistants and the postpartum women, achieving the desired results, as there have been no reports of falls in the transport of newborns since its implementation. There was a high degree of satisfaction with the device, and most participants think newborns are safe in the baby carrier. On the other hand, suggestions for improvements should be considered, especially with regard to the strings of the carrier.

Due to the absence of similar studies, further studies are needed on the topic of safety in the transport of neonates, so that other measures can be developed and implemented to prevent incidents.

The findings of this study may contribute to improvements in the baby carrier, which can also be implemented in other health institutions that provide care to newborns. These findings may also provide guidance for other studies on safety in the transport of newborn infants.

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Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - TAG
Drafting the work or revising it critically for important intellectual content - TAG, MSAMS, MGM
Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - HGG