Original Article

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☑ Knowledge translation and advances in health and nursing practices

Physiological evaluation of premature infants in traditional and humanized weighing: a quasi-experimental study

Avaliação fisiológica de prematuros na pesagem tradicional e humanizada: estudo quase-experimental

Evaluación fisiológica de prematuros en pesaje tradicional y humanizado: un estudio cuasi experimental

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ABSTRACT

Objective: To describe and compare the physiological signs presented by premature infants in traditional and humanized weighing.
Method: A quasi-experimental crossover study, with a sample of 30 premature infants randomly assigned and allocated to the control group (traditional) and the intervention group (humanized), from March 2019 to March 2020, with the collection of general data, vital signs before and after the procedures. Statistical analyses included description of relative and absolute frequencies, measure of central tendency and dispersion.
Results: Premature infants showed less increase in heart rate (53.3%) and respiratory rate (43%) in the verification of humanized weighing than in the traditional way, with 83.3% of neonates and 80%, respectively.
Conclusion: It was observed that the humanized form provided less physiological instability, especially in heart and respiratory rates, making it necessary to encourage discussions about the humanization of care and perform this practice routinely in health units.
Keywords: Infant, premature. Body weight. Body temperature. Humanization of assistance.

RESUMO

Objetivo: Descrever e comparar os sinais fisiológicos apresentados pelos prematuros na pesagem tradicional e humanizada.
Método: Estudo quase-experimental *crossover*, com amostra de 30 prematuros randomicamente assinalados e alocados no grupo controle (tradicional) e no grupo intervenção (humanizada),no período de março de 2019 a março de 2020, com a coleta de dados gerais, sinais vitais antes e depois dos procedimentos. As análises estatísticas incluíram descrição de frequências relativas e absolutas, medida de tendência central e de dispersão.
Resultados: Os prematuros apresentaram menos aumento na frequência cardíaca (53,3%) e respiratória (43%) na verificação da pesagem humanizada do que na tradicional, com 83,3% dos neonatos e 80%,respectivamente.
Conclusão: Observou-se que a forma humanizada proporcionou menos instabilidade fisiológica, principalmente nas frequências cardíaca e respiratória, tornando-se necessário estimular discussões sobre a humanização da assistência e realizar essa prática de forma rotineira nas unidades de saúde.
Palavras-chave: Recém-nascido prematuro. Peso corporal. Temperatura corporal. Humanização da assistência.

RESUMEN

Objetivo: Describir y comparar los signos fisiológicos que presentan los recién nacidos prematuros en pesaje tradicional y humanizado.
Método: Estudio cuasi-experimental *crossover*, con una muestra de 30 prematuros asignados al azar y asignados al grupo control (tradicional) y al grupo intervención (humanizado), desde marzo 2019 hasta marzo 2020, con la recolección de datos generales, signos vitales antes y después de los procedimientos. Los análisis estadísticos incluyeron descripción de frecuencias relativas y absolutas, medida de tendencia central y dispersión.
Resultados: Los prematuros mostraron menor aumento de la frecuencia cardiaca (53,3%) y respiratoria (43%) en pesaje humanizada que, en la forma tradicional, con un 83,3% de neonatos y un 80%, respectivamente.
Conclusión: Se observó que la forma humanizada proporcionó menos inestabilidad fisiológica, especialmente en las frecuencias cardíaca y respiratoria, siendo necesario estimular discusiones sobre la humanización del cuidado y realizar esa práctica de forma rutinaria en las unidades de salud.
Palabras clave: Recién nacido prematuro. Peso corporal. Temperatura corporal. Humanización de la atención.

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INTRODUCTION

Neonatal mortality generally reflects the socioeconomic and maternal health conditions of a population, as well as the quality of prenatal and childbirth care. Despite the decline from 26 to 16.7 newborns per thousand live births between 2000 and 2017, neonatal mortality, especially early (0-6 days), still represents a major concern for public health, due to the large percentage of preventable cases associated with sentinel events, which occur due to failures in neonatal care, and because they are associated with a higher prevalence of situations of neonatal severity[1,2].

The implementation of policies aimed at better quality in maternal and child health care contributed to this decline, such as the National Program for the Humanization of Delivery and Childbirth (*Programa Nacional de Humanização do Parto e Nascimento*) (2000) and Stork Network (*Rede Cegonha*) (2011)[3].

The Stork Network was a public policy that helped to achieve the goals proposed by the Millennium Development Goal (MDG). This strategy aimed to implement assistance to guarantee women's right to reproductive planning and humanized care during pregnancy, delivery, and the postpartum period. Furthermore, it ensured the right of children to a safe birth, healthy growth and development[4].

The decline in neonatal mortality was a priority of the goals established in the MDGs for 2015, in which it was a pact defined by the United Nations (UN) in order to reduce the world infant mortality rate by 2/3 of children under five years of age[5].

Currently, the reduction of neonatal mortality is a goal to be achieved in the Sustainable Development Goals (SDGs) by the year 2030. In this scenario, the monitoring of infant and neonatal mortality rates represents an opportunity to evaluate the levels of health and socioeconomic development of a given population and region[6].

Added to this, prematurity is considered one of the main causes of neonatal death, due to the physiological and metabolic immaturity that preterm newborns (PTNB) present. Thus, PTNB have a higher prevalence for the development of complications, such as changes in the respiratory system, hypothermia, hypoglycemia, and infections. In this sense, PTNB require increased multiprofessional and family care, since these complications can negatively influence the development of the newborn[7].

The Neonatal Intensive Care Unit (NICU) contributes to the survival of PTNB, through specialized assistance, in which advanced technologies are used that aim to maintain the physiological and behavioral development of the baby in the extrauterine environment. However, the use of invasive and painful approaches and intense manipulation with PTNB can contribute to an increase in their stress, consequently affecting their physiological signs[8].

For this, to reduce stress and changes in the physiological signs of newborns in the NICU, it is essential that professionals use humanized therapies during care, such as non-nutritive suction, skin-to-skin contact (kangaroo position), humanized bath and humanized weighing. In addition, they must keep control of environmental stimuli (noise, lighting and temperature) and reduce excessive manipulation to help the healthy development of PTNB[9].

In this sense, the Ministry of Health, through the Technical Manual of Humanized Care for the Newborn – Kangaroo Method (*Manual Técnico de Atenção Humanizada ao Recém-Nascido – Método Canguru*), recommends the use of the technique of humanized weighing in the NU, with the view to minimize the impacts on the physiological signs of PTNB. Such humanized actions help to prevent traumatic consequences to PTNB due to hospitalization, which can negatively influence the development and restoration of the newborn's physiological pattern[10].

In view of this, it is important for nurses to develop strategies aimed at humanizing PTNB care, aiming at individualized care and minimal manipulation. Humanized care is capable of minimizing the impacts of hospitalization, in addition to enabling the family to be integrated in the care for this PTNB[11].

However, humanized weighing is not a procedure performed frequently in the NU due to the lack of evidence on the benefits to the newborn, lack of training or because the procedure demands more time and attention from the professional. On the other hand, traditional weighing seems to be faster and more practical, but it can cause physiological and behavioral damage to babies[9].

From these perspectives and with the aim of evaluating the performance between the two techniques, based on the physiological differences presented by the PTNB, the study hypothesis was defined: the verification of traditional weighing in PTNB admitted to the NU provides more changes in the physiological signs in relation to humanized weighing.

The research aims to describe and compare the physiological signs presented by PTNB during the weighing checking in a traditional and humanized way.

The study is justified by the need to prevent the physiological changes that PTNB suffer when undergoing routine and painful procedures at the NU, which can cause physiological changes and, consequently, corroborate with damage to the PTNB due to body immaturity.

In this sense, weighing is one of the daily procedures necessary for the clinical evaluation of the newborn, however, there is still no knowledge about the impact that this

daily activity has on the physiological signs of newborns. This weighing can be performed in different ways and with different devices. In this study, we will approach two different weighing techniques, the traditional technique, which is the technique most commonly practiced in the routines of the NU, and the humanized technique, which is the technique recommended by the Low-Weight Newborn Care Policy: Kangaroo Method (*Política de Atenção ao Recém-Nascido de Baixo Peso: Método Canguru*)[10].

The theme of the study is relevant, as there is a scarcity of research that deals with changes in physiological signs in PTNB during qualified and humanized neonatal care. In this sense, there is a need to investigate new care strategies and elucidate the influence of weighing on the physiological stabilization of PTNB.

METHOD

This is a quantitative, quasi-experimental, crossover study conducted at the NU, which comprises the NICU and the Conventional Intermediate Care Unit (*Unidade de Cuidados Intermediários Convencionais* – UCINCo) of a university hospital in Rio de Janeiro.

A amostra por conveniência[12] consisted of PTNB who were hospitalized at the UCINCo and who met the inclusion and exclusion criteria. During the research period, we identified 40 eligible PTNB. After applying the inclusion and exclusion criteria, 10 were excluded, and 30 PTNB were selected to compose the study. The research inclusion criteria were gestational age (GA) less than 37 weeks; more than 96 hours of life; more than 24 hours of hospitalization, in order to minimize the stress caused by the need for multiple procedures, an interval of at least 1 hour from the diet and stable physiological parameters. Exclusion criteria were episode of vomiting or regurgitation within 24 hours of study participation; apnea less than 72 hours; use of oxygen therapy; having been submitted to painful procedures less than 1 hour; carrier of some congenital anomaly; having impairment on the Central Nervous System; and having injuries or bone fractures (Figure 1).

The PTNB were randomized and allocated to the control group (traditional) and the intervention group (humanized),

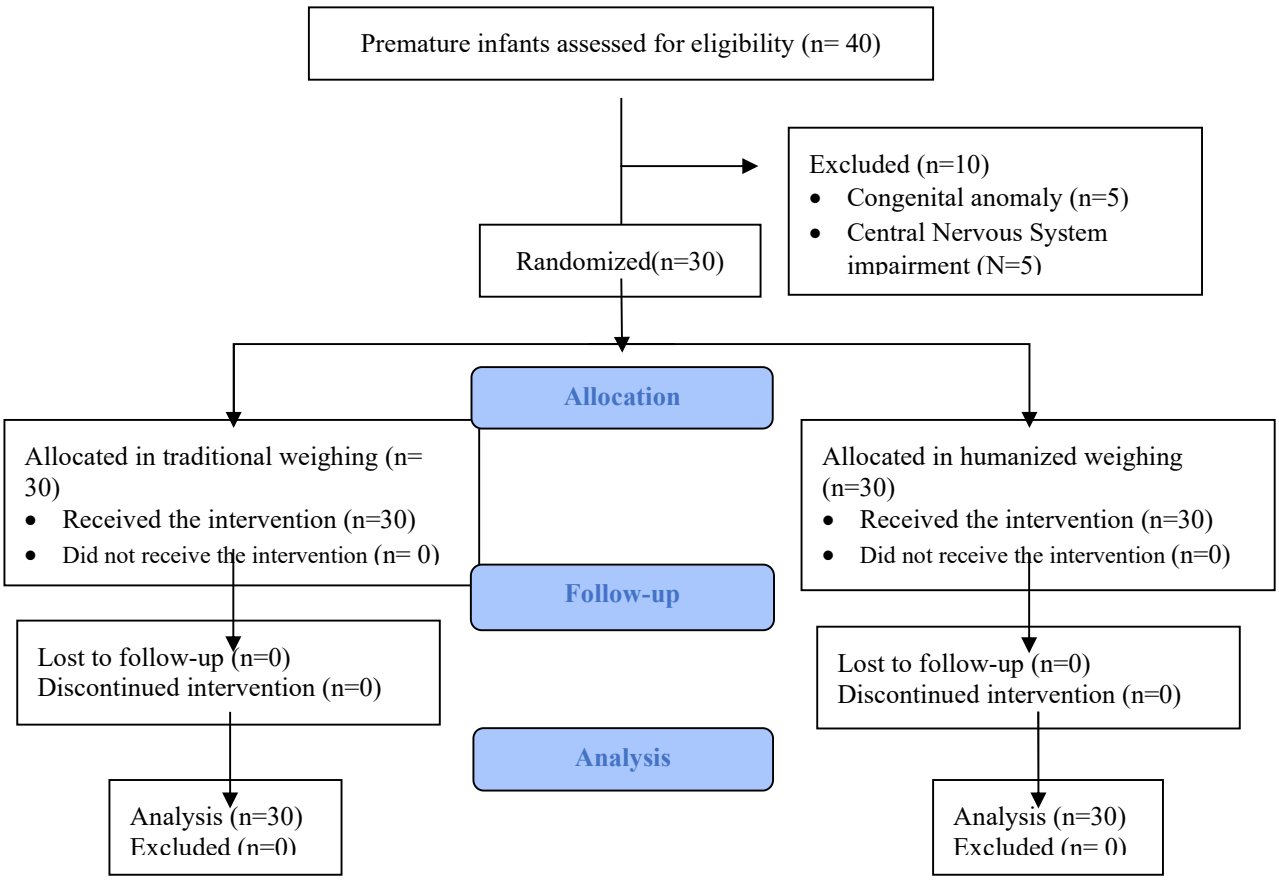

Figure 1 – Flowchart of sample tracking. Rio de Janeiro, Rio de Janeiro, Brazil, 2019-2020
Source: adapted according to CONSORT (http://www.consort-statement.org/consort-statement/flow-diagram).

from March 2019 to March 2020, after approval by the Research Ethics Committee of the Institution, according to Resolution No. 466/12 of the National Health Council of the Ministry of Health, approved by the Research Ethics Committee (REC) of the institution, under Opinion No.2,611,956. The established ethical precepts were respected ensuring the legitimacy of information, privacy and confidentiality of information.

The participants' guardians signed the Free Consent Form and the Authorization form for Use of Newborn Images.

The study submitted the PTNB to two types of weighing techniques (traditional and humanized), evaluating the influence of this practice on changes in physiological signs. All participants received, randomly, the two weighing techniques, being allocated in the control group, at the time of the traditional weighing, and in the intervention group during the verification of the weight in a humanized way. As it is a crossover study, the infant newborn was considered its own control, eliminating the variation between babies.

Due to the very nature of the interventions, it was not possible for the researchers to remain blind during data collection and image coding. The Consolidated Standards of Reporting Trials[10] (CONSORT) tool was used to assist in the reporting of the study.

Data collection was performed by record of general data of PTNB, vital signs before and after the procedures and filming. The weighing checking was performed at 7:30 am, before performing daily hygiene and feeding care of the PTNB, in order to reduce interference in the unit's routine. Initially, the observation form was filled out through the data collected from the patient's medical record before weighing checking. Then, vital signs were recorded before and after the procedure on the form.

The procedure was conducted by three neonatal nurses, researchers and trained for 30 days with a Kangaroo Method tutor, following guidelines of the Ministry of Health. Randomization was performed by an independent researcher, external to the research, through the website www.randomization.com. Subsequently, a randomization table was created, in blocks of individuals, with the permutation of the two weighing groups: traditional (control) and humanized (intervention). All PTNB received the two ways of weighing checking, traditional (control) and humanized (intervention), with the allocation order defined by randomization for the first day.

Then, the same external researcher proceeded to randomizing the weights for each PTNB in opaque, sequentially numbered, and sealed envelopes, confidentially until the time of collection. The weighing checking respected the minimum interval of 24 hours (washout) between the two techniques, thus avoiding the residual effect of one intervention on the other (carryover). To measure the body weight of all PTNB, it was used a digital pediatric scale, model BP Baby – brand Filizola™.

The traditional weighing procedure lasted approximately 2 minutes and was conducted with the PTNB undressed. Then, it was placed on the scale previously sanitized with 70% alcohol and covered with a paper towel, in which the weight value was determined at the moment of least movement of the newborn. After removing the baby from the scale, the nurse recorded the weight checked, discarded the paper towel, disinfected the scale again with 70% alcohol and then sanitized hands.

The procedure for weighing checking in a humanized way lasted approximately 1 minute, being conducted after disinfection of the scale with 70% alcohol. Thus, the cloth was weighed and, after obtaining the value, the scale was tared. Then, the PTNB was undressed and wrapped with the cloth and placed on the scale. After stabilization of their weight, the neonate was removed and the nurse recorded the verified weight, subtracting the cloth value, sanitized the scale plate again with 70% alcohol and sanitized hands.

The filiming of the weighings were made by a research assistant, duly trained, using a Samsung S8 cell phone (after being saved in the database, the videos were permanently excluded from the electronics). The cameraman presented an appropriate position so as not to disturb the path from the bed to the scale, catching full view of the newborn. The duration of filming was approximately 2 minutes.

The clinical variables evaluated in the study were: weighing time (minutes); gestational age (days); temperature (°C); heart rate (BPM); respiratory rate (BPM); and oxygen saturation (SPO_2).

Statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS) software, version 20.0 (IBM Corp, NY, United States), considering a significance level of 5%. Categorical variables were presented by means of frequencies (relative (n) and absolute (%)), and continuous variables, by means of central tendency (median) and dispersion (interquartile range (IR)) measures. To check the normality of continuous variables, the Shapiro-Wilk test was used. McNemar, Fridman and Wilcoxon's non-parametric hypothesis tests were used, all considering that the samples are paired, to investigate possible associations between clinical variables and the type of traditional and humanized weighing.

RESULTS

The results show that the time spent on weight checking in a humanized way was statistically shorter than in the traditional way (p-value = 0.01) (Table 1), as the newborn's body stability on the scale is eased by the postural organization

that the wrapping provides. This data corroborates the understanding of the other variables that were observed.

It can be identified, still in Table 1, that all clinical measurements were not different before weighing (p-value > 0.05), which guarantees that PTNB were under the same conditions before weighing (Table 1). As for the measurements after the weighing, the results showed that the median values of the respiratory rate of the traditional weighing (52 BPM, interquartile range= 49 BPM; 63.5 BPM) were statistically higher than the median values after the humanized weighing (Me = 50.5 BPM, interquartile range= 42.8 BPM; 56.3 BPM) (p-value = 0.04) (Table 1).

Regarding the differences between weighing, all the clinical measures evaluated were different (p-value < 0.05) (Table 2).

When comparing the clinical measurements of PTNB with the type of weighing in Table 3, we can see that 83.3% of PTNB showed an increase in heart rate after traditional weighing, against only 53.3% after humanized weighing (p-value = 0.02). In addition, it was possible to notice that 80% of PTNB increased their respiratory rate after traditional weighing and 43% of PTNB after humanized weighing (p-value = 0.03).

Regarding oxygen saturation, it is also noted in Table 3 that the variation in oxygen saturation was similar between weighing. Regarding the temperature variation of PTNB after weighing, 16 (56.3%) had a drop in temperature after traditional weighing, and in humanized weighing, 11 (36.7%) had a decrease in body temperature.

Table 1 – Distribution of clinical measurements of 30 premature infant newborns in each type of weighing. Rio de Janeiro, Rio de Janeiro, Brazil, 2022

Clinical measurements	Type of weighing						p-value[1]
	Traditional (n=30)			Humanized (n=30)			
	Median	Interquartile range 25 75		Median	Interquartile range		
Weighing time (seconds)	21.5	16.3	30	14	11.8	20	0.01*
CGI (days)	252	245.5	260	251	246	258	0.65
CGI	36	35	37	36	35	37	0.66
Temperature (ºC)	36.4	36.2	37	36.5	36.3	37	0.65
Before weighing							
Heart rate (BPM)	155.6	141	162	157	144	168.3	0.82
Respiratory rate (BPM)	48	42	56.3	49.5	43.8	62.5	0.37
Saturation (SPO2)	96	95	97.5	96	95	98.3	0.9
After weighing							
Heart rate (BPM)	162.5	156.7	180.8	162.5	149	165.5	0.06
Respiratory rate (BPM)	52	49	63.5	50.5	42.8	56.3	0.04*
Saturation (SPO2)	97	95.7	99.5	96	94.8	99	0.28

Source: the authors, 2022.
[1]p-value obtained through the Wilcoxon non-parametric test for dependent samples; *statistically significant values at significance level of 0.05.

Table 2 – Distribution of differences in clinical measurements before and after weighing the 30 premature infant newborns in each type of weighing. Rio de Janeiro, Rio de Janeiro, Brazil, 2022

Clinical measurements	Type of weighing						p-value*
	Traditional (n=30)			Humanized (n=30)			
	Median	Interquartile range		Median	Interquartile range		
Differences (before and after)							
Temperature (°C)	-0,1	-0.5	0	0	-0.3	0	0.01*
Heart rate (BPM)	16.5	5.5	23.7	2	-7.2	14	0.03*
Respiratory rate (BPM)	7	1.75	11	-0.5	-9.2	8.25	0.04*
Saturation (SPO_2)	0	-1	3	2	1	3	0.03*

Source: the authors, 2022.
*p-value obtained through the Wilcoxon non-parametric test for dependent samples;
*statistically significant values at significance level of 0.05.

Table 3 – Distribution of clinical measurements by type of weighing (N=30). Rio de Janeiro, Rio de Janeiro, Brazil, 2022

Clinical measurements	Type of weighing				p-value*
	Traditional (n=30)		Humanized (n=30)		
	N	%	N	%	
Temperature loss (°C)					
Yes	16	53.3	11	36.7	0.19
No	14	46.7	19	63.3	
Increased heart rate (BPM)					
Yes	25	83.3	16	53.3	0.02*
No	5	16.7	14	46.7	
Increased respiratory rate (BPM)					
Yes	24	80	13	43.3	0.03*
No	6	20	17	56.7	
Decreased saturation (SPO2)					
Yes	11	36.7	12	40	0.78
No	19	63.3	18	60	

Source: the authors, 2022.
*p-value obtained using McNemar's nonparametric test for dependent samples;

DISCUSSION

The comparative evaluation of variations in body temperature, heart rate, respiratory rate, and oxygen saturation before and after the traditional and humanized weighing of PTNB admitted to a NU was conducted in the morning, before performing daily care.

It is understood that weighing is a routine procedure that can cause daily harm to PTNB and, therefore, the evaluation of physiological signs during the two ways of weighing was necessary to avoid future complications for the health of newborns.

When evaluating the vital parameters after each weighing, it was noticed that there was a significant increase in the heart rate of premature newborns (83.3%) after traditional weighing, against only 53.3% in humanized weighing. A similar result was found in a study that evaluated heart rate during the traditional bathtub bath in PTNB, showing that the increase in this vital sign may be associated with signs of stress and excessive handling, procedures that generate pain and noise[13].

On the other hand, two studies found a tendency to decreased heart rate of neonates when submitted to humanized procedures, such as a curled or humanized bath and hydrotherapy. Heated water is capable of decreasing stress-related hormone levels, in addition to reducing the sensory stimuli of premature infants, keeping heart rate parameters in the normal range[13,14].

When comparing the respiratory rate relationship, it was evidenced that 24 (80%) of the PTNB had an increase in respiratory rate after traditional weighing, and 13 (43.3%) had an increase in this parameter after humanized weighing, with a statistically significant difference. This may be related to the decreased muscle tone of PTNB, as they are susceptible to involuntary movements that can be spared by wrapping in humanized weighing, reducing the physiological variation[15].

In this same perspective, a systematic review of 6 articles observed positive effects of the physiological parameters of heart rate, respiratory rate, oxygen saturation of infant newborns snuggled in a baby hammock[16].

On the other hand, the immersion bath in premature infants triggers an increase in respiratory rate, which can be caused by the development of stressing signs and respiratory effort to compensate for the loss of temperature[17].

As for oxygen saturation, it was found that the variation of this vital sign was the same in both weighing. However, a study demonstrates that there is an increase in oxygen saturation in PTNB after the bath in relation to the immersion bath in the bathtub. The study also shows that the effect of water increases blood flow in the alveoli, due to the hydrostatic pressure in which helps gas exchange[14].

The findings of the study showed that there was no statistical significance in the temperature parameter (p-value = 0.19), despite the difference in this vital sign between weighing, with greater thermal loss in traditional weighing than in humanized weighing. In the same sense, a study conducted with 30 premature infant newborns showed that the immersion bath in a bathtub favors neonatal hypothermia. On the other hand, the humanized bath does not cause losses or gains in temperature[9].

Hypothermia is more common in PTNB than in full-term newborns, due to the inability to maintain stable body temperature, as they have reduced brown fat, low body mass index and difficulty in maintaining flexion of the extremities. In this sense, studies indicate that temperature values below 36.5°C are considered hypothermia, which may be associated with the evaporation of moisture from the skin, which occurs when PTNB are exposed to cold[18,19].

Thus, the present study identified an increase in temperature and saturation variables in humanized weighing, indicating that this procedure may favor positive effects in premature newborns. On the other hand, the study found an increase in heart and respiratory rate in the same PTNB, when submitted to traditional weighing, indicating greater demand and energy expenditure to perform this procedure.

As limitation of the study points out the lack of published research related to the theme. This reality refers to the need to show to the scientific community the importance of developing studies in the area of humanization of care. Another limiting factor is the fact that it was conducted in only one center, and there may be variations in results in other realities. However, we can consider this research as a pilot that can be replicated in other realities, in order to search for more generalizable data. One possible limitation was the difficulty of calculating a randomized sample, since the study setting is a unit with a variable flow of hospitalization of participants. It is believed that the present study adopted the necessary procedures to reduce the possibilities of bias, such as the adoption of a trained team, according to the ministerial protocols. Also, as it is a sample consisted of PTNB who participated in the two proposed interventions, it is expected that it will contribute to the reduction of the possibilities of bias.

CONCLUSION

The present study comparatively evaluated variations in body temperature, heart rate, respiratory rate, and oxygen saturation before and after traditional and humanized weighing of PTNB admitted to a NICU. It was observed that, in the humanized weighing procedure, there were fewer changes in the respiratory, heart rates and temperature of PTNB than in the traditional way. As for oxygen saturation, it was found that the variation of this vital sign was the same in both weighing.

This study suggests that the weighing checking in a humanized way be adopted as a routine measure to reduce the impacts of the environment on the physiological signs of the PTNB during hospitalization.

Contributions and innovations for teaching, research, management and/or assistance in nursing and health

The proposed study can contribute to teaching, as it allows reflection and knowledge to academics, residents and graduate students about the importance of humanizing care to reduce negative impacts on PTNB.

In research, it represents the possibility of producing knowledge, contributing to future studies and expanding debates that value humanized procedures and respectful care for PTNB and their families.

Therefore, it is expected that the results of this study will allow the implementation of care protocols to provide adequate care with the objective of minimizing the physiological damage to the infant newborn during neonatal hospitalization.

REFERENCES

1. França KEX, Vilela MBR, Frias PG, Chaves MA, Sarinho SW. Near miss neonatal em hospitais de referência para gestação e parto de alto risco: estudo transversal. Cad Saude Publica. 2021;37(6):1-13. doi: https://doi.org/10.1590/0102-311X00196220.
2. Passos BCM, Pimenta LT, Silva MA, Carvalho TV, Vieira TLB, Dias SB, et al. Perfil das causas básicas de mortalidade neonatal no Brasil, período 2008-2013: revisão integrativa. J Nurs Health Sci. 2021[cited 2022 May 20];10(1):41-7. Available from: https://www.iosrjournals.org/iosr-jnhs/papers/vol10-issue1/Ser-1/G1001014147.pdf.
3. Prezotto KH, Oliveira RR, Pelloso SM, Fernandes CAM. Trend of preventable neonatal mortality in the States of Brazil. Rev Bras Saúde Mater Infant. 2021;21(1):301-9. doi: https://doi.org/10.1590/1806-93042021000100015.
4. Pereira FZ, Araújo AG, Santos AM, Silva LMN, Oliveira LPL, Lopes PV, et al. Mortalidade infantil e sua relação com as políticas públicas em saúde sob o olhar dos objetivos de desenvolvimento do milênio e objetivos de desenvolvimento sustentável no Estado de Goiás. Braz J Health Rev. 2021;4(1):3331-48. doi: https://doi.org/10.34119/bjhrv4n1-262.
5. Ferreira VA, Monteiro DAT, Garcia LAA, Camargo FC, Contim D, Amaral JB. Evolution of the completeness of information on neonatal mortality in Minas Gerais. Rev Enferm Atenção Saúde. 2019;8(2):61-73. doi: https://doi.org/10.18554/reas.v8i2.3734.
6. United Nations Children's Fund. Levels and trends in child mortality: report 2021 [Internet]. New York: UNICEF; 2021 [cited 2022 May 20]. Available from: https://cdn.who.int/media/docs/default-source/mca-documents/rmncah/unicef-2021-child-mortality-report.pdf?sfvrsn=7bbacc7d_1&download=true.
7. Almeida AHV, Gama SGN, Costa MCO, Carmo CN, Pacheco VE, Martinelli KG, et al. Prematuridade e gravidez na adolescência no Brasil, 2011-2012. Cad Saude Publica. 2020;36(12):00145919. doi: https://doi.org/10.1590/0102-311X00145919.
8. Rocha ECS, Silva LA, Araújo MC, Avezedo SS, Marinho MFJ. Acute painful procedures pain in the preterm newborn in a neonatal unit. Rev Enferm UERJ. 2019;27:e42849 doi: https://doi.org/10.12957/reuerj.2019.42849.
9. Araújo BBM, Martins TAS, Miranda AFR, Morais AS, Mesquita BC, Souza VAG. Physiological evaluation of premature neonates submitted to bath and humanized bath. R Pesq Cuid Fundam. 2021;13:925-9. doi: https://doi.org/10.9789/2175-5361.rpcfo.v13.9643.
10. Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Departamento de Ações Programáticas Estratégicas. Atenção humanizada ao recém-nascido: Método Canguru: manual técnico [Internet]. 3. ed. Brasília, DF: Ministério da Saúde; 2017 [cited 2022 May 20]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/atencao_humanizada_metodo_canguru_manual_3ed.pdf.
11. Silveira Filho CCZ, Silveira MDA, Silva JC. Estratégias do enfermeiro intensivista neonatal frente à humanização do cuidado. CuidArte Enferm. 2019 [cited 2022 May 20];13(2):180-5. Available from: http://www.webfipa.net/facfipa/ner/sumarios/cuidarte/2019v2/180.pdf.
12. Cochran WG. Sampling techniques. 3. ed. New York: John Willey; 1977.
13. Ceylan SS, Bolışık B. Effects of swaddled and sponge bathing methods on signs of stress and pain in premature newborns: implications for evidence-based practice.Worldviews Evid Based Nurs. 2018;15(4):296-303. doi:https://doi.org/10.1111/wvn.12299.
14. Alves MV, Cantalice ASC, Azevedo EB, Silva HMFA, Barbosa JCG. Comparação do ofurô com o banho de higiene após procedimentos invasivos. Res Soc Dev. 2020;9(10):e7189108882. doi: https://doi.org/10.33448/rsd-v9i10.8882.
15. Vasconcelos JH, Freitas SS, Furtado ECS, Sampaio TL, Sousa RCS, Aquino GLB, et al. Efeitos do posicionamento terapêutico na função respiratória em neonatos prematuros: revisão. Braz J Dev. 2022;8(4):24885-93. doi: https://doi.org/10.34117/bjdv8n4-146.
16. Menger JL, Malfado LR, Schiwe D, Schaan CW, Heinzmann-Filho JP. Effects of hammock positioning on clinical parameters in preterm infants admitted to a neonatal intensive care unit: a systematic review. Rev Paul Pediatr. 2021;39:e2019399. doi: https://doi.org/10.1590/1984-0462/2021/39/2019399.
17. Costa AQ, Reis CSC, Alves AMA, Sá Neto JA. Efeitos do banho de imersão para a termorregulação do recém-nascido prematuro. Enferm Obst. 2017 [cited 2022 May 20];4:e64. Available from: http://www.enfo.com.br/ojs/index.php/EnfObst/article/view/64.
18. Freitas P, Munhoz MMB, Costa P, Kimura AF. Effect of two immersion bathing techniques on the axillary temperature of preterm newborns: a pilot study. Texto Contexto Enferm. 2018;27(1):e0580016. doi: https://doi.org/10.1590/0104-070720180000580016.
19. França DCA, Silva BL, Santos TTM, Nascimento WG, Rocha GCBS, Melo PYB. Thermoregulation in the newborn: an integrative review in the literature. Saúde Colet. 2021;11(60):4625-9. doi: https://doi.org/10.36489/saudecoletiva.2021v11i60p4620-4629.

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