Father newborn skin-to-skin wheelchair transfer from delivery room to neonatal care unit: Possible change in practices

L.M. Bodet, M. Danielo, J.C. Rozé, C. Flamant, J.B. Muller

Father newborn skin-to-skin wheelchair transfer from delivery room to neonatal care unit: possible change in practices

Short title: Father newborn skin-to-skin wheelchair transfer

L.-M. Bodet[a*], M. Danielo[b], J.-C. Rozé [a], C. Flamant[a], J.-B. Muller[a]

[a] Pediatric and neonatal intensive care unit, Nantes University Hospital, 44000 Nantes, France

[b] Maternity, Ancenis Hospital, 44156 Ancenis, France

***Corresponding author:**

Dr. Louis-Marie BODET, Pediatric and neonatal intensive care unit, Nantes University Hospital, 44000 Nantes, France, 38 bld Jean Monnet, 44093 Nantes Cedex 1, France

E-mail: louismarie.bodet@chu-nantes.fr

Tel : +33244768320

Abstract

Objective: To evaluate the transfer of newborns from the delivery room to the neonatal care unit with their fathers on wheelchairs in terms of the safety of the procedure and paternal anxiety.

Methods: A prospective observational single-center before-and-after pilot study was conducted from February to May 2018 at the University Maternity Hospital of Nantes. Safe

transfer was judged on the basis of episodes of hypothermia or hypoglycemia. Paternal anxiety was assessed with the State–Trait Anxiety Inventory (STAI) scale after newborn transfer.

Results: Overall, 70 preterm newborns were enrolled, 44 were carried in wheelchairs in the father's arms (target group) and 26 were transferred in an incubator (control group). After adjusting for gestational age and birthweight, there were no statistically significantly differences between the target and the control group in the rates of hypothermia (43.9% vs 30.8%, p=0,59) and hypoglycemia (9.52% vs 19.23%, p=0,19). The STAI scale score was not significantly different between groups after incubator transfer or wheelchair transfer, at 35 ± 8.2 and 38 ± 10.2, respectively (p=0.07).

Conclusion: Transferring a newborn to the neonatal care unit via wheelchair with the father is a safe alternative to incubator transfer.

Keywords: Fathers, newborn, anxiety, skin-to-skin transfer

1. Introduction

Inborn hospitalized newborns are usually separated from their mother and quickly transported in an incubator to a neonatal care unit. While immediate postnatal incubator transfer ensures thermal stability, it may cause vibrations increasing the neonate's blood pressure. Hake-Brooks and Anderson even reported an increased risk of intraventricular hemorrhage [1]. Bystrova demonstrated that during the first 2 h after birth, mother–newborn contact constitutes a sensitive period. Maternal sensitivity and dyad interaction at 1 year of age is enhanced [2]. Nevertheless, even though mothers are monitored in the delivery room, there are some situations, such as respiratory distress or risk of hypoglycemia, that require urgent hospitalization of the newborn after birth, .

The first objective of the present study was to assess the safety of transferring the newborn from the delivery room to the neonatal care unit with the father via wheelchair. The secondary objective was to assess paternal anxiety and delay between birth and the first skin-to-skin (STS) contact with the father in the neonatal care unit.

2. Materials and methods

2.1 Study design

From February to May 2018, an observational study on changes in practice was carried out at the University Hospital of Nantes. During the first study period from February 1 to 28, newborns were transferred to the neonatal care unit in a NITE Mediprema incubator (incubator group). During the second period, from March to May, 2018, STS transfer with the father in a wheelchair was proposed (father group). All neonates born in Nantes during these two periods were included in the study. Newborns whose fathers did not speak French were excluded, as were newborns hospitalized in the kangaroo unit transferred secondarily with their mother and newborns whose wheelchair transfer was not suggested by the pediatrician.

2.2 Data collection

Data were collected prospectively: perinatal, neonatal, and physiological data at the time of admission (admission delay, body temperature, blood glycemia, heart rate, respiratory rate, oxygen saturation, blood pressure [BP], and ventilation support).

Hypothermia was defined as an axillary temperature below 36.0°C according to the World Health Organization (WHO) recommendations [3]. Blood glucose levels below 2.6 mmol/L (0.47 g/L) defined hypoglycemia [4].

2.3 Main evaluation criteria

The safety of wheelchair transfer with the father was defined by the absence of increased episodes of hypothermia and hypoglycemia.

2.4 Secondary evaluation criteria

Father anxiety was explored after transfer with the State–Trait Anxiety Inventory-State subscale (STAI-Y A) questionnaire. STAI-Y A includes 20 items that explore "right now feeling." A cut-off score of ≥ 45 define a clinical anxiety state. The French adaptation of the questionnaire was validated by Bruchon-Schweitzer and Paulhan [5]. Delay between birth and the father's first STS contact in the neonatal care unit was recorded.

2.5 Intervention

During the first period, newborns were transferred conventionally in an incubator, with ventilation by a controlled pressure insufflator (Neopuff® Fischer & Paykel) if necessary and they were checked via multiparametric cardiorespiratory monitoring (Intellivue X2, Philips). During the second period, the newborn and father were seated in a home-designed wheelchair either in an STS kangaroo position or directly in the arm. An additional blanket was placed on the father and newborn during transfer to prevent hypothermia (**Figures 1 and 2**).

The wheelchair is equipped with a controlled pressure insufflator (Inspire rPAP® Eurocare) and the same monitoring unit. The device was presented to the medical team through video-learning and the installation was explained to nurses during two practical sessions.

2.6 Statistical analysis

Statistical analyses were performed using STATA 11 software (StataCorp, College Station, TX, USA). A descriptive analysis of the population was carried out. Mean, median, and

standard deviation values are used to describe quantitative variables. Qualitative variables are described as percentages with their 95% confidence interval.

The Student test for quantitative variables and the chi-square test for qualitative variables were run. Logistic regression was performed using multivariate analyses. Statistical significance was set at $p<0.05$.

2.6 Ethics

The transfer of newborns via STS contact with the father in a wheelchair has been common practice in our unit for many years. This transfer was possible after the parents gave their authorization for care. Taking into account that parents signed authorization for care and for medical clinical research in our unit, patient participation was not subject to specific consent.

3. Results

In the first phase of the study, 26 out of 306 neonates born at Nantes University Hospital met the inclusion criteria. During the second phase, 86 of 961 newborns were eligible. Among 86 eligible newborns, 42 were not included: in 10 cases the father was absent, two fathers refused, and 30 wheelchair transfers were not proposed by the nightshift team. Finally, 70 newborns were included in the analysis, 26 in the incubator group and 44 in the father group (**Figure 3**).

The characteristics of the two groups are presented in **Table 1**. In the father group, the newborns had a lower gestational age, lower birthweight, and received more ventilatory support.

3.1 Wheelchair transfer with fathers and physiological response

Table 2 presents the physiological parameters of newborns on admission to the neonatal care unit. There was no significant difference between the two groups in terms of the occurrence of hypothermia or hypoglycemia, and also no differences in the time delay for admission to the neonatal care unit. Wheelchair transfer did not increase fathers' S-anxiety score and was not statistically significant after adjusting for gestational age and father age (p=0.09). Father STS contact within 24 h of life occurred more frequently in the father group (63% vs. 27%; p=0.004).

4. Discussion

In our maternity ward, the set-up of wheelchair transfer of newborns with their father from the delivery room to the neonatal unit seems safe. Furthermore, father STS contact within 24 h of life occurs more frequently with wheelchair transfer than with incubator transfer.

To our knowledge, no study has assessed the feasibility of STS transfer of unstable newborns from the delivery room to the neonatal care unit. Our results support previous data from Sontheimer et al. about the safety of later inter-hospital STS transfer of preterm newborns. In their study, transport during hospitalization ensured the stability of physiological parameters but also promoted the mother–infant relationship and early father–infant interactions [6]. The initial risk of hypoglycemia and hypothermia depends on the time delay in admission to the neonatal intensive care unit [7]. Here, after a brief training of the care team, the admission delay in wheelchair transfer with the father did not increase. The incidence of hypoglycemia was similar in the two groups (44% vs. 31%; p=0.28), close to the rate reported in the literature [8]. In contrast to previous studies, we did not observe an increase in the number of hypothermia cases in the father group. Indeed, in a late preterm newborn population, Walsh et al. observed at 1 h of life, after vaginal birth, an increase in hypothermia burden (28.6%) in newborns with STS contact compared to newborns in incubators (4.3%); however, there were

no details reported on admission delay to the neonatal intensive care unit [9]. In an open interview after STS transport during hospitalization , parents reported feeling important in their role as parent when an uninterrupted closeness chain was proposed [10].

Some limitations in our study should be mentioned, such as missing data on the reasons for refusing to participate in the study. Comfort was not assessed, although it is known that STS set-ups can be uncomfortable. In the same way, despite cardiorespiratory monitoring, data on severe adverse events were not collected [11]. Finally, the father group comprised more at-risk preterm newborns. Since these newborns are cared for by experienced senior staff, this reassuring presence may have constituted a bias. Nevertheless, the more at-risk newborns in the father group did not experience a higher number of adverse events, thereby emphasizing the safety of wheelchair transfer.

5. Conclusion

Transfer of newborns to a neonatal care unit with their fathers carrying them in a wheelchair seems to be a safe alternative to incubator transfer. These initial results should be confirmed in a study with a larger group of newborns as well as a long-term assessment of father–infant interactions.

Conflict of interest: None

Acknowledgments:

We would like to thank M. Hubert Flannagan for the translation.

We thank Soline's parents for the photograph.

References

1. Hake-Brooks SJ, Anderson GC. Kangaroo care and breastfeeding of mother-preterm infant dyads 0-18 months: a randomized, controlled trial. Neonatal Netw 2008;27:151-9.
2. Bystrova K, Ivanova V, Edhborg M, et al. Early contact versus separation: effects on mother-infant interaction one year later. Birth 2009;36:97–109.
3. World Health Organization. Maternal and Newborn Health/Safe Motherhood. Thermal protection of the newborn : a practical guide. Geneva, World Health Organization. 1997. https://apps.who.int/iris/handle/10665/63986
4. Harris DL, Weston PJ, Harding JE. Incidence of neonatal hypoglycemia in babies identified as at risk. J Pediatr 2012;161:787-91
5. Spielberger CD. Inventaire d'anxiété État-Trait: Forme Y. Paris: ECPA, les Éditions du centre de psychologie appliquée; 1993.
6. Sontheimer D, Fischer CB, Buch KE. Kangaroo transport instead of incubator transport. Pediatrics 2004;113:920-3.
7. Lambeth TM, Rojas MA, Holmes AP, Dail RB. First Golden Hour of Life: A Quality Improvement Initiative. Adv Neonatal Care 2016;16:264-72.
8. Mitchell NA, Grimbly C, Rosolowsky ET, et al. Incidence and Risk Factors for Hypoglycemia During Fetal-to-Neonatal Transition in Premature Infants. Front Pediatr 2020;8:34.
9. Walsh RS, Payne A, Cossler NJ, et al. Safety of immediate skin-to-skin contact after vaginal birth in vigorous late preterm neonates - A pilot study. J Neonatal Perinatal Med 2021;14:95-100.
10. Lundqvist P, Jakobsson U, Terp K, et al. Kangaroo position during neonatal ground ambulance transport: Parents' experiences. Nurs Crit Care 2021 Jul 7. doi: 10.1111/nicc.12681. Epub ahead of print.
11. Bohnhorst B, Gill D, Dördelmann M, et al. Bradycardia and desaturation during skin-to-skin care: no relationship to hyperthermia. J Pediatr 2004;145:499-502.

Tables:

Table 1. Study population characteristics

Table 2. Physiological parameters and STAI

Figures:

Figure 1: Wheelchair equipped with a pressure-controlled insufflator (Inspire rPAP® Eurocare) and multiparameter cardiorespiratory monitoring (Philips Intellivue X2)

Figure 2: Wheelchair transfer of newborn with the father

Figure 3: Flowchart

KU: kangaroo unit; NICU: neonatal intensive care unit; ED: emergency department; H2: 2 h


BOITE
LARYNGO

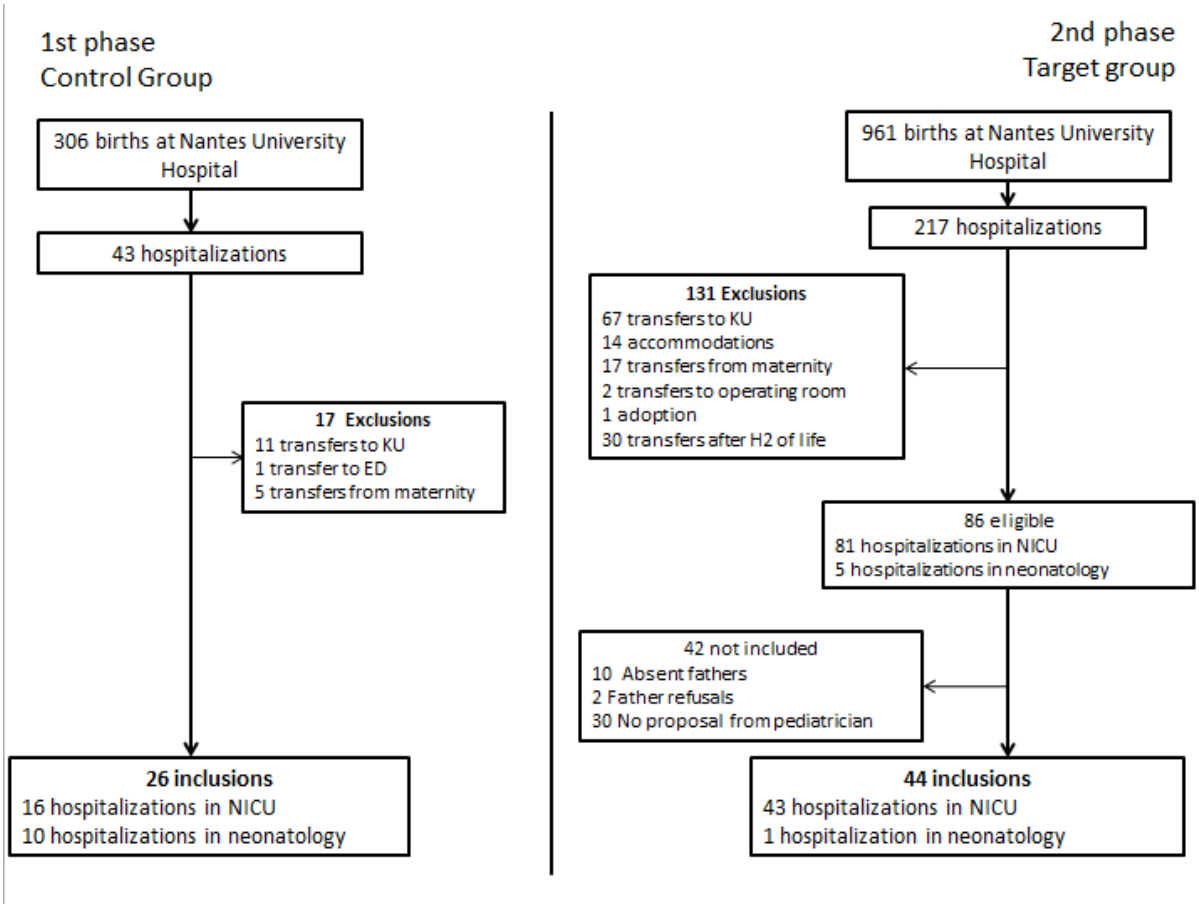
1st phase
Control Group
306 births at Nantes University Hospital
43 hospitalizations
17 Exclusions
11 transfers to KU
1 transfer to ED
5 transfers from maternity
26 inclusions
16 hospitalizations in NICU
10 hospitalizations in neonatology
2nd phase
Target group
961 births at Nantes University Hospital
217 hospitalizations
131 Exclusions
67 transfers to KU
14 accommodations
17 transfers from maternity
2 transfers to operating room
1 adoption
30 transfers after H2 of life
86 eligible
81 hospitalizations in NICU
5 hospitalizations in neonatology
42 not included
10 Absent fathers
2 Father refusals
30 No proposal from pediatrician
44 inclusions
43 hospitalizations in NICU
1 hospitalization in neonatology

Table 1. Study population characteristics

Characteristics	Classification	Incubator group (*n*=26) *n (%)*/M ± SD	Father group (*n*=44) *n (%)*/M ± SD	*p*
Sex	Boy	5 (57.69)	25 (56.82)	0.94
	Girl	11 (42.31)	19 (43.18)	
GA (weeks)		35.9 ± 4.35	33.2 ± 3.55	0.006
Birth weight (g)		2478 ± 1069	1836 ± 820	0.006
Arterial cord pH		7.19	7.27	0.001
Apgar M1	≥8	20 (76.92)	24 (60)	0.08
	4-7	3 (11.54)	14 (35)	
	<4	3 (11.54)	2 (5)	
Apgar M5	≥8	17 (65.38)	39 (90.7)	0.02
	4-7	7 (26.92)	4 (9.3)	
	<4	2 (7.69)	0 (0)	
Hospital unit	Neonatology	10(38.47)	1(2.27)	0.0001
	NICU	16(61.53)	43(97.73)	
Transport ventilation	None	18 (61.54)	9 (20.45)	0.0001
	CPAP	5 (19.23)	31 (70.45)	
	Invasive ventilation	3 (11.54)	4 (9.09)	
FiO_2 during transport		0.27 ± 0.17	0.25 ± 0.11	0.5902
Ventilation in the unit	None	15 (57.7)	10 (22.73)	0.0001
	CPAP	1 (3.85)	30 (68.18)	

Invasive ventilation	10 (38.46)	4 (9.09)

CPAP: continuous positive airway pressure; GA: gestational age; M1/M5: first minute/fifth minute; NICU: neonatal intensive care unit; SD: standard deviation

Table 2. Physiological parameters and STAI

		Incubator group (*n*=26)	Father group (*n*=44)	
		***n* (%)/M ± SD**	***n* (%)/M ± SD**	*p*
Physiological parameters at time of admission				
	Admission delay (min)	54 ± 42.11	49 ± 29.45	0.57
	Body temperature (°c)	36.5 ± 0.67	36.9 ± 0.67	0.01
	Hypothermia < 36°c	5 (19.23)	4 (9.52)	0.25
	Blood glycemia (mmol/L)	3.8 ± 1.68	3.1 ± 1.46	0.07
	Hypoglycemia < 2.6 mmol/L	8 (30.8)	18 (43.9)	0.28
	HR (bpm)	142 ± 15.9	158 ± 20.3	0.001
	RR (min)	47 ± 17.5	45 ± 14.76	0.65
	Oxygen saturation (%)	94 ± 19.28	97 ± 3.36	0.33
	Systolic BP (mmHg)	75 ± 13.76	69 ± 10.78	0.11
	Diastolic BP (mmHg)	46 ± 13.22	40 ± 10.58	0.11
STAI and date of fist skin-to-skin contact				
	1^{st} skin-to-skin			0.004
	<24 h	7 (27)	25 (63)	
	<48 h	5 (19)	10 (25.00)	
	<72 h	14 (54)	5 (12)	
	STAI at D0	35 ± 8. 2	38.0 ± 10. 2	0.07
	STAI at D0 $\geq$ 45	7(27)	14(32)	0.66

STAI: State–Trait Anxiety Inventory; BP: blood pressure; HR: heart rate; RR: respiratory rate; bpm: beats per minute