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# Fathers' Stress in a Neonatal Intensive Care Unit

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## ABSTRACT

**Background:** Healthcare professionals in neonatal intensive care units (NICUs) tend to focus attention on the mothers and the newborn infants. Thus, fathers may find it difficult to establish an optimal father–child relationship and their stress may increase and persist during hospitalization.

**Purpose:** To investigate the impact of a more father-friendly NICU on paternal stress and their participation in childcare.

**Methods:** A quasiexperimental design was conducted on Danish-speaking fathers of newborn infants 28 or more weeks' gestational age. The Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU) was used to measure paternal perceptions of stressors. Paternal participation in childcare was measured using 7 additional items. The questionnaires were distributed on admission to the NICU, at the 14th day of hospitalization, and at the time of discharge. The primary outcome was the difference in the PSS:NICU overall stress score on admission to the NICU and at the time of discharge in the control group compared with the intervention group.

**Results:** A total of 109 fathers were included. The overall PSS:NICU stress score increased after the intervention. Paternal involvement, staff expectations, and the social expectation to fulfill the traditional role of a breadwinner and additionally of a caregiver may have caused increased stress.

**Implications for Practice:** Healthcare professionals must be aware of the father's need to be an equal coparent. Nurses, as key persons, should motivate and expect fathers to be involved, and support them to establish a father–child relationship, although they might become more stressed.

**Implications for Research:** More adequate outcome measures are needed to determine the effect of interventions on paternal stress.

**Key Words:** father, infant bonding, intervention, NICU, parenting, paternal involvement, stress

An early parent–child relationship is important for a child's development, both intellectually and socially.<sup>1-3</sup> When preterm or ill newborn infants are admitted to a neonatal intensive care unit (NICU), the preconditions for the parent–child attachment process is not optimal, as the parents are

often anxious about their child's health, and are worried about the whole family situation.<sup>2</sup>

When parents are involved in childcare at the NICU, there is a significant reduction in infant admission time by 5.3 days.<sup>4,5</sup> Similarly, the frequency of visits by fathers, and their involvement in the care of their children, has shown to have a positive effect on infant weight and social development both during hospitalization and after 8 and 18 months.<sup>6</sup>

Traditionally, healthcare professionals pay the most attention to the newborn infants and their mothers, despite the fathers' desire to be equal partners in childcare.<sup>7</sup> Fathers often find it difficult to establish an optimal father–child relationship, and several studies have identified elevated stress levels among parents with infants admitted to the NICU. Parents experienced the following situations as stressful: the appearance and behavior of their premature or ill infants, the parenting of sick infants, the unknown routines of the NICU, and the relationships and collaboration with the staff.<sup>8</sup> As with mothers, fathers experience fear, anger, and guilt, and their self-reported stress persists during the infants' hospitalization.<sup>9,10</sup>

Research has shown that one-third of fathers experience depressive symptoms, lasting up to 35 days following the birth of their child or

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children<sup>11</sup>; a Danish study found that 7% of new fathers were diagnosed with depression, as compared with 10% to 14% of mothers.<sup>12</sup>

The emotional distress from having an infant hospitalized at the NICU may develop into posttraumatic stress syndrome. Parents of infants in the NICU have a higher incidence of posttraumatic stress syndrome compared with parents of “healthy” infants, which has been shown to affect parental ability to establish a parent–child relationship.<sup>13–18</sup>

Various interventional programs (eg, individual support, education, and communication) have investigated how to reduce parental stress levels with different outcomes.<sup>19–31</sup> For example, a 5-step individualized intervention program delivered by a psychologist<sup>23</sup> and nurse–parent dialogues using semistructured reflection sheets and person-centered communication<sup>30</sup> did not have any effect on paternal stress. In contrast, fathers benefitted from a 2-stage family support program including information regarding the NICU, face-to-face training sessions, psychological training, and sharing experiences with other parents.<sup>20</sup> Contrary to what was expected, a Norwegian randomized controlled trial found that paternal stress increased in parallel with paternal involvement in the intervention.<sup>28</sup> Other studies indicated that fathers require different interventions from mothers and that it is important to find out how fathers can be involved.<sup>25,26,28</sup> Paternal needs and experiences while their newborn infants are admitted in the NICU have been explored,<sup>2,32–41</sup> but as far as we know, no study has investigated the effect of activities addressing these needs.

The present study is part of an intervention project evaluating the effect of a father-friendly NICU on newborn infants, parents, and staff. We used an approach based on participatory action research that involved fathers, mothers, interdisciplinary healthcare professionals, and managers in developing a father-friendly NICU intending to meet the paternal needs.<sup>42–44</sup>

The aim of this part of the project was to investigate the impact of the intervention, the father-friendly NICU, on paternal stress levels, and on their participation in childcare.

### What This Study Adds

- Knowledge of the effect of a father-friendly NICU in terms of self-perceived paternal stress.
- Identification of the need to develop more appropriate outcome measures to assess the effect of interventions on paternal stress.

## METHODS

### Study Design and Setting

The effect of the father-friendly NICU was investigated in a quasiexperimental design.<sup>45</sup> In accordance with

Danish law, the study was approved by the Danish Data Protection Agency.

This study was conducted at a 22-bed level II NICU at a regional hospital in southern Denmark, having approximately 600 admissions per year.<sup>46</sup> The unit is organized into 2 groups, with 38 nurses, 2 assistant nurses, and 4 consultants. The majority of newborn infants are admitted directly from the delivery room though some are admitted from the maternity ward. The unit treats ill newborn infants, including preterm infants with a gestational age of 28 weeks or more. Single, double, and quadruple occupancy rooms are available to patients. Parents and siblings (without any acute illness) have unrestricted access to visit the infants. An armchair is provided next to the incubators or cradles, and the parents are allowed to sleep in a patient hotel adjacent to the NICU. Only one of the parents can stay free of charge; the second parent must pay, which could have an impact on paternal presence in the NICU. However, during long-term hospitalization, both parents may stay with their newborn(s) in an NICU family room without payment during the last week of hospitalization.

### Sample

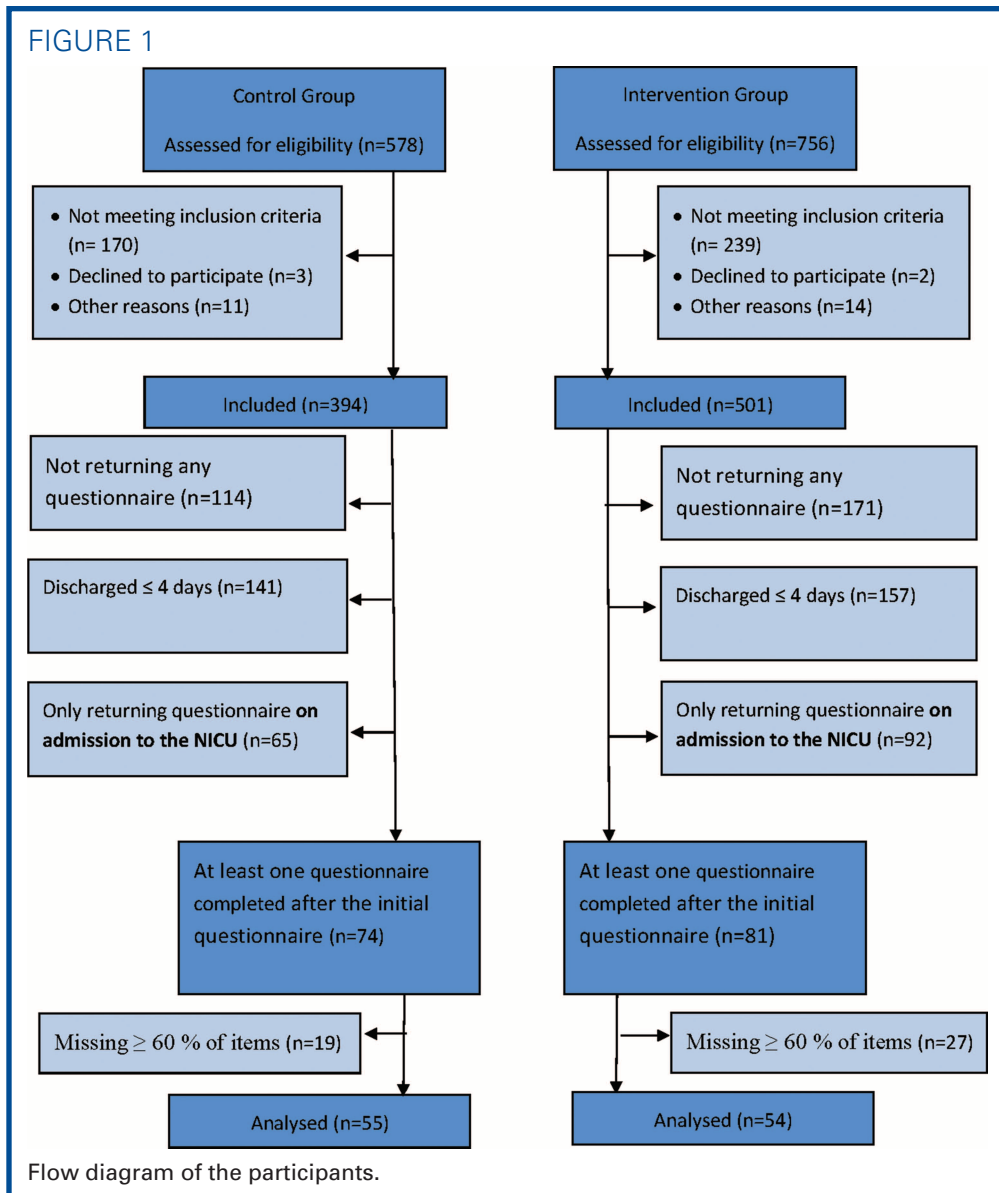
Two hundred fifty-three fathers with infants admitted to the NICU were enrolled to the control group from December 1, 2011, to December 31, 2012, and 344 fathers to the intervention group from August 1, 2013, to January 31, 2015 (see Figure 1). Exclusion criteria were (a) fathers who did not understand verbal and written Danish; (b) fathers of critically ill newborn infants (infants who were transferred to a university hospital shortly after admission or were not expected to survive); (c) fathers of newborn infants whose mother was critically ill; and (d) fathers of newborn infants admitted to the NICU from home.

### Intervention

The intervention, the father-friendly NICU, was developed and implemented based on the principles of participatory action research by Reason and Bradbury,<sup>42</sup> and Herr and Anderson.<sup>43</sup> In collaboration with the fathers and other stakeholders, the research team obtained knowledge and understanding of paternal needs and wishes, which was used in the design of the intervention during the period from August 2011 to February 2013. The 8 activities listed in Figure 2 were implemented to create the father-friendly NICU from February 2013 to August 2013.<sup>44,47</sup> With these new activities the healthcare professionals would also focus on the fathers and encourage them to participate in the childcare (eg, to have skin-to-skin contact, to participate in father groups, and to feed their infants).

### Outcome

The primary outcome was the difference in the overall stress score, determined using the Parental



Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU) score, which was measured on admission to the NICU (during the first 3 days of hospitalization), at the 14th day of hospitalization, and at the time of discharge, in both the control and intervention groups. Secondary outcomes were (a) the difference in the PSS:NICU overall stress score and the subscale scores between on admission to the NICU, at the 14th day of hospitalization, and at the time of discharge for fathers in the control versus the intervention group, (b) the difference in the PSS:NICU overall stress scores and the subscale scores during hospitalization for fathers in the control versus intervention groups, and (c) the difference in paternal participation in childcare at the time of discharge for fathers in the control versus intervention groups.

### Instruments

Stress is defined<sup>48</sup> as a particular relationship between a person and the environment that exceeds the person's resources and threatens his or her well-being.<sup>48</sup> Stress reactions are both physical and psychosocial, and various stressors can cause stress in different persons.<sup>48</sup>

After obtaining approval from Miles et al<sup>8</sup> and in accordance with the recommendation, the PSS:NICU questionnaire was forward-translated from English into Danish by 2 Danish-native speakers fluent in English, and then back-translated into English by an independent translator to provide quality control of the translation.<sup>49</sup> The translated PSS:NICU was used to measure paternal perception of stressors when their newborn infants were admitted to the NICU. The questionnaire included 3 dimensions: sights and

FIGURE 2

1. Fathers shall be encouraged to have skin-to-skin contact with their infants as soon as the newborns are admitted to the NICU if the mothers are still in the recovery room or intensive care unit.
2. Fathers shall be encouraged and given the opportunity to participate in important situations, such as their infants' first baths, when their infants are moved from the incubator to cradle or from the intensive care to a lower dependency room.
3. Fathers shall receive information and guidance directly from the healthcare professionals (and not only through the mothers).
4. Important conversations about the children's development shall be scheduled so both parents can participate.
5. The department shall offer counselling by a social worker about paternity leave and other social and economic issues
6. The department shall organize father-groups where the fathers can meet and talk "father to father" about their situation.
7. The families shall have the opportunity to have a close family member to support them in the unit. The family member can stay with the newborn infant if the parents wish, e.g. if the parents want to visit their older children at home.
8. Older siblings shall have the opportunity to stay overnight.

Principles for a father-friendly neonatal unit.

sounds of the unit (6 items), infant behavior and appearance (13 items), and parental role alteration (7 items). Fathers were asked to rate their stress related to particular situations on a 5-point Likert scale, ranging from 1 (not at all stressful) to 5 (extremely stressful). Fathers who had not experienced a particular situation on an item indicated this with a "not relevant" response.<sup>8</sup> Both for the PSS:NICU overall stress score and each of the sub-scale scores, the maximal score was 5, a high score indicating a high level of paternal stress.

Paternal participation in childcare was measured by assessing 7 items: feeding, washing, holding in

arms, skin-to-skin contact, talking, eye contact, and daily visits. These items were added to the PSS:NICU at the 14th day of hospitalization and at the time of discharge. The fathers could choose from the following responses: "not at all," "once a day," or "several times a day." In this article, we dichotomized these variables as either "yes" (once a day and several times a day) or "no."

### Data Collection

Participating fathers received up to 3 questionnaires depending on the length of their newborn infants' NICU stay. In order to not overload the fathers who



participated in this study, a gap of at least 5 days was given between being asked to complete the questionnaires. They received a questionnaire during the first 3 days of hospitalization, at the 14th day of hospitalization ( $\pm 3$  days), and at the time of discharge (length of hospital stay: [a]  $>5$  and  $\leq 13$  days and [b]  $>19$  days).

In accordance with Danish law, the Danish Data Protection Agency, the fathers were informed about the study in writing and face-to-face before participation. They were told that participation was voluntary and that they could withdraw at any time and that refusal would not affect the care of their infants. Fathers were guaranteed confidentiality and anonymity. On admission to the NICU, fathers were given an envelope, with the first questionnaire and an information sheet. The fathers could then choose to complete the subsequent questionnaires electronically or on paper. The electronic questionnaires were administered using SurveyXact (<http://www.surveymxact.com/>). All paper-based questionnaires were double-entered on SurveyXact.

### Data Analysis

We used a power analysis ( $\alpha = 5\%$ ,  $\beta = 10\%$ ) with a relatively small effect size of  $-20\%$ . This indicated that 170 fathers needed to be included in this study (85 in each group). Allowing for dropout, we planned to recruit 250 fathers, 125 in each group. The difference in change in PSS:NICU stress scores between the control and intervention groups was tested using the  $\chi^2$  test or the 2-sample Wilcoxon rank sum (Mann-Whitney) test, as appropriate. A multiple linear regression model—adjusted for baseline stress and with the following covariates: gestational age, cesarean delivery, monitoring of peripheral oxygen saturation, oxygen therapy, intravenous access on the first day of hospitalization, length of hospitalization, first-time fathers, other children living with the family, and paternal age—was all used to evaluate the differences between the stress scores on admission to the NICU and at the time of discharge.

Stress scores were calculated by adding the scores for each subscale score and the PSS:NICU total stress score, respectively, divided by the number of items.<sup>8</sup> Our focus was on the fathers, and as recommended by Miles et al,<sup>8</sup> all fathers received a score on each item. Fathers who had not experienced a situation received a score of “1” for that item, corresponding with “not at all stressful” (metric 2).

A missing data criterion for stress scores was set as follows: If the fathers had missed 60% or more of items for at least one of the subscale score, their data were withdrawn from the analysis.

For simplicity, the missing items of PSS:NICU stress scores of the analyzed population were replaced with 0 because there were few missing

items. The difference in paternal participation in childcare was compared using the  $\chi^2$  test and ordinal logistic regression analysis, controlling for the same covariates as for the stress analysis. The data were analyzed using Stata statistical software (StataCorp, LLC, College Station, Texas).<sup>50</sup>

### Population Included in the Analysis

The analyzed population consisted of fathers with at least 1 measure after the initial questionnaire completed on admission to the NICU. In this questionnaire, the fathers rated the stress they experienced during the first days of their children's hospitalization. As the return rate of the surveys was low, we decided to compare 2 time points. The initial questionnaire was compared with either the questionnaire at the 14th day of hospitalization or the questionnaire at the time of discharge, whichever was answered latest.

## RESULTS

### Participants

During the study period 578 fathers were assessed for eligibility in the control group and 756 fathers in the intervention group (Figure 1). We excluded 184 fathers in the control group and 255 in the intervention group for not meeting the inclusion criteria, refusing to take part, or other reasons. Other reasons were social or psychological problems (8 in the control group and 10 in the intervention group), unknown identity number (3 in the control group and 2 in the intervention group), 1 infant who died, and 4 infant who was given up for adoption in the intervention group.

Out of 394 fathers in the control group and 501 in the intervention group, 74 and 81 fathers, respectively, answered at least 1 questionnaire after the initial questionnaire on admission to the NICU (Figure 1). Table 1 shows how many fathers completed the different surveys.

Nineteen fathers (25%) in the control group and 27 fathers (33%) in the intervention group missed more than 60% of the items in at least 1 of the subscale scores in the PSS:NICU. Data from 109 fathers were included in this analysis: 55 fathers in the control group and 54 in the intervention group (Figure 1). In the control group, 6 fathers missed 1 item and 1 father missed 2 items. In the intervention group, 3 fathers missed 1 item and 1 father missed 2 items.

The demographic characteristics of the fathers and the characteristics of their newborn infants are shown in Table 2. Among the fathers there were no differences in age, participation in the infant's birth, and father's first child between the 2 groups. In the intervention group, more fathers were employed compared with the fathers in the control group. There were no

TABLE 1. Number of Fathers Answering the Questionnaires

	Control Group N = 74, n (%) <sup>a</sup> N = 55, n (%) <sup>b</sup>	Intervention Group N = 81, n (%) <sup>a</sup> N = 54, n (%) <sup>b</sup>
On admission to the NICU and at the 14th day of hospitalization, and at the time of discharge	28 (38) 26 (69)	24 (30) 23 (43)
Only on admission to the NICU and at the 14th day of hospitalization	15 (20) 0 (0)	25 (30) 0 (0)
Only on admission to the NICU and at the time of discharge	31 (42) 29 (53)	32 (40) 31 (57)

Abbreviation: NICU, neonatal intensive care unit.  
<sup>a</sup>Fathers who completed at least 1 questionnaire after the initial questionnaire.  
<sup>b</sup>Fathers whose responses are analyzed.

differences in gestational age, cesarean delivery, Apgar score, and length of stay in the NICU among infants of the 2 groups. Fewer infants were monitored in the intervention group than in the control group.

### Stress Score

Apart from the subscale score parental role on admission to the NICU, fathers in the intervention group had significantly higher PSS:NICU overall stress scores and higher subscale scores than fathers in the control group both on admission to the NICU (as measured during the first 3 days of admission) and at the time of discharge (Table 3). Analyzing the differences of change of stress scores from the time of admission to the time of discharge showed that for both groups the stress scores decreased significantly during hospitalization. The change of stress score was statistically greater for the control group than for the intervention group (Table 3).

### Paternal Participation in Childcare

At the time of discharge, fathers in the intervention group had significantly more frequent skin-to-skin contact with their newborn infants compared with fathers in the control group (Table 4). When adjusting for confounders, we still found a significant result for skin-to-skin contact, with a 95% confidence interval of  $-3.815$  to  $-1.016$ ;  $P = .001$  (data not shown).

## DISCUSSION

Within the Department of Paediatrics, we developed a father-friendly NICU that consisted of different activities meant to address the needs of fathers during the hospitalization of their newborn infants,<sup>44,47</sup> allowing and supporting fathers to be more involved in the care of their infants. The present study investigated the impact of this new concept on paternal stress.

We found that the decrease in PSS:NICU overall stress scores from admission to the NICU until the time of discharge was greater in the control group than in the intervention group. The same result was

shown for the 3 subscale scores that measured the stress caused by the sights and sounds of the NICU; by the appearance of the infant, behaviors, and special treatments; and by the relationship the fathers had with their infants, and their parental role. Our results agree with the results of other studies, having found increased stress levels for fathers who were more involved in the care of their infants.<sup>28,51-53</sup> For example, Ravn et al<sup>28</sup> report that paternal stress increased with increased involvement in the Mother-Infant Transaction Intervention Program that taught parents to be sensitive and responsive to their children's physiological and social cues. In addition, van der Pal et al,<sup>51</sup> in the Newborn Individualized Developmental Care and Assessment Program, found that fathers were more stressed when they were involved in childcare, such as being informed about tubes, the behavior of their infants, and signals of pain and distress.<sup>51</sup>

The fact that the intervention caused higher stress scores among fathers both on admission to the NICU and during hospitalization can be explained by the staff's expectations that the fathers should be more involved in childcare (eg, expected to be present at different procedures such as introducing feeding tubes, performing intubations, or giving their infants the first baths), being encouraged to have skin-to-skin contact with the infant, and expected to be part of father groups. The fact that the fathers still had obligations regarding to their work, taking care of siblings, and managing the housework at home might have caused more stress for the fathers in the intervention group than for those in the control group.<sup>54</sup>

In this study the risk that emotional stress may develop into posttraumatic stress syndrome, as shown in other studies,<sup>13-18</sup> does not appear to be an issue, as we found that the paternal stress scores varied from "not at all stressful" to "little stressful," with a mean score ranging from 1.40 to 2.10 during hospitalization as compared with other studies finding stress scores ranging from 2 (little stressful) to 3 (moderately stressful).<sup>55</sup> That the PSS:NICU overall stress score was relatively low could be due to the fact that the most severely ill newborn infants were

TABLE 2. Demographic and Clinical Characteristics of the Participants

	Control Group n = 55 n (%) or Mean (Range)	Intervention Group n = 54 n (%) or Mean (Range)
<i>Fathers<sup>a,b</sup></i>		
Age, median (range), y	31.3 (22-55)	32.7 (23-51)
Participated in the child's birth	50/53 (94)	49/53 (92)
First child	30/54 (56)	35/54 (65)
Other children living with the family	29/55 (53)	22/54 (41)
Previous infant(s) admitted to the NICU	8/47 (17)	8/51 (16)
Cohabiting with the infant's mother	53/54 (98)	52/53 (98)
Employment		
Employed	45/54 (83) <sup>c</sup>	49/54 (91) <sup>c</sup>
Unemployed	2/54 (4) <sup>c</sup>	1/54 (2) <sup>c</sup>
Other	7/54 (13) <sup>c</sup>	4/54 (7) <sup>c</sup>
Distance from father's home to the hospital, km		
0-10	12/53 (23)	14/54 (26)
11-30	18/53 (34)	25/54 (46)
≥31	23/53 (43)	15/54 (28)
<i>Children<sup>b,d</sup></i>		
Boys	33/55 (62)	31/54 (57)
Twins	8/55 (14)	4/54 (7)
Gestational age, wk	35.7 (27.0-41.0)	35.3 (26-41)
Weight at birth, g	2697.0 (1120-4600)	2474.4 (593-4530)
Length at birth, cm	48.4 (39-66)	47.3 (30-57)
Head circumference at birth, cm	32.7 (25-39)	32 (22.5-37)
Cesarean delivery	29/55 (53)	20/54 (37)
Apgar score after 5 min	9.1 (4-10)	9.1 (2-10)
Duration of CPAP, d	4.5 (0-41)	6.3 (0-120)
Intervention on the first day of admission		
Oxygen therapy	28/55 (51)	22/54 (41)
Monitoring (SAT)	55/55 (100) <sup>c</sup>	50/54 (93) <sup>c</sup>
Intravenous access	34/55 (62)	26/54 (48)
Length of stay in the NICU	24.5 (5-85)	25.2 (5-125)
<i>Abbreviations: CPAP, continuous positive airway pressure; NICU, neonatal intensive care unit; SAT, peripheral oxygen saturation.</i>		
<i><sup>a</sup>Data collected from questionnaires and the infants' electronic patient records.</i>		
<i><sup>b</sup>Number may vary due to missing in single items.</i>		
<i><sup>c</sup>P value ≤ .05.</i>		
<i><sup>d</sup>Data collected from the infants' electronic patient records.</i>		

transferred to a university NICU and therefore not included. This corroborated the results of a meta-analysis that found that higher birth weight and higher gestational age were associated with less parental stress in studies of preterm infants.<sup>18,53</sup>

The finding that the stress score was higher when scored during the first days of hospitalization can be caused by the fact that childbirth itself is a stressful experience for parents.<sup>55</sup> Furthermore, the stress

level has also been shown to be related to the severity of the newborn infants' illness, which is often more severe during the first days of life.<sup>55</sup>

Although not hypothesized a priori, we found that 2 of the 7 indicators, skin-to-skin contact and feeding (not significant), increased in the intervention group compared with the control group, which helped the fathers to define their parental role.<sup>47</sup> This corroborates the results from other studies that pointed out

TABLE 3. Stress Scores on Admission to the NICU and at the Time of Discharge, and the Change in Stress Score From on Admission to the NICU to the Time of Discharge of Fathers in the Control Group Compared With Fathers in the Intervention Group<sup>a</sup>

	Score on Admission to the NICU			Score at the Time of Discharge			Change in Stress Score From on Admission to the NICU to the Time of Discharge in the Control and Intervention Groups, Respectively <sup>c</sup> Mean Change (P Value)
	Control N = 55 Mean (SD)	Intervention N = 54 Mean (SD)	P Value <sup>b</sup>	Control N = 55 Mean (SD)	Intervention N = 54 Mean (SD)	P Value <sup>b</sup>	
PSS:NICU Total stress score	1.71 (0.46)	2.02 (0.55)	.0014	1.43 (0.44)	1.84 (0.59)	.0001	-0.28 vs -0.18 (.004)
Subscales							
Sights and sounds	1.55 (0.44)	1.78 (0.53)	.0215	1.42 (0.44)	1.77 (0.64)	.0030	-0.13 vs -0.01 (.023)
Infant behavior	1.64 (0.51)	2.10 (0.59)	.0000	1.40 (0.48)	1.87 (0.62)	.0000	-0.24 vs -0.23 (.074)
Parental role	1.94 (0.68)	2.10 (0.86)	.4734	1.50 (0.58)	1.83 (0.80)	.0319	-0.44 vs -0.27 (.004)

Abbreviations: PSS:NICU, Parental Stressor Scale:Neonatal Intensive Care Unit; SD, standard deviation.  
<sup>a</sup>Data from fathers who answered both on the admission to the NICU and the discharge questionnaire. Seven fathers in the control group and 4 in the intervention group missed a total of 13 items.  
<sup>b</sup>The stress scores reported by the control compared with the intervention group. The 2-sample Wilcoxon rank sum (Mann-Whitney) test was used.  
<sup>c</sup>Linear regression analysis was used. The covariates were gestational age, cesarean delivery, monitoring (SAT) on the first day of admission, oxygen therapy on the first day of admission, intravenous access on the first day of admission, length of stay, father's first child, other children living with the family, and father's age.

that caregiving initiated a closer father–child relationship and engagement in childcare.<sup>53,56,57</sup> Until now, most evaluations of father-friendly initiatives (including those in this study) have been based on an expectation of “decreased stress” as a criterion of success.<sup>20-31</sup> But as a higher stress level might be a consequence of more involvement and a closer father–child relationship, future studies, in addition to stress, might need to develop different and more adequate outcomes to measure the effect of complex interventions.<sup>58</sup>

## STRENGTHS AND LIMITATIONS

The strength of the study was the complex intervention program developed in collaboration with fathers, mothers, and staff members, ensuring that the changes were tailored to the NICU.<sup>44,45,58</sup> Moreover, the intervention was implemented in a real-life clinical practice. Our before-and-after intervention design had a sufficient period between each phase, ensuring an appropriate design with explicit inclusion and exclusion criteria.<sup>44,45,58</sup>

However, the study had several limitations. First, the sample population fell short of our power analysis, which may limit the strength of the results. The response rate was low, probably due to the fathers being involved in their work, housework, and family life, in addition to their newborn infants. However,

the response rate corresponds to other studies using multiple measurements, which have also been challenged with low response rates.<sup>18,22,28</sup> The length of

TABLE 4. Fathers' Participation in Childcare at the Time of Discharge

	Control <sup>a</sup> n = 55 Yes, n (%)	Intervention <sup>b</sup> n = 54 Yes, n (%)	P Value <sup>c</sup>
Tube feeding/ bottle	29 (54)	36 (68)	.132
Changing diaper	53 (98)	52 (98)	1.000
Holding in arms	53 (98)	52 (98)	1.000
Having skin-to- skin contact	34 (63)	50 (94)	.000
Talking	54 (100)	52 (98)	.495
Eye contact	52 (96)	52 (98)	1.000
Daily visits	46 (90)	51 (98)	.109

<sup>a</sup>One father missed all 7 items. Three fathers did not answer the question on daily visits.  
<sup>b</sup>Two fathers missed all 7 items.  
<sup>c</sup> $\chi^2$  test was used. Ordinal logistic regression analysis was used controlling for appropriate confounders: gestational age, cesarean delivery, monitoring (SAT) on the first day of admission, oxygen therapy on the first day of admission, intravenous access on the first day of admission, length of stay, father's first infant, other children living with the family, and father's age.



### Summary of Recommendations for Practice and Research

<b>What we know:</b>	<ul style="list-style-type: none"> <li>• Fathers in the intervention group had a higher stress level both upon admission and at discharge, and the decrease in stress level was lower than for the control group.</li> <li>• Paternal stress scores were relatively low.</li> <li>• The fathers in the intervention group had more skin-to-skin contact with their infants than those in the control group.</li> <li>• Both the staff's expectations of fathers to be more involved and the social expectations and norms might cause more stress for the fathers.</li> </ul>
<b>What needs to be studied:</b>	<ul style="list-style-type: none"> <li>• A follow-up study after discharge would add knowledge of the long-term effect of paternal early involvement in childcare.</li> <li>• Future studies need to develop additional and adequate outcomes to measure the effect of such complex interventions.</li> </ul>
<b>What we can do today:</b>	<ul style="list-style-type: none"> <li>• Recognize that fathers are competent and important caregivers, as are mothers.</li> <li>• Support fathers to have skin-to-skin contact.</li> <li>• Involve fathers in childcare considering that this might increase their stress level.</li> <li>• Be conscious of cultural expectations and norms regarding men and fathers.</li> </ul>

stays at a level II NICU is in average shorter, and therefore this setting might not be the best for this kind of study (eg, there was not enough time for the intervention to have an impact). Conducting the study in a unit in which the fathers would have time to become comfortable in being involved may result in different response rates and outcomes.

Another limitation was the high rate of surveys missing more than 60% of the items (Figure 1). More than two-thirds was chosen as an exclusion criterion based on the premise that most items within each subscale score should be tested. Eight fathers in the control group and 10 fathers in the intervention group failed to answer entire pages in the paper questionnaire because they simply overlooked the pages. By using electronic questionnaires only, these “nonresponses” could be prevented.<sup>59</sup>

A major limitation is the lack of data measuring to what extent the intervention was implemented and accepted in the clinical practice, because if the intervention is not incorporated into the clinical practice, the outcome can become invalid.<sup>60</sup> As the father-friendly NICU was a complex intervention, it was difficult to measure to what extent the various activities were accomplished. However, the aim of our study was to implement a father-friendly package for the NICU to be able to investigate the impact on paternal stress in a real-life setting.

Lastly, the study was conducted over a 3-year period, during which time other changes could have influenced the results.<sup>58</sup> However, there were no significant changes in the care of parents during the period.

## CONCLUSION

The father-friendly NICU was unique, as it was developed in collaboration with fathers, mothers, and staff working in the NICU. Interestingly and importantly, we found that paternal stress increased

after the intervention, paralleling a higher involvement in the care of the infant. As stress might be a consequence of more involvement, and a closer father–child relationship, in addition to stress other and more adequate outcomes to measure the effect of the interventions should be developed. A follow-up study after the time of discharge would add to the knowledge of the long-term effects of paternal early involvement in childcare.

## References

1. Meberg A. Familiefokuseret nyfødtomsorg. *Tidsskr Nor Lægeforen*. 2010;130:1730-1731.
2. Fegran L, Helsest S, Fagermoen M. A comparison of mothers' and fathers' experiences of the attachment process in a neonatal intensive care unit. *J Clin Nurs*. 2008;17(6):810-816.
3. Sarkadi A, Kristiansson R, Oberklaid F, Bremberg S. Fathers' involvement and children's developmental outcomes: a systematic review of longitudinal studies. *Acta Paediatrica*. 2008;97(2):153-158.
4. Melnyk B, Feinstein NF, Alpert-Gillis L, et al. Reducing premature infants' length of stay and improving parents' mental health outcomes with the creating opportunities for parent empowerment (COPE) neonatal intensive care unit program: a randomized, controlled trial. *Pediatrics*. 2006;118(5):e1414-e1427.
5. Ortenstrand A, Westrup B, Brostrom EB, et al. The Stockholm Neonatal Family Centered Care Study: effects on length of stay and infant morbidity. *Pediatrics*. 2010;125(2):e278-e285.
6. Levy-Shiff R, Hoffman MA, Mogilner S, Lvinger S, Mogilner MB. Fathers' hospital visits to their preterm infants as a predictor of father-infant relationship and infant development. *Pediatrics*. 1990;86(2):289-293.
7. Reinicke K. *Drenge og Mænd i Krise? Perspektiver og Indsatsområder* [in Danish]. [Boys and Men in Crisis? Perspectives and Focus Area]. København, Denmark, Hans Reitzels Forlag; 2012.
8. Miles MS, Funk SG, Carlson J. Parental Stressor Scale: neonatal intensive care unit. *Nurs Res*. 1993;42(3):148-152.
9. Arockiasamy V, Holsti L, Albersheim S. Fathers' experiences in the neonatal intensive care unit: a search for control. *Pediatrics*. 2008;121(2):e215-e222.
10. Hynan MT. Supporting fathers during stressful times in the nursery: an evidence-based review. *Newborn Infant Nurs Rev*. 2005;5(2):87-92.
11. Mackley A, Locke R, Spear M, Joseph R. Forgotten parent: NICU paternal emotional response. *Adv Neonatal Care*. 2010;10(4):200-203.
12. Madsen SA, Burgess A. Fatherhood and mental health—difficulties in the postnatal period. In: White A, Conrad D, eds. *Promoting Men's Mental Health*. Oxford, England: Radcliffe Publishing; 2010:74-82.
13. Pierrehumbert B, Nicole A, Muller-Nix C, Forcada-Guex M, Ansermet F. Parental post-traumatic reactions after premature birth: implications for sleeping and eating problems in the infant. *Arch Dis Child Fetal Neonatal Ed*. 2003;88(5):F400-F404.

14. Youngblut JM, Brooten D, Cantwell GP, del Moral T, Totapally B. Parent health and functioning 13 months after infant or child NICU/PICU death. *Pediatrics*. 2013;132(5):e1295-e1301.
15. Lasiuk GC, Comeau T, Newburn-Cook C. Unexpected: an interpretive description of parental traumas' associated with preterm birth. *BMC Pregnancy Childbirth*. 2013;13(suppl 1):S13.
16. Karatzias A, Chouliara Z, Maxton F, Freer Y, Power K. Post-traumatic symptomatology in parents with premature infants: a systematic review of the literature. *J Prenat Perinat Psychol Health*. 2007;21(3):249-260.
17. Lefkowitz DS, Baxt C, Evans JR. Prevalence and correlates of post-traumatic stress and postpartum depression in parents of infants in the neonatal intensive care unit (NICU). *J Clin Psychol Med Settings*. 2010;17(3):230-237.
18. Ionio C, Colombo C, Brazzoduro V, et al. Mothers and fathers in NICU: the impact of preterm birth on parental distress. *Eur J Psychol*. 2016;12(4):604-621.
19. Provenzi L, Santoro E. The lived experience of fathers of preterm infants in the neonatal intensive care unit: a systematic review of qualitative studies. *J Clin Nurs*. 2015;24(13/14):1784-1794.
20. Abdeyazdan Z, Shahkolahi Z, Mehrabi T, Hajiheidari M. A family support intervention to reduce stress among parents of preterm infants in neonatal intensive care unit. *Iran J Nurs Midwifery Res*. 2014;19(4):349-353.
21. Ahn YM, Kim NH. Parental perception of neonates, parental stress and education for NICU parents. *Asian Nurs Res*. 2007;1(3):199-210.
22. Beheshtipour N, Baharlu SM, Montaseri S, Razavinezhad Ardakani SM. The effect of the educational program on Iranian premature infants' parental stress in a neonatal intensive care unit: a double-blind randomized controlled trial. *Int J Community Based Nurs Midwifery*. 2014;2(4):240-250.
23. Cano Gimenez E, Sanchez-Luna M. Providing parents with individualised support in a neonatal intensive care unit reduced stress, anxiety and depression. *Acta Paediatr*. 2015;104(7):e300-e305.
24. Kaarsen PI, Ronning JA, Ulvund SE, Dahl LB. A randomized, controlled trial of the effectiveness of an early-intervention program in reducing parenting stress after preterm birth. *Pediatrics*. 2006;118(1):e9-e19.
25. Maguire CM, Bruil J, Wit JM, Walther FJ. Reading preterm infants' behavioral cues: an intervention study with parents of premature infants born <32 weeks. *Early Hum Dev*. 2007;83(7):419-424.
26. Maticardi S, Agostino R, Fedeli C, Montirosso R. Mothers are not fathers: differences between parents in the reduction of stress levels after a parental intervention in a NICU. *Acta Paediatr*. 2013;102(1):8-14.
27. Melnyk BM, Feinstein NF, Alpert-Gillis L, et al. Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment (COPE) neonatal intensive care unit program: a randomized, controlled trial. *Pediatrics*. 2006;118(5):e1414-e1427.
28. Ravn I, Lindemann R, Smeby NA, Bunche EH, Sandvik L, Smithe L. Stress in fathers of moderately and late preterm infants: a randomized controlled trial. *Early Child Dev Care*. 2012;537-552.
29. Turan T, Basbakkal Z, Ozbek S. Effect of nursing interventions on stressors of parents of premature infants in neonatal intensive care unit. *J Clin Nurs*. 2008;17(21):2856-2866.
30. Weis J, Zoffmann V, Greisen G, Egerod I. The effect of person-centred communication on parental stress in a NICU: a randomized clinical trial. *Acta Paediatr*. 2013;102(12):1130-1136.
31. Lee TY, Wang MM, Lin KC, Kao CH. The effectiveness of early intervention on paternal stress for fathers of premature infants admitted to a neonatal intensive care unit. *J Adv Nurs*. 2013;69(5):1085-1095.
32. Ignell Mode R, Mard E, Nyqvist KH, Blomqvist YT. Fathers' perception of information received during their infants; stay at a neonatal intensive care unit. *Sex Reprod Healthc*. 2014;5(3):131-136.
33. Pohlman S. Fathering premature infants and the technological imperative of the neonatal intensive care unit: an interpretive inquiry. *Adv Neonatal Care*. 2009;32(3):E1-E16.
34. Pohlman S. The primacy of work and fathering preterm infants: findings from an interpretive phenomenological study. *Adv Neonatal Care*. 2005;5(4):204-216.
35. Lindberg B, Axelsson K, Ohrling K. Adjusting to being a father to an infant born prematurely: experiences from Swedish fathers. *Scand J Caring Sci*. 2008;22(1):79-85.
36. Johnson AN. Engaging fathers in the NICU: taking down the barriers to the baby. *J Perinat Neonatal Nurs*. 2008;22(4):302-306.
37. Gloppestad K. Initial separation time between fathers and their premature infants: comparison between two periods of time. *Vard Nord Utveckl Forsk*. 1995;15:10-17.
38. Lundqvist P, Westas L, Hallstrom I. From distance toward proximity: fathers lived experience of caring for their preterm infants. *J Pediatr Nurs*. 2007;22(6):490-497.
39. Novak JC. Facilitating nurturant fathering behaviour in the NICU. *J Perinat Neonatal Nurs*. 1990;4(2):68-77.
40. Discenza D. Dads of premature infants are important too. *Neonatal Netw*. 2010;29(2):125-126.
41. Mundy CA. Assessment of family needs in neonatal intensive care units. *Am J Crit Care*. 2010;19(2):156-163.
42. Reason P, Bradbury RH. Introduction. In: Reason P, Bradbury H, eds. *The SAGE Handbook of Action Research Participative Inquiry and Practice*. London, England: Sage; 2013;1-10.
43. Herr K, Anderson GL. *The Action Research Dissertation: A Guide for Students and Faculty*. Thousand Oaks, CA: Sage; 2015.
44. Noergaard B, Johannessen H, Fenger-Gron J, Kofoed P, Ammentorp J. Participatory action research in the field of neonatal intensive care. Developing an intervention to meet the fathers' needs—a case study. *J Public Health Res*. 2016; 21;5(3):744.
45. Deeks JJ, Dinnes J, D'Amico R, et al. Evaluating non-randomised intervention studies. *Health Technol Assess*. 2003;7(27):iii-x, 1-173.
46. American Academy of Pediatrics Committee on Fetus And Newborn. Levels of neonatal care. *Pediatrics*. 2012;130(3):587-597.
47. Noergaard B, Ammentorp J, Fenger-Gron J, Kofoed P, Johannessen H. Fathers' needs and masculinity dilemmas in neonatal intensive care unit in Denmark. *Adv Neonatal Care*. 2017;17(4):E13-E22.
48. Netterstrøm B. *Stress og Arbejde. Nyeste Viden om Årsager, Konsekvenser, Forebyggelse og Behandling* [in Danish]. [Stress and Work. Knowledge About Causes, Consequences, Prevention and Treatment]. København, Denmark: Hans Reitzel Forlag; 2014;11-54.
49. Wild D, Grove A, Martin M, et al. Principles of good practice for the translation and cultural adaptation process for patient-reported outcomes (PRO) measures: report of the ISPOR Task Force for Translation and Cultural Adaptation. *Value Health*. 2005;8(2):94-104.
50. STATA. (R) 14.0 Copyright 1985-2015 StataCorp LP. *Statistics/Data Analysis*. College Station, Texas:StataCorp.
51. van der Pal SM, Maguire CM, le Cessie S, Wit JM, Walther FJ, Bruil J. Parental experiences during the first period at the neonatal unit after two developmental care interventions. *Acta Paediatr*. 2007;96(11):1611-1616.
52. Blomqvist YT, Rubertsson C, Kylberg E, Joreskog K, Nyqvist KH. Kangaroo mother care helps fathers of preterm infants gain confidence in the paternal role. *J Adv Nurs*. 2012;68(9):1988-1996.
53. Koliouli F, Gaudron CZ, Raynaud J-P. Life experiences of French premature fathers: a qualitative study. *J Neonatal Nurs*. 2016;22(5):244-249.
54. Ireland J, Minesh K, Cescutti-Butler L, van Teijlingen E, Hewitt-Taylor J. Experiences of fathers with babies admitted to neonatal care units: a review of the literature. *J Neonatal Nurs*. 2016;22(4):171-176.
55. Schappin R, Wijnroks L, Uniken Venema MM, Jongmans MJ. Rethinking stress in parents of preterm infants: a meta-analysis. *PLoS One*. 2013;8(2):e54992.
56. Feeley N, Waitzer E, Sherrard K, Boisvert L, Zerkowitz P. Fathers' perceptions of the barriers and facilitators to their involvement with their newborn hospitalised in the neonatal intensive care unit. *J Clin Nurs*. 2013;22(3/4):521-530.
57. Feeley N, Sherrard K, Waitzer E, Boisvert L. The father at the bedside: patterns of involvement in the NICU. *J Perinat Neonatal Nurs*. 2013;27(1):72-80.
58. Craig P, Dieppe P, Macintyre S, et al. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ*. 2008;337:a1655.
59. Gwaltney CJ, Shields AL, Shiffman S. Equivalence of electronic and paper-and-pencil administration of patient-reported outcome measures: a meta-analytic review. *Value Health*. 2008;11(2):322-333.
60. Swantz M. Participatory action research as practice. In: Reason P, Bradbury H, eds. *The SAGE Handbook of Action Research Participative Inquiry and Practice*. London, England: Sage 2013; 13-48.