

Does a restrictive visitor arrangement on the NICU, due to the COVID-pandemic, have a negative impact on the parent-child bonding process?

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Keywords

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Abstract

Background and objectives

Due to the COVID-19 pandemic and the associated safety measures, visitor arrangements on the neonatal intensive care unit had to be drastically restricted. This single-centre prospective study investigated the influence of this restrictive visitor arrangement on parent-child bonding.

Methods

Thirty parental couples were recruited. Their preterm children were born at a gestation age between 25+4 and 37+3 weeks.

During restricted visitor policy only one parent at a time was allowed to visit and kangaroo the baby with a time restriction of 3 hours per day per parent. During non-restrictive policy there were no time restrictions for parental visits and parents were allowed to visit their baby simultaneously.

Fourteen couples were recruited during restricted visitors policy in April 2020. Sixteen couples were recruited in the following period with non-restrictive policy. The couples filled in two questionnaires, the Dutch Postpartum Bonding Questionnaire and the Dutch Edinburgh Parental Depression Scale, at one week postpartum (T1) and at the child's age of four months (T2).

Result

At T1 there was a significant ($p = 0.019$) lower Postpartum Bonding Questionnaire-score in the non-restrictive group, representing better parent-child bonding. This difference between these groups was not found at 4 months postnatally.

Conclusion

We suggest that restrictive visitor policy on the neonatal intensive care unit had a negative effect on early parent-child bonding. This shows the importance of an unlimited visitor policy. Little is known about long-term effects of parent-child bonding at specific ages, although some reports emphasize the importance of very early parent-child bonding. Further investigations are needed.

Introduction

Parent-child bonding is a very important, well-known, but hard to define concept.

It is an innate system in mammals that consists of biological reactions that make a parent and child seek reciprocal proximity, and stimulates the parent to keep the child safe. The evolutionary purpose is to ensure survival to a reproductive age. But there is more. Early attachment will also shape future behaviour of the child and recent brain research with Diffusion Tensor Imaging tractography has shown that the quality of parent-child interaction influences development of connectivity in certain areas of the brain(1-3).

To achieve secure attachment the caregiver needs to be present and available, responsive and sensitive to the emotional and physical needs of their infant. Personal factors like parental stress and depression can influence the responsivity and sensitivity of the parent and thus jeopardise the parent child bonding, but also external factors such as separation from the child and low responsiveness of the infant have impact on the bonding process (4). Earlier studies found that physical closeness on the neonatal intensive care unit (NICU) facilitates emotional closeness and benefits the parents' psychological well-being and their relationship with their baby (5). Research in the field of neonatology has identified different other external factors that have impact on the parent-child bonding. It is known that prematurity and the associated compromised health expectation play a negative role in the quality of parental engagement with the baby (6-8). On the other hand, having a vulnerable child

can also intensify the parental care and bonding. When parents have access to abundant resources (material resources such as food and financial income, but even more important non-material resources such as support in how to find relevant information and how to use problem-solving tactics), they are more likely to invest in their high risk child. This non-material support is offered to parents by a highly engaged NICU-staff during the hospitalisation of their child. The more parents are present, the more this kind of support reaches them (9). Long hospitalisation also has a negative effect on bonding. Breastfeeding on the other hand is a positive contributing factor (10, 11). Parent-child bonding can also be fostered by skin-to-skin contact (SSC) (12). Earlier studies indicated that immediate SSC in the delivery room has a positive effect on the early bonding process (13). In addition, support of the partner during this neonatal period is shown to be an important factor for the mothers' wellbeing and will enhance her interaction with the baby (14).

In this COVID-19 pandemic protecting the most fragile individuals in our society is top priority. This applies strongly to the infants on a neonatal intensive care unit. In April 2020, the peak of the first wave of the COVID-pandemic in Belgium, the hospital visitor arrangements were drastically cut down. At this point, there were no national or international guidelines available with advice on NICU visitor arrangements. Our local hospital protocol did not allow any visitors for patients at that time. Parents of paediatric and neonatal patients were excepted in this protocol, but their visits were restricted. The restricted

visitor policy was based on the national protocols for social distancing (1,5 metre distance and surgical masks). Due to infrastructural limitations in the NICU ward we had to limit the amount of people present at the same time on the ward. The visitors restriction meant that only one parent at a time was allowed to visit and kangaroo the baby with a time restriction of 3 hours per day for each parent. Parents were not allowed to visit their baby together. As a consequence the present parent was also deprived of support of their partner during their visits. In July and August a lower national infection rate permitted diminished restriction measures. Larger groups were allowed to have outdoor contact, and smaller groups indoor. In our NICU-unit all parents were allowed to visit their baby together, at any time and with no time restriction.

Since restrictive visiting arrangements limited time for interaction with the baby, skin-to-skin contact and breastfeeding and also made simultaneous visit of both parents impossible, we hypothesized that the restrictive visitor arrangement could negatively influence parent-child bonding.

Methods

Approval was granted by the Research Ethics Committee Ziekenhuis Oost-Limburg (ZOL) (ctu2020029).

In this single centre prospective study conducted at the NICU ZOL parents were asked to fill-out 2 questionnaires on 2 different points in time: at 1 week postnatal age (T1) and at 4 months post-natal age (T2). Both parents or either father, or either mother filled in both questionnaires at T1 and T2 (see table 1 for the distribution). Thus for each parent couple one set of questionnaires was completed at both of the different points in time by the same person(s). The questionnaires were anonymised and completed online. The gestational age, days of hospitalisation and the self-reported daily time both of the parents spent with their child, regardless whether they were just holding the baby or whether they practiced SSC, were noted. Crib scores were calculated for each neonate, indicating the severity of disease (15).

Table 1: Baseline characteristics

	Restrictive group	Non-restrictive group	Total
Female gender baby, n (%)	8 (53%)	9 (53%)	17 (53%)
Mean gestational age	32+5	32+5	-
Mean duration of stay (d)	36	39	-
Respondent mother, n (%)	9 (64%)	10 (63%)	19 (63%)
Respondent father, n (%)	1 (7%)	1 (6%)	2 (7%)
Respondent both parents, n (%)	4 (29%)	5 (31%)	9 (30%)
Crib score, mean	1.07	1.69	-

Abbreviations: n, number

All infants admitted to our NICU in April 2020 and for the non-restrictive period in July and August 2020, were screened for eligibility. Additional inclusion criteria were: at least 1 week NICU-admission, good understanding of Dutch language and parental informed consent.

Perceived parent-child bonding during the covid-restricted visitor arrangement, in which only one parent at a time was allowed to visit and kangaroo the baby with a time restriction of 3 hours per day for each parent, was compared to a visitor arrangement where both parents were allowed at the same time without time restrictions.

Dutch validated self-report questionnaires were used, one on parental-child bonding, the Postpartum Bonding Questionnaire (PBQ) (16) and one on mental well-being of the parents, the Edinburgh postnatal depression scale (EPDS) (17).

The PBQ consists of 25 statements, each followed by six alternative responses ranging from 'always' to 'never'. Positive responses, such as "I enjoy playing with my baby", are scored from zero ('always') to 5 ('never'). Negative

responses, such as "I am afraid of my baby", are scored from 5 ('always') to zero ('never'). The PBQ categorizes these 25 statements into 4 factors, from which we only used factor 1: general bonding. This factor is based upon 12 of the statements with a maximum total score of 60, all scores up to 11 are categorised as normal (18). The other factors of this questionnaire are for detecting severe bonding problems and fears in parents with pre-existing psychological problems, which is not applicable for our group.

The EPDS consists of 10 items, developed to detect postnatal parental depression. Parents have to indicate how often they experience certain symptoms or feelings during the past week. The answers of the EPDS range from 'yes, always', 'yes, most of the time', 'no, not very often' to 'no, never' and score respectively from 0 to 3. The total score is between 0 and 30. Evins et al. set the threshold value at a score of 11 or higher, indicating parental depression with a high sensitivity (19, 20). This threshold was also used in this study.

Statistical tests

For comparison of the PBQ data we used paired and unpaired T-tests where appropriate. The EPDS data was compared with the Mann-Whitney U test and the Wilcoxon signed-rank test.

We conducted a power analysis to calculate the desired sample size. With a power of 0.8 and a alpha of 0.05 we found a sample size of 32 included parent couples.

Results

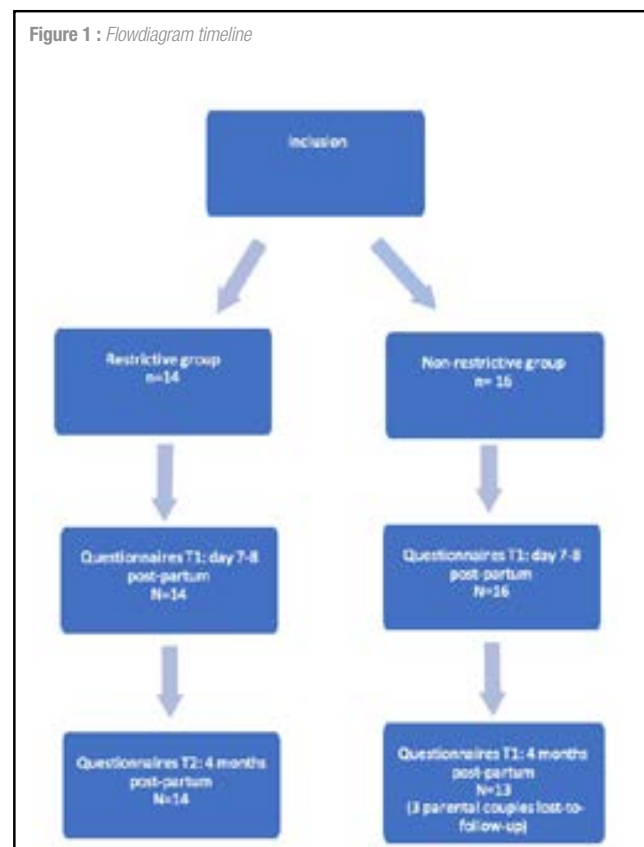
Recruitment

Thirty couples of preterm children born between a gestational age of 25+4 and 37+3 weeks were recruited. Fourteen couples were recruited during the restricted visitors policy of 8 weeks. Sixteen couples were recruited in the following period with non-restrictive policy for parents (figure 1). There were no differences in baseline characteristics between the two groups (Table 1).

There was a loss to follow up of 3 couples in the non-restrictive group on T2, therefore the T2 data of these 3 couples was excluded for the T2 analyses and for the T1 versus T2 analyses.

On T2 all of our included patients were discharged.

Figure 1 : Flowdiagram timeline



Results T1 (restrictive versus non-restrictive group)

The total PBQ score on factor 1 (general bonding) was compared between the two groups and initially no significant difference was found. However reviewing the separate data of the non-restrictive group one extra-ordinary high result stood out (Figure 2), it differed greatly from the main trend of result in this group. When this single score was considered an outlier and excluded from the non-restrictive group, there was a significant difference ($p=0.019$) between the restrictive (mean score 5.41) and non-restrictive group (mean score 2.50) at T1 with lower PBQ scores in the non-restrictive group. This indicates a better perceived parent-child bonding in a non-restrictive visitor arrangement.

No significant difference in EPD scores was found for both groups at T1.

Results T2 (restrictive versus non-restrictive group)

The total PBQ score on factor 1 (general bonding) and the EPD scores was compared between the two groups (restrictive group mean score 4.64, non-restrictive group mean score 5.54) and no significant differences was found at the age of 4 months postnatally.

Results T1 versus T2

The total PBQ score on factor 1 (general bonding) for both the restrictive (mean difference 0.50, $p=0.75$) and non-restrictive group (mean difference -2.58, $p=0.07$) was compared at T1 and T2 and no significant difference was found.

However, a significant difference for the EPDS between T1 and T2 for both the restrictive (T1 median 11.50, T2 median 5.50, $p=0.011$) and the non-restrictive group (T1 median 10.00, T2 median 8.00, $p=0.011$) with lower EPD scores on T2 was found, indicating fewer depressive feelings at the child's age of 4 months.

Daily time spent with child

Table 2 shows the different indications of time spent with the child filled in by the parents on T1 and T2. There is an evident difference between the groups consistent with the restrictive measures on T1. At T1 65% of the parents in the restrictive group spent 2-4 hours per day with their child, while in the non-restrictive group at T1 only 19% of the parents spent 2-4 hours per day with their child, while 50% spent 4-6 hours per day and 31% even more than 6 hours per day. At T2 equalization of time parents spent with their child in both groups is seen.

Table 2: Self-reported daily time spent with child

	T1: restrictive	T1: non- restrictive	T2: restrictive	T2: non- restrictive
<2 hours/day contact	0%	0%	0%	0%
2-4 hours/day contact	65% (N= 9)	19% (N=3)	7% (N=1)	0%
4-6 hours/day contact	21% (N=3)	50% (N=8)	7% (N=1)	23% (N=3)
>6 hours/day contact	14% (N=2)	31% (N=5)	86% (N=12)	77% (N=10)

Discussion

The forced restricted visitor policy for parents due to the COVID-19 pandemic provided a unique opportunity to look at the importance of physical closeness in the NICU on the parent-child bonding.

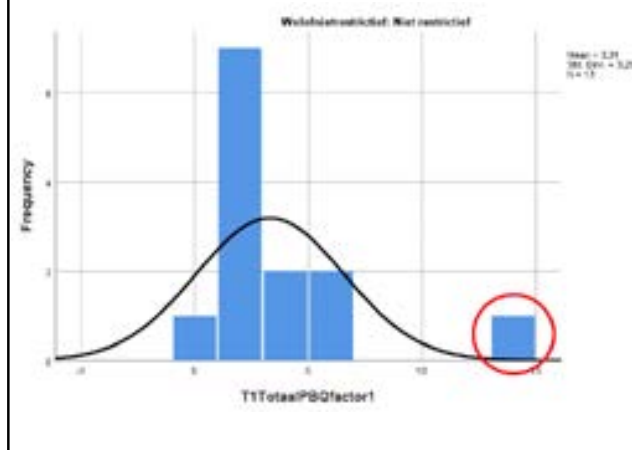
In this study we found a strong indication that restricted visitors' arrangements on the NICU had a negative impact on the early parent-child bonding.

Factors that might explain this impact are differences in SSC, a lower rate of really breastfeeding, a lesser extent of parental presence and skin to skin contact, interaction and the lack of the partners' support.

1. Skin to skin contact and parental presence

Previous studies have shown beneficial effects of physical contact between parent and infant with Kangaroo care and baby massage in the NICU (21, 22). The restricted visitor arrangement was implemented during the first COVID-19 lockdown in Belgium. With the national lockdown measures everybody had

Figure 2 : Data histogram of total PBQ factor 1 with a single outlying result



drastically less social obligations and more time at home. Many fathers were temporarily unemployed or working from home at their own rhythm during the whole period of the study. Since each parent had only 3 visiting hours a day, they both made great efforts to kangaroo as long as possible during these hours. When parents visit the baby together, we see that it is more likely the mother that will kangaroo during the visit. Together they could achieve a daily SSC-time of 6 h and sometimes even a little more: they were allowed to stay a bit longer when there were few parents present and distance could be guaranteed. Previous (2019) observations on the daily time of SSC on our NICU showed an average SSC time of 4 hours per day. A total time of SSC that to our experience was not less during the restricted visitors policy, but we did not measure the SSC-time exactly. On the other hand we saw that total time spent with the baby was less in the restricted group, compared to the non-restricted group.

On the other hand SSC is not always obvious for first-time fathers. Fathers tend to grow slower into parenthood. Their first concern is to protect the mother and their child. Their primary stress on the NICU is caused by loss of control. Involving them early in care for their premature baby frequently is, at first, an extra source of stress for them (23, 24). Since fathers in the restricted group were very quickly engaged in SSC, it could be that they experienced more stress at that time. This could have had a negative effect on the bonding with their child. In our study there were only 2 fathers that filled in the PBQ alone. This small sample size makes it impossible to make conclusions. Further research on the fathers of premature born children could give more insight in the importance of paternal skin-to-skin care.

2. Breastfeeding:

Breastfeeding has a positive effect on the mother-child binding process (11). Since mothers had maximal 2 options per day to breastfeed: at the beginning and at the end of their visit, this could have contributed to the negative impact on the parent-child bonding in this group. We did not collect data on the daily number of breastfeeding moments.

3. Presence of the partner

Another factor that might explain the negative effect of visit restrictions on parent-child bonding is the lack of presence of the parents' partner during the visit. There is little, but nevertheless increasing, literature on the role and importance of the father of a NICU patient (14). The support and presence of the partner can keep NICU-parents in emotional balance. Although all parents experience a lot of stress on the NICU, this does not need to be deleterious. The stress they undergo on the NICU can also be an opportunity to grow stronger as a couple and as a parent. From this point of view not allowing parents to be together near their baby could make them more insecure and might hinder bonding and interaction with their child.

Finally we can ask ourselves whether the more difficult bonding in the first week after birth is of importance for the further development of the baby,

when we see that this difference is levelled out at 4 months of age? Only few research is done on the effects of the quality of early parent-child bonding on later behaviour. In a literature review Thompson mentioned quite a few clinical studies that proved a strong relation between early attachment and specific personality features and anxiety disorders later on. But other studies in his review failed to confirm this (16). Nevertheless recent neuroscience research has demonstrated that early parent-child interaction defines the quality of connectivity between pallidum and temporal cortex, a trajectory for emotions and social behaviour. In depressed parents with lower parent-child interaction and lower bonding, less connectivity in this area was found (1). Other brain research indicates the importance of early (adverse) environment in the way the prefrontal cortex develops. The frontal circuits that originate from this prefrontal cortex have an important role in complex cognitive skills like decision-making and regulation of behaviour and emotions later on in life (25). Another clinical study investigated the effect of parental presence and infant holding on the neuro-development of the preterm infant and confirmed a positive effect of early parenting in the NICU on the neurobehavior of the child at term age (3).

A limitation in this study is the lack of exact data on SSC ratio and direct breastfeeding ratio in both groups. Secondly, only 6 to 7% of fathers filled in the questionnaire. Having parents fill in the questionnaires separately might have given more insight in the underlying mechanisms that hindered parent-child bonding in case of visit restrictions. The biggest limitation of this study however was the small sample-size. This sample-size was determined by the limited time frame with the restricted visitor arrangement during the first lockdown. There was a lower admission-rate at our NICU in these months, which is now confirmed in different studies (26). This unfortunately also caused a lower inclusion for this study then initially expected. However, even with this smaller sample-size the importance of a non-time restricted visitor arrangement for both parents and their babies was demonstrated.

Conclusion

This study strongly suggests that a restrictive visitor policy on the NICU has a negative effect on early parent child-bonding.

The findings of this study emphasize the need to develop a visitor arrangement that facilitates parent-child bonding, and also could help to encourage parents to spend more time together with their babies in the NICU. Especially, since early parent-child bonding can have implications for the child later on. Further long-term studies for a better understanding of the relationship between early bonding and the effects later in life are needed. The results of this study should also encourage hospital management to provide sufficient space and facilities for each preterm infant and their family, so they can really "be together", physically and emotionally.

Conflict of interest statement

The authors have no conflict of interest to declare.

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