Infants in a neonatal intensive care unit: parental response

J D Carter, R T Mulder, A F Bartram, B A Darlow

Objective: To compare the psychosocial functioning of the parents (mother and father) of infants admitted to a neonatal intensive care unit (NICU) with the parents of infants born at term and not admitted to the NICU.

Design: Random sample of NICU parents and term non-NICU parents were assessed across a variety of psychometric and psychosocial measures shortly after the birth of their infant.

Setting: Christchurch Women's Hospital, New Zealand. Labour ward and level III NICU.

Participants: A total of 447 parents (242 mothers; 205 fathers) with an infant admitted to a regional NICU during a 12 month period; 189 parents (100 mothers; 89 fathers) with infants born at term and not requiring NICU admission.

Main outcome measures: Depression and anxiety symptoms, psychosocial functioning.

Results: Overall, levels of anxiety and depression were low in both parent groups. Compared with control parents, a higher percentage of NICU parents had clinically relevant anxiety and were more likely to have had a previous NICU admission and be in a lower family income bracket. Infant prematurity was associated with higher levels of symptomatology in both NICU mothers and fathers.

Conclusions: Specific interventions are not needed for most parents who have an infant admitted to the NICU as they appear to adapt relatively successfully. Infant prematurity impacts negatively on the father as well as the mother. Consequently these parents may benefit from increased clinical attention.

METHODS

Participants and setting

The participants in this study are parents residing in the central Canterbury province who had an infant in the Christchurch Women's Hospital labour ward or the NICU. The Christchurch Women's Hospital NICU is the only level III centre in a geographical region that has 7000 births annually, and consequently all sick newborns are admitted to this unit. Criteria for NICU admission are birth weight <1800 g, gestation <34 weeks, or any illness in the infant such as respiratory distress. Families were not eligible if it was known that the infant would go straight into foster care or be adopted (12 families). The only exclusion criterion was lack of written informed consent. A table of random numbers was generated to select 300 families from the sequential admission register for the NICU in one calendar year (February 2001 to February 2002). Owing to a higher than expected proportion of admissions to the unit coming from outside the region during the enrolment period, recruitment was falling below the target number so in the last four months of the target year all eligible admissions were approached to participate in the study. The obtained sample is thus representative of the births resulting in admissions to the NICU in the target year. Total admissions to the NICU in the target year were 578 infants. In all, 296 families were approached to participate in this study. Of these, 242 (82%) gave written informed consent (242 mothers; 205 fathers).

The control group for this study was recruited as part of a larger companion study. A representative sample of families who were usually resident in central Canterbury province and whose infant had not been admitted to the NICU were selected from the sequential register of births held in the delivery ward of the Christchurch Women's Hospital by sampling every eighth birth not admitted to the NICU.

Abbreviations: DAS, dyadic adjustment scale; EPDS, Edinburgh postnatal depression scale; HADS, hospital anxiety and depression rating scale; NICU, neonatal intensive care unit; SAS, social adjustment scale
Eligible families were then approached to be recruited into the larger project. As part of this process, one in every three eligible families was selected at random (using a table of random numbers) to be recruited as a control group for this study (n = 100). Of the 120 families approached, 100 (83%) families (100 mothers; 89 fathers) consented to participate in the study.

 Procedure
After informed written consent had been obtained, an experienced interviewer met each parent to conduct an assessment. This usually occurred within three weeks of the infant’s date of admission (mode 13 days, mean (SD) 17 (11.2) days). The assessment consisted of a clinical interview14 and self report questionnaires assessing depression and anxiety symptoms: Edinburgh postnatal depression scale (EPDS)15; hospital anxiety and depression rating scale (HADS).16 The quality of the couple relationship and social adjustment were also examined: the dyadic adjustment scale (DAS)17; social adjustment scale (SAS).18 Mothers and fathers were interviewed separately, and they completed self report questionnaires independently of each other.

 Infant characteristics
Assessment of infant health status was collected in a companion study. The gestation of NICU infants ranged from 23 to 42 weeks (mean (SD) 35.1 (3.8)), and weight ranged from 370 to 4850 g (mean (SD) 2477 (889.1)). The control group included one set of twins. Control group infant gestation ranged from 36 to 42 weeks (mean (SD) 40.0 (1.2)), and the weight ranged from 2260 to 4940 g (mean (SD) 3518 (491.6)). Of the NICU infants, 19% (49, including seven sets of twins and one set of triplets) had a gestation of less than 33 weeks, 32% (85, including nine sets of twins) had a gestation of 33–35 weeks, and 59% (129, including three sets of twins) were near or full term (36–42 weeks). The most common reasons for term infants to be admitted to the NICU were respiratory distress (36%), hypoglycaemia (16%), suspected sepsis (9%), feeding difficulties (8%), possible hypoxic-ischaemic encephalopathy (7%), jaundice treatment (6%), and surgical conditions (5%).

 Statistical analysis
Basic characteristics, pregnancy related factors, and psychiatric history were compared between groups independently for mothers and fathers using \( t \), \( \chi^2 \), and non-parametric Mann-Whitney U tests. Current psychological functioning was compared between NICU and control groups using a mixed model analysis of covariance, which allowed for the dependence of the data derived from mothers and fathers from the same family. The appropriateness of parametric analyses of the measures of psychological functioning was verified graphically by assessing the normality of residual plots. Probable cases of anxiety and depression were

### Table 1 Comparison of basic details across neonatal intensive care unit (NICU) mothers with control mothers and NICU fathers with control fathers

<table>
<thead>
<tr>
<th></th>
<th>Mothers (n = 342)</th>
<th>Fathers (n = 294)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NICU</td>
<td>Control</td>
</tr>
<tr>
<td>Age (years)</td>
<td>30.1 (5.4)</td>
<td>30.7 (5.4)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>58% (140)</td>
<td>68% (68)</td>
</tr>
<tr>
<td>De facto</td>
<td>30% (73)</td>
<td>22% (22)</td>
</tr>
<tr>
<td>Never married</td>
<td>10% (23)</td>
<td>9% (9)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtained one or more subject in school certificate</td>
<td>74% (179)</td>
<td>83% (83)</td>
</tr>
<tr>
<td>Completed sixth form</td>
<td>55% (133)</td>
<td>61% (61)</td>
</tr>
<tr>
<td>Completed seventh form</td>
<td>32% (77)</td>
<td>40% (40)</td>
</tr>
<tr>
<td>Completed further tertiary qualification</td>
<td>52% (126)</td>
<td>56% (56)</td>
</tr>
<tr>
<td>Trade/secretarial qualification</td>
<td>48% (61)</td>
<td>52% (29)</td>
</tr>
<tr>
<td>Professional qualification</td>
<td>52% (65)</td>
<td>52% (29)</td>
</tr>
<tr>
<td>Family income over past year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $15000 a year</td>
<td>7% (16)</td>
<td>6% (6)</td>
</tr>
<tr>
<td>$15000 to &lt; $25000 a year</td>
<td>17% (40)</td>
<td>12% (12)</td>
</tr>
<tr>
<td>$25000 to &lt; $40000 a year</td>
<td>20% (49)</td>
<td>11% (11)</td>
</tr>
<tr>
<td>$40000 to &lt; $50000 a year</td>
<td>17% (41)</td>
<td>12% (12)</td>
</tr>
<tr>
<td>$50000 to &lt; $70000 a year</td>
<td>19% (46)</td>
<td>18% (18)</td>
</tr>
<tr>
<td>$70000 and over a year</td>
<td>20% (49)</td>
<td>41% (41)</td>
</tr>
</tbody>
</table>

*Significantly different from NICU parent, \( p = 0.001 \) (Mann-Whitney U test).

### Table 2 Comparison of neonatal intensive care unit (NICU) mothers with control mothers and NICU fathers with control fathers across pregnancy related factors

<table>
<thead>
<tr>
<th></th>
<th>Mothers</th>
<th>Fathers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NICU</td>
<td>Control</td>
</tr>
<tr>
<td>Number of previous pregnancies</td>
<td>1.7 (2.3)</td>
<td>1.6 (1.5)</td>
</tr>
<tr>
<td>Age first pregnant</td>
<td>24.9 (6.1)</td>
<td>25.6 (5.9)</td>
</tr>
<tr>
<td>Number of live births (incl current)</td>
<td>2.0 (1.2)</td>
<td>2.0 (1.0)</td>
</tr>
<tr>
<td>Had a previous NICU admission</td>
<td>17% (42)</td>
<td>9% (9)</td>
</tr>
<tr>
<td>Regarded the pregnancy as planned</td>
<td>29% (143)</td>
<td>62% (62)</td>
</tr>
</tbody>
</table>

*Significantly different from NICU mother, \( \chi^2 = 3.893, \ p = 0.048 \).
compared independently for mothers and fathers using logistic regression. The effect of gestational age on psychological functioning was explored separately for mothers and fathers using analysis of covariance, and, where this indicated a significant effect of gestational age, Fisher’s protected LSD tests were used for pairwise comparisons among the four gestational age groups.

### RESULTS

#### Basic characteristics

There were no significant differences in age, marital status, or education between the NICU and control mothers and fathers (table 1). The only difference was in income, where 40% of control families earned over $70 000 a year compared with only 20% of NICU families (table 1). Because of the possible confounding effects of income and group status (NICU v control), further analyses on symptoms and probable cases incorporated income as a covariate.

#### Pregnancy factors

There were no significant differences in the number of previous pregnancies, age at first pregnancy, number of births, and percentage of the parents who regarded the pregnancy as planned (table 2). NICU mothers were significantly more likely than control mothers to have had an infant previously admitted to an NICU.

#### Psychiatric history

There were no significant differences between groups in the rate of past depression, past alcohol problems (abuse and dependence), and past mental health treatment received (table 3).

#### Current psychological functioning

Symptom averages

Overall, the mean level of depressive and anxiety symptoms in the NICU and control groups were low. There was no significant difference between NICU and control parents on the average HADS depression subscale. The NICU parents had significantly higher HADS anxiety scores than the control parents (5.9 (3.8) vs 4.7 (3.1), p = 0.010). Similarly, the NICU parents had higher total HADS scores than the control parents (9.7 (7.0) vs 8.1 (5.2), p = 0.034). There was no significant difference between NICU and control parents on the average EPDS scores. There were no significant differences between the NICU and control groups on levels of social adjustment (SAS) and perceived quality of their couple relationship (DAS).

#### Probable cases of depression or anxiety

A score of 11 or greater on the HADS and 12.5 or greater on the EPDS indicates a probable—that is, clinically relevant—case of depression or anxiety. Probable anxiety was found in 11% (20/180) of the NICU fathers and 3% (2/80) of control fathers (p = 0.045), and 18% (35/199) of NICU mothers and 7% (6/93) of control mothers (p = 0.023). Four per cent (7/180) of NICU fathers were probable cases of depression on the HADS. No control fathers had HADS depression scores over 11. Six per cent (11/199) of NICU mothers and 4% (4/93) of control mothers were probable cases of depression on the HADS (p = 0.769). Six per cent (10/181) of NICU fathers and 1% (n = 1/79) of control fathers were probable cases of depression on the EPDS (p = 0.190). Twenty two per cent (45/202) of NICU mothers and 12% (n = 11/92) of control mothers were probable cases of depression on the EPDS (p = 0.080).

#### Current psychological functioning and gestation: fathers

Fathers with an infant in the NICU (regardless of gestation) had higher total HADS scores and anxiety subscale scores than control fathers. Fathers who had very premature infants (<33 weeks) had significantly higher depressive symptoms scores on the EPDS than fathers of full term infants in the NICU or in the control group (table 4).

#### Current psychological functioning and gestation: mothers

For mothers, there were significant differences within the NICU gestation groups. Specifically, increasing prematurity was associated with increasing HADS total and depression scores on the EPDS than fathers of full term infants in the NICU or in the control group (table 4).

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### Table 3

A comparison of the psychiatric history of neonatal intensive care unit (NICU) mothers with control mothers and NICU fathers with control fathers

<table>
<thead>
<tr>
<th></th>
<th>Mothers</th>
<th></th>
<th>Fathers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NICU</td>
<td>Control</td>
<td>NICU</td>
<td>Control</td>
</tr>
<tr>
<td>Life time diagnosis of major depressive episode</td>
<td>27% (66)</td>
<td>26% (26)</td>
<td>21% (42)</td>
<td>11% (10)</td>
</tr>
<tr>
<td>Alcohol abuse (life time)</td>
<td>9% (21)</td>
<td>12% (12)</td>
<td>14% (28)</td>
<td>23% (20)</td>
</tr>
<tr>
<td>Alcohol dependence (life time)</td>
<td>10% (25)</td>
<td>6% (6)</td>
<td>13% (26)</td>
<td>8% (7)</td>
</tr>
<tr>
<td>Ever had psychotherapy or counselling</td>
<td>39% (94)</td>
<td>38% (38)</td>
<td>28% (58)</td>
<td>22% (19)</td>
</tr>
<tr>
<td>Ever attended an outpatient specialist mental health service</td>
<td>10% (23)</td>
<td>9% (9)</td>
<td>3% (7)</td>
<td>2% (2)</td>
</tr>
</tbody>
</table>

Values are percentage (number).

### Table 4

Current psychological functioning across infant gestational age in fathers only

<table>
<thead>
<tr>
<th></th>
<th>NICU (n = 30)</th>
<th>NICU (n = 53)</th>
<th>NICU (n = 97)</th>
<th>Control (n = 80)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>33 weeks</td>
<td>33–35 weeks</td>
<td>36–42 weeks</td>
<td>36–42 weeks</td>
</tr>
<tr>
<td></td>
<td>p Value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HADS total score</td>
<td>9.6 (6.4)</td>
<td>8.5 (6.6)</td>
<td>8.3 (6.7)</td>
<td>6.2 (6.3)</td>
</tr>
<tr>
<td>Anxiety subscale</td>
<td>6.0 (3.6)</td>
<td>5.4 (3.7)</td>
<td>5.1 (3.8)</td>
<td>3.8 (3.5)</td>
</tr>
<tr>
<td>Depression subscale</td>
<td>3.7 (3.7)</td>
<td>3.1 (3.8)</td>
<td>3.2 (3.9)</td>
<td>2.4 (3.7)</td>
</tr>
<tr>
<td>EPDS total score</td>
<td>6.1 (4.0)</td>
<td>4.6 (4.1)</td>
<td>4.3 (4.2)</td>
<td>3.5 (4.0)</td>
</tr>
</tbody>
</table>

Values are mean (SD). HADS, Hospital anxiety and depression scale; EPDS, Edinburgh postnatal depression scale.
subscale scores. There was no significant difference between the NICU mothers of full term infants and the control mothers of full term infants (table 5).

**DISCUSSION**

**Depression and anxiety**

Overall, the average level of anxiety and depressive symptoms in both the NICU and control parents was low, suggesting that for most parents the hospital experience was not associated with obvious depression or anxiety, even if their infant was admitted to an NICU. The latter finding is contrary to generally held assumptions that the NICU experience and environment is intrinsically distressing for all parents.

Although symptom scores were modest overall, significantly more of the NICU mothers (18%) and fathers (11%) did have clinically relevant anxiety symptoms (probable cases) compared with control mothers (7%) and fathers (3%). The nature of the relationship between having an infant in the NICU and heightened anxiety in mothers and fathers is uncertain. It is possible that higher levels of anxiety and depression during pregnancy may lead to an increased chance of having an infant requiring admission to an NICU; however, there was no significant difference in the psychiatric history of NICU and control parents in this study. A more likely explanation is that the combination of a parent’s personal psychological resources, contextual sources of support and stress, and infant health status all interact to determine parental response.

The percentage of NICU and control parents with clinically relevant depressive symptoms, measured on the HADS and the EPDS, was not significantly different. Although originally designed for use with mothers, several studies have used the EPDS with fathers. In their recent study, Matthey et al. validated the EPDS for men and reported that this questionnaire is a reliable and valid measure of mood in fathers. These researchers also suggested that the cut off for a case for fathers may be two points lower than the cut off for mothers. It is possible therefore that the same cut off for mothers and fathers, which was used in this study, may underestimate the probable cases of depression in fathers.

**Basic and psychosocial variables**

The parents of NICU and control infants were very similar with respect to their basic characteristics, a number of pregnancy related factors, social adjustment, and couple functioning. The mothers of NICU infants were more likely to have had an infant previously admitted to the NICU, and NICU families were in a lower income bracket. Studies with low birthweight infants have also reported the latter finding and also report that infants born into socioeconomically disadvantaged families are at increased health risk. It is noteworthy that, in this study, increased rates of anxiety symptoms in NICU mothers and fathers compared with control mothers and fathers remained when family income was taken into account.

**Impact of prematurity**

Given that most of the previous research has focused on the impact on parents of having a premature infant, we also examined the effect of gestation on current psychological functioning. For NICU fathers, anxiety symptoms shortly after the birth of their infant were associated with having an infant admitted to the NICU, but not with prematurity per se. In contrast, increased depressive symptoms were associated with prematurity for both mothers and fathers. These results confirm the findings of previous research on the impact of infant prematurity or low birth weight on mothers functioning. Our results also extend the research in this area by showing that the impact of low birth weight and prematurity is not confined to the mother, but similarly impacts on fathers, in addition to the stress of having an infant admitted to the NICU.

**Strengths and weaknesses**

In contrast with other research in this area, the sample for this study was selected from a large geographical catchment area and therefore included parents with diverse socioeconomic status and infant health status. In addition, by recruiting parents who did not have an infant admitted to the NICU, we were able to compare their experience with that of the NICU parents, including the experience of fathers. A weakness of this study is that parental psychiatric and psychosocial functioning was based on self report measures. The recruitment strategy was changed in the last four months of the target year to overcome the lower than expected recruitment rate. However, the sample obtained is still representative, and we consider it unlikely that this sampling process will have affected the results of this study.

**Implications of research**

Overall, this study suggests that, at least initially, most parents make a relatively successful adaptation to having their infant admitted to the NICU, and therefore the addition of a general intervention—that is, beyond those measures already in place—targeted at all parents with an infant admitted to the NICU is not necessary. In common with many NICUs, the Christchurch Women’s Hospital unit has, over the past decade, adopted several aspects of care designed to create a “parent friendly” atmosphere. These aspects of care include open access to the NICU and the infant’s medical record, involvement in clinical decision making, skin to skin contact between parents and infant(s) from an early stage, and having a named clinical nursing coordinator as the prime contact person.

There is, however, a small but significant group of mothers and fathers who do suffer from significant distress, and this group may benefit from intervention. In particular, increased attention to the parents, including the father, of premature infants born into socioeconomically disadvantaged families is warranted.
infants may be warranted. Follow up research in this sample is being conducted to determine if any psychological distress persists over time and also to determine the factors that identify this group. Once identified, interventions specifically targeted to the needs of these parents can be implemented.

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