

THE COURSE OF DEPRESSION IN MOTHERS OF PREMATURE INFANTS IN HOSPITAL AND AT HOME

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ABSTRACT

The risk of continuing depression in mothers of very premature infants after discharge has not been studied in any depth. This study compared reports of maternal depressive symptomatology at one month after infant birth (Phase 1) and three months following infant hospital discharge (Phase 2). Fifty-two mothers completed the Edinburgh Postnatal Depression Scale at these two points in time. Results indicate that the percentage of mothers who reported high levels of depressive symptoms significantly decreased between Phase 1 and Phase 2. Logistic regression analysis indicated that depression scores at Phase 1 and maternal stress at Phase 2 were important factors in explaining depression scores at Phase 2.

BACKGROUND

In Australia, premature birth accounts for 7.3% of all births with approximately one in five of these being less than 32 weeks gestation (Day et al 1997). Over the past three decades, significant advances in the medical management of critically ill premature infants have resulted in unprecedented rates of survival of small premature infants especially those of extremely low birth weight (<1000grams) (Lee et al 1995; Vohr and Msall 1997; Raddish and Merritt 1998). These medically fragile infants can spend weeks and months separated from their parents receiving life saving treatment in the neonatal nurseries.

While the infant's hospitalisation is stressful for mothers, the transition home does not always mean the infant's problems are resolved and such circumstances introduce new challenges to parents' adaptation and coping ability (Affleck et al 1991).

Going home with their baby is often eagerly anticipated but can be stressful for parents who will assume full responsibility for an infant who for weeks or months has been regarded as medically fragile and in the care of experts (Easterbrooks 1988; Miles and Holditch-Davis 1997).

A number of studies have found that parents feel ill equipped to assume full responsibility for their infant at discharge (Brooten et al 1989; Kenner and Lott 1990). In the weeks following discharge parents continue to feel anxious about infant care issues, how to recognise infant illness, understanding growth and development and fearing for their infant whom they still view as sick (Brooten et al 1989; Kenner and Lott 1990). In many cases parents must give care to a sick infant whose needs

are beyond the needs of a normally developing infant (Patterson et al 1994; Sterling et al 1996). It has also been reported that premature infants are more difficult to parent than full-term infants, at least for the first year of life, as they tend to be less adaptable, less predictable, and fussier than their term counterpart probably because of neurological immaturity (Gennaro et al 1990; Gottwald and Thurman 1990). These aspects of the infant's behaviour and atypical infant responses may affect parent-infant interaction and complicate the developing relationship (Harrison and Magill-Evans 1996).

Together, these difficulties can create additional stress that can lead to depression (Mercer 1990) and mothers of these infants have been shown to be at greater risk of psychological distress than mothers of term infants (Pederson et al 1987; Gennaro 1988). However, there have been few studies into the extent to which depressive symptomatology continues for mothers after infant discharge. Studies have found initially high levels of maternal psychological distress in the neonatal period subsided by eight to 12 months after discharge (Brooten et al 1988; Singer et al 1999). However, women with premature infants have been shown to demonstrate evidence of depression prior to infant discharge and at one month after discharge (Logsdon and Davis 1997). In another study of maternal depression, 33% mothers of infants in NICU showed high levels of psychological distress, three to five weeks after infant admission and a further 41% were significantly distressed at six months - corrected for prematurity (Thompson et al 1993). Miles et al (1999) also reported elevated but comparable rates of depression at the time of hospital discharge (42%) and 12 months later (36%).

There has been little consensus regarding which mothers of very premature infants are most at risk and which maternal or infant characteristics best predict maternal depressive symptoms (Meyer et al 1995). Some studies have found that the severity of the infant's illness has been related to increased rates of depression (Blumberg 1980; Minde 1983; Singer 1999) but others have not (Gennaro et al 1990; Thompson et al 1993).

In general, research indicates that postpartum depression develops as a consequence of a complex interplay of biological and psychosocial risk factors (O'Hara 1997; Cooper and Murray 1998). Studies have also drawn attention to protective factors that reduce the risk of depression developing (Affleck et al 1991).

Social support research has established many links between supportive elements within family relationships and individual outcomes including psychological distress or coping with stressful life events (Pierce et al 1996). Researchers have found that the stress buffering role of social support was related to improved psychological adjustment in mother's of premature infants (Affleck et al 1991) and that parents who have effective social networks are better adjusted and interact in more optimal ways with

their child (Dunst et al 1986). Researchers are now examining both risk and resiliency factors in relation to postpartum depression.

Theoretical models have attempted to provide ways to understand how families adapt to differing stages of childhood illness including the birth and transition home of a very premature infant. The Resiliency Model of Family Stress, Adjustment and Adaptation (McCubbin et al 1996) suggests that two related but discernible phases mark a family crisis: namely adjustment and adaptation. Adjustment is described as the family's initial response to a crisis event during which the family attempts to meet demands utilising existing resources or resistance capabilities (McCubbin and McCubbin 1993). The adaptation phase describes the outcome of the family's efforts to bring about a new level of functioning in response to a family crisis situation (McCubbin and McCubbin 1993). During the adaptation phase the family attempts to restore family stability by acquiring new resources and coping behaviours. Families who are able to marshal their resources may respond with resiliency and adaptive functioning.

A family's coping behaviours consist of cognitive and behavioural efforts to manage psychological stress (Lazarus 1993). Family change and adaptation over time is the primary focus of the Resiliency Model and denotes the outcome of family efforts to bring a new level of balance, harmony, coherence, and functioning to a family crisis situation (McCubbin et al 1996). The Resiliency Model attempts to delineate post-crisis variables that may influence the family's ability to achieve adaptation, including critical psychological, social and coping factors that may affect adaptation.

In this study, the adjustment phase or Phase 1 (P1) denoted the period at one month after infant admission to a neonatal intensive care unit (NICU) while the mothers of very premature infants were in the process of adjusting to the crisis of premature birth. Those mothers who agreed to participate at P1 also gave consent for the researcher to visit them three months after their infant had been discharged home. This time was considered as the adaptation phase or Phase 2 (P2) when mothers had time to adapt to the practical and emotional effects of caring for their very premature infant.

PURPOSE OF THE STUDY

This paper reports the second phase in a two-phase study investigating variables associated with maternal reports of depressive symptomatology at three months after the infant was discharged from hospital (Phase 2). The results of the first phase (P1) are the subject of another paper, but generally indicated that many mothers suffered considerable psychological distress while their infant was hospitalised. The purpose of the second phase of the study was to visit these mothers again at three

months after infant hospital discharge to compare maternal depressive symptomatology and factors that influence depressive symptoms across time. Specifically, the study aims to determine if critical psychosocial and demographic factors measured at P1 and P2 are associated with depressive symptoms at P2.

Research hypotheses

- On the basis of the literature reviewed, it was hypothesised that: Mothers with a previous history of depression and limited formal education reported limited social support, high levels of stress and depressive symptoms, limited use of coping strategies, and with infants of low gestational age, birth weight and Apgar scores during P1 would report higher levels of depressive symptomatology at P2.

- After controlling for P1 depression: Mothers who reported limited social support, high levels of stress, limited use of coping strategies at P2 and had infants who had longer hospital stays and a high risk of developmental delay would report higher levels of depressive symptomatology at P2.

METHOD

Participants

All mothers of singleton premature infants born at less than 32 weeks gestation, without congenital anomalies and cared for at least three weeks in the neonatal nurseries of a local tertiary referral hospital were eligible to participate in the study. Mothers were required to be able to read and converse in English and live within a 200km radius of the participating hospital.

Procedure

The institutional and university ethics committees approved the follow-up protocol. Sixty-two mothers participated in the first phase of the study by completing a survey questionnaire at one month after infant admission to the neonatal nurseries. In giving informed consent, participants gave the researcher permission to visit them in their homes at three months after infant discharge from hospital.

At P2, all of the P1 mothers were contacted. Of the original 62 mothers, five were unable to be followed up due to infant rehospitalisation (two) and social issues (three). Four mothers were not traceable and there was one infant death. Fifty-two mothers made up the final comparison sample.

Instruments

Mothers completed a survey questionnaire which contained a number of previously validated research instruments drawing on the concepts contained within the Resiliency Model. This model focuses on the stress response (depression and stress measures), resources

a family has (ie support) and what a family does in response to a stressful event (ie coping behaviours). The questionnaires which were included are described below.

Edinburgh Postpartum Depression Scale

The 10-item Edinburgh Postpartum Depression Scale (EPDS) (Cox et al 1987) is a well-validated and widely used screening tool for depression after childbirth. Each item is scored on a 4-point scale (0-3), the minimum and maximum total score ranging from 0-30, respectively. In this study a score of 12 and above was used as a cut-off for depressive symptomatology.

Stress Scale of the Depression, Anxiety and Stress Scale

The stress scale of Depression Anxiety Stress Scales (DASS) (Lovibond and Lovibond, 1995) contains seven questions each scored on a 4-point scale (0-3), and a minimum and maximum total score ranging from 0-40. Higher scores indicate higher levels of stress.

Social Support Interview

The Social Support Interview (SSI) was designed to assess post-partum social support provided by, and given to, a participant's spouse/partner, closest confidant and closest parent (O'Hara et al 1982; 1983). The SSI asks the participant to give a rating from no person available (0) and never to always (1-5), for each identified sources of support (spouse, parent and confidant). Summing across the questions give a total support score ranging from 0-135. A high score reflects a high level of perceived support.

The Nurse Parent Support Tool

The Nurse Parent Support Tool (NPST) (Miles et al 1999) is designed to measure a mother's perception of nursing support during their infant's hospitalisation. Parents are asked to rate the amount of nursing support received on a Likert-type rating scale ranging from '1' almost never to '5' almost always. The scores are summed and divided by the number of items completed (21). The range of scores is from 1-5 with the higher scores reflecting a greater amount of perceived support from staff.

Coping Health Inventory for Parents

The Coping Health Inventory for Parents (CHIP) (McCubbin et al 1983) is a coping measure used to assess parents' appraisal of their coping responses when their infant is seriously ill. The CHIP consists of a checklist of 45 specific behaviours. The CHIP asks parents to record on a scale of 0-3, how helpful each behaviour is in their particular family situation. Summing across the questions gives a total support score with higher scores indicating greater satisfaction with coping behaviours.

Neurobiologic Risk Score

The principal researcher collected the following information from the maternal and infant hospital records.

The infant Neurobiologic Risk Score (NBRS) (Brazy 1991) was developed in response to the need for an assessment tool that provides early identification of infants who are at high risk for neurodevelopmental abnormality. The seven-item NBRS instrument uses a progression of scores (ie 0, 1, 2, 4) to assess the presence, duration and severity of a medical event. Three neurobiological risk groups are identified: Low risk (0-4), intermediate risk (5-7) and high risk (>8). The principal researcher and the director of neonatology determined the NBRS for participants from chart data after infant discharge. Maternal demographic data including education and a previous history of depression were collected. Infant data included birth weight (grams) gestational age (weeks) and total length of hospital stay (LOS).

Preparation for data analysis

An independent samples t-test was performed to compare the mean EPDS scores between those who continued in the study and those who were lost through attrition. Results indicated that the differences in the means were not significant ($p=0.477$).

Also, there was a difference in the timing of administration of the P2 questionnaire resulting from differing lengths of infant hospitalisation. To test if there was a relationship between length of time to follow-up and P2 depression scores, the correlation between the two variables was examined. Results indicated there was not a significant association between the length of time to follow-up and P2 depression scores ($r=0.148$, $p=0.136$).

Multivariable logistic regression analysis was carried out to examine the relationship between P2 maternal depressive symptomatology and a range of P1 and P2 variables associated with self-reported depression. In preparation for data analysis, bivariate associations were examined. Only those variables with significant associations with the dependent variable were entered into the final logistic model.

Results

The sample characteristics had not changed greatly from the P1 sample. The majority of mothers in the sample were born in Australia (94.2%). The mother's ages ranged from 18-42 with the mean age of 29 years (sd 5.5) and 77% (41) had completed secondary or tertiary education. While for 60% (31) of mothers, this was their first baby, a further 23% (12) reported that this was their first premature infant. Fifteen percent (8) reported having had a previous history of depression. An overwhelming majority of mothers (96%) reported having a supportive spouse or partner in whom they could confide.

The infants gestational ages ranged from 24-32 weeks with a mean of 28 weeks (sd 2.5) and birth weight ranged

from 513-2002 grams with a mean of 1092 grams (sd 365). Apgar scores at one minute ranged from 1-9 with a mean of 5.75 (sd 2.48) and Apgar scores at five minutes ranged from 1-10 with a mean of 7.71 (sd 2.25). Infants were hospitalised between 26-179 days with a mean of 70 days (sd 30). Neurobiological Risk Scores ranged from 0-15 with a mean of 2.7 (sd 3). A vast majority of infants 81% (42) fell within the range of low risk for developmental delay while 9.6% (5) were at intermediate risk and a further 9.6% (5) were categorised at high risk for developmental delay.

During P1 just over 40% (25/62) of mothers scored significant depressive symptomatology however this number decreased to 17% (9/52) at P2, a level similar to the population prevalence of 10-15% (O'Hara and Swain 1996). However of the mothers who suffered significant depressive symptoms at P2, all but one had been depressed at P1.

A separate paired samples t-test was conducted to formally test the significance of the change in the EPDS scores between P1 and P2. Results showed strong evidence for a drop in EPDS scores across time ($p=0.001$) (P1= 10.54 to P2=7.33) indicating that mothers' depressive symptomatology did improve between the two time points. At P2, scores on the EPDS ranged from 1-25 (Mean 7.3 sd 5.29). Just over 17% (9) of the mothers scored >12 on the Edinburgh Postpartum Depression Scale, the threshold indicating probable depression (Cox et al 1987).

Initial bivariate associations of the P1 variables from the first hypothesis revealed that maternal socio-demographic and infant demographic were not statistically associated with the P2 depression scores. Only P1 depression scores were associated with P2 depression. To test the first hypothesis, a logistic regression examined the relationship between P1 depressive symptomatology and P2 depression scores. The logistic regression model were significant (2 12.93 (3), ($p<0.000$)). Depression scores reported while the infant was in hospital were significant ($p<0.05$) so that mothers who were depressed at P1 were 28% more likely to be depressed at P2 (OR 1.28 CI=1.02-1.59).

Bivariate associations with the P2 variables from the second hypothesis showed that maternal socio-demographic and infant hospital stay and morbidity risk were also not significantly associated with P2 depression scores. Only P2 stress scores were associated with P2 depression. Therefore only P1 depression scores and P2 stress scores were used in the final logistic regression model to examine the hypotheses of interest. After controlling for P1 depression scores a second logistic regression was conducted to examine the relationship between P2 depression and variables reported at P2. The logistic regression model was significant (2 20.99 (4), ($p<0.000$)). The mother's stress score was significant ($p<0.049$) indicating that as the mother's stress increased

the risk of depression also increased by 17% (OR 1.17 CI=1.00-1.35).

Discussion

The purpose of the study was to compare maternal reports of depressive symptoms across time and to test two hypotheses that certain maternal demographic, psychosocial and infant variables measured at P1 and P2 are associated with maternal depressive symptoms at P2.

It seems that maternal reports of depressive symptomatology decreased significantly at three months after infant discharge. This finding is consistent with previous work that showed that mothers experienced less psychological distress in the months after discharge (Brooten et al 1988; Singer et al 1999). However, the findings are not consistent with other studies that found elevated rates of maternal depressive symptoms after discharge (Thompson et al 1993; Miles et al 1999). It seems that evidence of continuing depression in mothers of very premature infants remains inconclusive.

The association between premature birth and postpartum depression has been reported in terms of women experiencing an adverse life stressor (Kumar and Robson 1984), or having an infant in NICU for an extended period (Gennaro 1988). However, the results from the current study can be interpreted in light of evidence suggesting that no one factor can be implicated as a 'cause' for postpartum depression; that it is a result of the complex interaction between biological and psychosocial risk factors (O'Hara 1997; Cooper and Murray 1998).

This suggests the birth of a very premature infant may not pose a threat to family adaptation in the presence of adequate family resiliency resources. The Resiliency Model examines the adaptational outcome as a function of the relationship between characteristics of the infant (degree of prematurity, birth weight, and neurobiological risk) and the characteristics of the mother (educational level) and the family's resources (social support and coping). The study's sample was generally well resourced with a majority of women living with supportive spouse or partner, having 12 years education or more, and infants who were at low risk for neurodevelopmental abnormality. It appeared that many mothers in the study had resolved their initial shock and by three months had adapted to the realities of caring for their premature infant as evidenced by the decrease in depression scores over time.

Nevertheless, the incidence of depression in this study is similar to the population prevalence and unlike mothers of full-term infants who experience shorter hospital stays, mothers of very premature infants remain in constant contact with the health care system until their infant is discharged. The neonatal period provides an ideal opportunity to screen for those women who may be most at risk. This provides an opportunity for staff to identify the mothers' depressive symptomatology and ensure

support systems are in place to reduce its continuation especially following discharge from hospital. The disabling symptoms of postpartum depression create disruption in family life when exceptional demands are being placed on a woman caring for a vulnerable infant (Holden 1994). In particular, the very premature infant is more vulnerable to the adverse effects of continued maternal depression because of his/her decreased responsiveness and increased need for appropriate stimulation (Field 1995). In order to prevent the development of more serious symptoms, it is crucial to identify and treat women with postpartum depression as early as possible (Beck 1998).

The first hypothesis was partially supported in that depression scores reported at one month after infant admission to hospital were significantly associated with depressive symptoms at three months post-discharge. There is a need for psychosocial and family services to be incorporated into neonatal follow-up services to evaluate maternal depression and adaptation since some studies have reported severe symptoms of psychological distress in mothers of high-risk premature infants at two years (Singer et al 1999). Referral for treatment may prevent the development of more serious symptoms that can have deleterious effects on the mother, family and infant.

The second hypothesis was also partially supported in that maternal reports of stress once at home with the infant were associated with depressive symptoms. While stress may be a result of many influences including the unique health care needs of an infant who may be temperamentally more difficult (Gennaro 1996), mothers were seen relatively early in the neonatal period when all young infants require substantial care giving efforts.

However, maternal stress and depression, through their impact on the quality of parenting and the caregiving environment, can have deleterious effects on parent-infant interaction, as well as the cognitive, emotional, and social developmental outcome of the infant (Sameroff and Fiese 1990). The effect of the other P2 variables including support and coping was not linked to P2 depression. Since the majority of mothers scored below the cut off for depression this result may reflect successful adaptive functioning when families are no longer in a state of crisis.

Other infant outcome variables including length of hospital stay and neurobiological risk were also not associated with P2 depressive symptoms. Although some studies have suggested that mothers whose infants were hospitalised longer may have a greater chance for physical and emotional recuperation than those with shorter stays (Brooten et al 1988; Tulman and Fawcett 1988), the length of hospital stay did not influence maternal depression in this study. Also, the severity of the infant's illness was not associated with depression, a finding supported by some studies (Gennaro et al 1990; Thompson et al 1993) but not by others (Blumberg 1980).

Results of the study need to be considered with caution due to the relatively small sample size; future studies would require a larger sample size to increase the study's power to detect effects, which are truly present. Results need to be interpreted within the limitations of the study, in particular the reliance on self-report data and the correlational nature of the study.

RECOMMENDATIONS

The findings have implications for health care policy given that the increased survival of very premature infants with neurodevelopmental abnormalities may lead to an intolerable family burden for those families with the least resources (McCormick 1997; Raddish and Merritt 1998). Findings from this study support the need for more longitudinal studies focusing on maternal stress and depressive symptoms in mothers of very premature infants and the factors that place a woman at continuing risk of depression. Once identified, postpartum depression is amenable to treatment. Early identification and intervention will promote family stability and enhance the long-term development of infants who are at both biological and psychosocial risk. Developing and practising preventive measures is cost-effective as well as humane and the importance of allocating scarce health care resources to prevention rather than treatment is increasingly acknowledged (Holden 1994).

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