SAMPLE CHAPTER FROM:

Modern Management of Perinatal Psychiatric Disorders

Second edition

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Puerperal psychosis

Early studies suggested that the few weeks after delivery are the time in a woman's life when she is at highest risk of a psychotic illness. Kendell *et al* (1987) demonstrated that in the 3 months following childbirth, a woman is more than 20 times more likely to be admitted with this diagnosis. However, Terp & Mortensen (1998), using women from the general population as controls, found that the relative risk (RR) of all admissions was only increased slightly (RR = 1.09) but that for a first admission with functional psychosis between days 2 and 28 after delivery the RR was 3.21. Harlow *et al* (2007) found a similar incidence of hospital admission in first-time mothers (0.01%), noting that this was largely confined to women who had previously had a psychotic or bipolar illness and that most of the postpartum episodes occurred within 4 weeks of delivery. Munk-Olsen *et al* (2006), using women who had delivered in the previous 11 to 12 months as controls, found the risk to be raised in the first 3 months; the highest risk for first-time mothers was 10–19 days postpartum (RR = 7.31). Similarly the risk of psychiatric out-patient contact for first-time mothers was increased in the first 3 months and highest 10–19 days after delivery (RR = 2.67). The prevalence for the first 3 months was 1.03 per 1000 births. Women with schizophrenia-like disorders were more likely to be admitted within the first month after delivery, and those with bipolar disorder in the first 2 months. Kendell *et al* (1976) identified a later peak of admissions from the 10th to the 24th month after delivery.

Puerperal psychoses are severe illnesses, which have their onset within 2–4 weeks of delivery and usually require admission. Affective illnesses predominate, most often fulfilling diagnostic criteria for major depression with psychotic features, mania or schizoaffective psychosis (Dean & Kendell, 1981; Meltzer & Kumar, 1985; Pfuhlmann *et al*, 1998). A proportion can only be classified as 'unspecified functional psychosis', and around half meet Leonhard's criteria for cycloid psychosis (Pfuhlmann *et al*, 1998).

Organic psychoses occurring in relation to childbirth have been recognised and documented since the time of Hippocrates and include idiopathic confusional states, stupor, post-eclamptic psychosis, infective

delirium, and delirium associated with anaemia and alcohol withdrawal (Brockington, 1996).

There are reports of subdural haematoma (Campbell & Varma, 1993), meningioma (Khong *et al*, 2007; Schwartz *et al*, 2013), acute encephalitis (Shaaban *et al*, 2012) and atypical posterior reversible encephalopathy syndrome (Kitabayashi *et al*, 2007) presenting with psychotic symptoms postpartum. Dhasmana *et al* (2010) describe a postpartum woman who presented with a mixed presentation of euphoria and aggressive behaviour, declaring that her baby possessed special powers and that she wished to harm her baby and herself. She later became mute and withdrawn, lacking insight. Platelets, fibrinogen and C-reactive protein were raised. A magnetic resonance imaging (MRI) brain scan revealed a transverse sinus thrombosis. A woman with memory problems, sensations of *déja vu* and mild headaches who became increasingly anxious with delusions that her baby was dying was admitted to a psychiatric unit with a diagnosis of puerperal psychosis. She was treated with olanzapine and electroconvulsive therapy (ECT) but after 3 days developed tonic–clonic seizures and was later diagnosed as having paraneoplastic encephalitis (Yu & Moore, 2011). Another woman with more marked confusion and who was less delusional than is usually seen in puerperal psychosis was subsequently found to have a late-onset urea cycle disorder (Fassier *et al*, 2011).

Organic psychoses, particularly infective psychoses, may be a common cause of puerperal psychosis in some low-income countries, or they may be a comorbidity (Ndosi & Mtawali, 2002). Forty-four per cent of mothers in a Tanzanian sample of mothers with puerperal psychosis had an infection, such as malaria, HIV, tuberculosis or infectious diarrhoea. Clinicians should therefore bear in mind that there might be an alternative diagnosis when assessing a woman with psychotic symptoms postpartum.

Phenomena

The early signs of illness are often non-specific, e.g. insomnia, agitation, perplexity and odd behaviour. Such symptoms can easily be overlooked or attributed to postpartum blues and their significance not recognised. However, the patient may be floridly psychotic within a few hours, as the onset is frequently very rapid and often occurs only a few days after delivery. Such symptoms occurring in a woman with a history of puerperal psychosis or bipolar disorder should be taken seriously as possibly indicating the onset of a recurrence.

When the symptoms of 58 patients with puerperal psychosis and 52 women with non-puerperal psychotic illnesses (including schizophrenia) were compared, the puerperal group were found to be less likely to have persecutory or systematised delusions, auditory hallucinations, odd affect and social withdrawal than the non-puerperal controls. However, they were more likely to have manic features such as elation, lability of mood,

rambling speech and distractibility, as well as having more confusion and an increased need to be supervised during tasks (Brockington *et al*, 1981). Conversely, in a South African study comparing 20 puerperal women with psychosis and 20 age-matched controls with mania (Oosthuizen *et al*, 1995), the puerperal group had more delusions of control, auditory hallucinations, blunted affect and emotional turmoil. However, these findings were limited by the following considerations: many women with puerperal psychosis have a depressive illness, but these individuals were excluded from the study; the patients were not randomly selected; and one-third of the puerperal group had a history of treatment for schizophrenia. Others have reported more anxiety and depressive symptoms, and increased lability of mood and disorientation in puerperal mania compared with non-puerperal mania (Ganjekar *et al*, 2013). Four cases meeting the criteria for delusional misidentification, as in the Fregoli syndrome, have been described (O'Sullivan & Dean, 1991).

Apparent cognitive deficits are not unusual. An American study compared 21 women who had childbearing-related affective psychoses with 96 women whose psychosis was not related to delivery. They found that the recently delivered group had 'more prominent symptoms relating to cognitive impairment and bizarre behaviour' and more homicidal ideas than the control group (Wisner *et al*, 1994).

Mood-incongruent delusions are not infrequent, e.g. delusions of reference or persecution – for example, the woman may believe that the nurses are trying to hurt her (Viguera *et al*, 2008). There may also be visual, tactile or olfactory hallucinations which again suggest an organic syndrome. Catatonic symptoms such as waxy flexibility, stupor, mutism, immobility and negativism have been reported in the literature (Hanson & Brown, 1973; Lai & Huang, 2004) and observed in clinical practice, but their true prevalence in the postpartum population is not known. One reported case of a postpartum woman with catatonic stupor was found to have an encephalopathy (Kitabayashi *et al*, 2007).

Epidemiology

The past few decades have seen a fall in mortality and morbidity from childbirth; however, this has not been paralleled by a fall in the incidence of puerperal psychosis, which has remained remarkably stable at 1–2 per 1000 deliveries (Meltzer & Kumar, 1985; Terp & Mortensen, 1998; Munk-Olsen *et al*, 2006; Harlow *et al*, 2007). However, if a woman has had a past episode, the risk rises to 1 in 7 (Kendell *et al*, 1987).

Risk factors for admission in the puerperium include being primiparous, being single, and having had a Caesarean section (Kendell *et al*, 1976, 1981, 1987; Meltzer & Kumar, 1985). This last study found an association with a history of perinatal death not found in the others. Paffenbarger (1964) also identified being older, having longer intervals between pregnancies, and

having had fertility problems as being risk factors. A large study of first-time mothers in Sweden ($n = 502\,767$), identified older age and being single as risk factors (Nager *et al*, 2005). Analyses on the same data-set found that those living in the poorest neighbourhoods had a significantly higher risk of admission (Nager *et al*, 2006). In a within-subject comparative study of 129 women with bipolar affective puerperal psychosis, Blackmore *et al* (2006) identified primiparity (odds ratio (OR) = 3.76) and delivery complications (OR = 2.68) as independent risk factors. More recent work has confirmed the association between primiparity and admissions for psychosis/mania (Bergink *et al*, 2011; Di Florio *et al*, 2014) and onset of recurrent major depression within 6 weeks of delivery (Di Florio *et al*, 2014).

There are differences in the sleep patterns of women in late pregnancy and the postpartum period that are more marked in first-time mothers. Women with puerperal psychosis may have had a longer labour and be more likely to have delivered at night than controls (Sharma *et al*, 2004), and sleep loss has been suggested as a final common pathway for various causal factors in the development of psychosis in vulnerable women (Sharma & Mazmanian, 2003).

In low- and middle-income countries (LMIC), there is high comorbidity with physical health problems, including anaemia, infection and edema proteinuria hypertension gestosis (Agrawal *et al*, 1990; Ndosi & Mtawali, 2002). However, some authors have noted the close match between the incidence, pattern of illness and associated findings in a Black African population and those described in the literature in populations in the Western world (Allwood *et al*, 2000). A recent study in the USA reported that women admitted to hospital with puerperal psychosis had 2.3 times higher odds of having complications such as infection, anaemia and venous or lactation problems, and that their infants had a 4.1 times higher odds of death within the first year of life (Hellerstedt *et al*, 2013).

Onset, course and prognosis

Paffenbarger (1964) reported that there was usually a 'lucid interval' after delivery, before the development of symptoms. One-third of his sample developed symptoms within the first week, 68% within the first month and 80% within 6 weeks. In a study of women admitted to hospital in Japan, half had an onset of illness in the first week postpartum and 56% in the second week; 80% became ill within the first month (Okano *et al*, 1998). However, a more recent study refutes the notion of a latent period, with 50% of bipolar women with a puerperal psychotic illness first experiencing symptoms on days 1–3, with 22% of onsets on day 1 (Heron *et al*, 2007). Early symptoms include feeling excited, elated or high, not sleeping, feeling energetic or active, and talking more (Heron *et al*, 2008). Others have reported a median onset at 8 days postpartum but with prodromal symptoms present earlier (Bergink *et al*, 2011).

There is often a time lag between onset of illness and admission. Several studies indicate that women with manic episodes are admitted more quickly than those with depressive psychoses (Dean & Kendell, 1981; Meltzer & Kumar, 1985; Okano *et al*, 1998), and that psychotic depressions onset earlier than non-psychotic illnesses (Meltzer & Kumar, 1985).

The course of illness can fluctuate and may involve very severe disturbance, but the prognosis for the acute episode is good, with most women making a good recovery (92.2% reported by Bergink *et al*, 2011) and returning to premorbid functioning. In the longer term, however, there is a risk of further episodes, both after subsequent pregnancies and at other times.

Brockington *et al* (1982) summed the findings of six studies published between 1956 and 1972 and estimated the combined risk of recurrence to be about one in five for each subsequent pregnancy. Others estimate it at 25–50%. For example, Pfuhlmann *et al* (2000) followed up women 6–26 years after a first-episode puerperal psychosis and observed a 47% recurrence rate after later deliveries. Puerperal recurrence after subsequent pregnancies in a 10-year follow-up was 75–80% for women whose index illness was a psychosis and 27.3% for those in whom it was depression (Garfield *et al*, 2004). The risk of non-puerperal episodes appears to be higher.

Da Silva & Johnstone (1981) found 50% of a sample of women admitted to hospital remaining well after 1–6 years' follow-up. Of the remainder, 2 had died by suicide, 3 were long-term in-patients, 14 were in out-patient care, 1 was on lithium but well, and 3 were unwell but not in treatment. They noted a poorer outcome in women with an index schizophrenic illness. Dean *et al* (1989) observed a 36% recurrence rate if the index episode was puerperal but 50% if it was not. Similar findings were reported by Schöpf & Rust (1994); others found a higher recurrence rate in those with index puerperal episodes (40% *v.* 31%), although this was a smaller sample (Hunt & Silverstone 1995). Videbech & Gouliaev (1995) followed up 50 women 7–14 years after their first psychotic episode, which was puerperal. Forty per cent of the women were not working to full capacity owing to mental disorder, and 60% had had recurrences, and schizophreniform symptoms in the index episode predicted incapacity to work. Only 4% of women had exclusively puerperal episodes.

Garfield *et al* (2004) followed up 66 women 10 years after hospital admission with a puerperal illness. The recurrence rate was 87.2% and the readmission rate 63.3%. The strongest predictor of recurrence was a past psychiatric history. Women with no previous psychiatric history or who had only experienced previous puerperal episodes did better at follow up (only 38.9% relapsed) than those who had a prior history of non-puerperal illness (70.9% relapsed). Most of the women in this study had a diagnosis of major depression. Of 61 women reviewed after 25 years since a puerperal psychotic episode (various diagnoses), 63.9% had had further episodes,

with the average number of episodes being 4.8 (Rohde & Marneros, 1993). A 9-year follow-up of women with clearly defined bipolar affective puerperal psychosis found 57% experiencing additional puerperal illnesses and 62% non-puerperal episodes (Robertson *et al*, 2005). A recent study of women a mean of 12 years after discharge reported diagnostic stability, with those who initially presented with an a unipolar or bipolar disorder having affective recurrences, and those whose postpartum diagnosis was a brief or cycloid psychosis shifting to a clear bipolar disorder with further recurrences (Kapfhammer *et al*, 2014).

In a retrospective study of 116 women (Blackmore *et al*, 2013), only 58% of those who experienced puerperal psychosis had a second pregnancy. Eighteen per cent of marriages ended after the puerperal psychosis episode. One-third of the women in this study had a past history of bipolar disorder (34%) or unipolar depression (55%). The recurrence rate of puerperal psychosis was 54%. A long duration of the first episode and a longer interval between the first and subsequent pregnancies were predictors. The rate of non-puerperal episodes (all bipolar) was 69%. Nager *et al* (2013) confirmed the high rate of non-puerperal readmission in a large study ($n = 3140$) but noted that this declined over time: 76% by the second year, 50% in years 6–10 and 29% after more than 20 years. Women with admissions prior to puerperal psychosis, lower levels of education and a diagnosis of schizophrenia were at highest risk of recurrence.

Psychosis in pregnancy

There are case reports of psychosis occurring (Brockington *et al*, 1990) and recurring during pregnancy (Glaze *et al*, 1991). Howe & Srinavasan (1999) report a case of Cotard's syndrome occurring around the 33rd week of pregnancy. The woman jumped out of the upstairs window of the obstetric unit, sustaining multiple fractures. Her baby was delivered by Caesarean section and she was treated with ECT. Friedman & Rosenthal (2003) reported a case of delusional disorder and borderline personality disorder in the third trimester. The patient was treated successfully with olanzapine and psychotherapy. Another report describes a woman presenting at 28 weeks gestation with symptoms initially appearing like eclampsia but becoming floridly psychotic within 48 h of Caesarean delivery of her infant. It was then assumed that her initial presentation had in fact been catatonic stupor (Ranzini *et al*, 1996). Menick (2005) reports 12.5% of women presenting to a hospital in Cameroon with childbirth-related psychotic disorders having become acutely ill while pregnant.

As with postpartum presentations, some acute neurological disorders may present with psychotic symptoms in pregnancy. McCarthy *et al* (2012) describe a case of anti-NMDA (*N*-methyl-D-aspartate) receptor encephalitis in a woman who was 8 weeks pregnant, presenting with visual and auditory hallucinations and paranoid delusions. She later developed catatonia, tachycardia, fever and labile blood pressure.

There are also case reports of psychosis occurring after termination of pregnancy or miscarriage (Da Silva & Johnstone 1981; Brockington, 2005), hydatidiform mole (Hopker & Brockington, 1991) and male-to-female gender reassignment (Mallett *et al*, 1989). Many of these women have gone on to suffer from puerperal psychoses after subsequent pregnancies that went to term, suggesting a link between late pregnancy, post-abortion and postpartum triggers.

Relationship to bipolar disorder

Chaudron & Pies (2003) reviewed the evidence base from 1966 to 2002, which includes the follow-up studies cited above, and concluded that it 'supported a link between postpartum psychosis and bipolar disorder', with many but not all puerperal psychotic episodes falling within the bipolar spectrum. The evidence base to support this is growing. Chapter 4 includes a discussion of the high risk of recurrence of bipolar disorder after delivery, and its management.

Aetiology

Genetics

In the early 19th century, Esquirol noted that puerperal psychosis tended to run in families (Esquirol, 1838). Dean *et al* (1989) observed a significantly and substantially higher incidence of affective morbidity in first-degree relatives of women who had experienced puerperal psychosis compared with the relatives of women with bipolar disorder who had not had a puerperal episode. Puerperal psychosis has a close relationship with bipolar disorder and there is compelling evidence from family, twin and adoption studies that genes influence susceptibility to bipolar disorder, although the mode of inheritance appears to be complex and it is likely that interaction of several susceptibility genes is required. There are case reports of monozygotic twin pairs concordant for puerperal psychosis (e.g. Kane, 1968) and a familial clustering where there was consanguinity (Craddock *et al*, 1994). Jones & Craddock (2001) have demonstrated that women with bipolar disorder who have a first-degree relative who has had an episode of puerperal psychosis are more likely to experience a puerperal episode following subsequent pregnancies, compared with those who have no first-degree relatives with a history of puerperal psychosis. In addition, bipolar women who have had a puerperal episode are more likely to have a first-degree relative with an affective disorder than those without a history of puerperal episodes (Jones & Craddock, 2001).

Variation at the serotonin transporter gene is influenced by oestradiol. The presence of one allele (Stin2.12) was associated with almost four times the risk of puerperal psychosis (OR = 3.9), an effect that increased when the

phenotype was restricted to women who had experienced multiple episodes (Coyle *et al*, 2000). Subsequent work has shown linkage with chromosomes 16p13 and 8q24 (Jones *et al*, 2007).

Dopamine

Oestrogen modulates monoamine neurotransmitter systems, including the dopaminergic system. The rapid fall of circulating gonadal steroid hormones after delivery, which occurs in parallel with the often acute onset of symptoms, led to the hypothesis that women who become psychotic may have supersensitive dopamine receptors, particularly D_2 receptors. Two cases in which the patients' puerperal psychosis was accompanied by abnormal extrapyramidal movements support this idea (Vinogradov & Csernansky, 1990), and there are case reports of puerperal psychosis following treatment with bromocriptine (e.g. Canterbury *et al*, 1987; Reeves & Pinkofsky, 1997; Pinardo Zabala *et al*, 2003). Wieck and colleagues (1991) tested this by giving the dopamine agonist apomorphine to postpartum women with a history of psychosis and to a control group 4 days after delivery. The women who had recurrences of psychosis had greater growth hormone responses than the controls and those who remained well. However, a later study was unable to replicate these findings and found no difference between those at high risk of recurrence and controls (Meakin *et al*, 1995).

Wieck *et al* (2003) demonstrated that women predisposed to bipolar relapses in the puerperium had greater growth hormone responses than controls in the midluteal phase of the menstrual cycle but not in the follicular phase.

Thyroid function

The relationship between nonpsychotic puerperal depression and thyroid function has been described in Chapter 2. The literature relating to psychotic puerperal illnesses and thyroid abnormalities is limited to a case report of a woman who developed a psychotic depression at 3 months postpartum and who also had thyroiditis. Her symptoms resolved when she became biochemically euthyroid (Bokhari *et al*, 1998).

Immune system dysregulation

Abnormal activation of the immune system (which has been suggested as contributing to the pathogenesis of mood disorders) is evidenced by elevated serum cytokines and chemokines, activation of circulating monocytes demonstrated via profiling of inflammatory gene expression, and activation of the T cell system. Bergink *et al* (2013) analysed immune system activation in a sample of women with first-onset puerperal psychosis, healthy postpartum women and non-postpartum women. They observed elevated T cell levels in healthy postpartum women compared to controls and a lack of this normal postpartum elevation in women with puerperal

psychosis. In women with puerperal psychosis, monocyte gene expression was upregulated compared to both control groups and monocyte levels were elevated. They propose that this immune dysregulation via increased macrophage activity and reduced T cell numbers might be the trigger for the onset of puerperal psychosis in women who have an underlying genetic susceptibility to bipolar disorder or psychosis.

Obstetric factors

Di Florio *et al* (2014) demonstrated that puerperal psychosis or mania were more likely to occur in primiparous women with bipolar I disorder. Blackmore and colleagues (2006) studied 129 women who had suffered bipolar puerperal psychosis and found that primiparity and delivery complications were independently associated with recurrence.

Women's experiences

There is a growing qualitative literature exploring the experience of puerperal psychosis for women and their partners. Women who have suffered from the disorder feel very strongly that it is different from other mental illnesses, as it is precipitated by childbirth and has a biological aetiology. As such, they feel that it requires specialised treatment. Those who had been treated in general psychiatric services felt frustrated and angry that their specific needs were not met and that they had been treated like everyone else. Other important themes were loss – of aspects of motherhood, of control and of future pregnancies – and disruption of social roles and relationships (Robertson & Lyons, 2003). Others stress that the experience cannot be fully shared with others who have not experienced it themselves (Engqvist & Nilsson, 2013). Hanzak (2005) has written a vivid account of her illness, admission to hospital and recovery, and Martini (2008) has described her experience of familial puerperal psychosis. More recent studies have focused on the recovery process, the need for professionals to provide reassurance and appropriate information and to understand that it will take time. The need for specialist support following discharge to continue long enough to allow women and their families to rebuild their lives has been highlighted. Informal support groups can lack knowledge of the illness, and fathers may struggle to identify their support needs (Doucet *et al*, 2012; Heron *et al*, 2012; McGrath *et al*, 2013).

Suicide, self-harm and infanticide

Suicide

Why Mothers Die 2000–2002 (Lewis & Drife, 2004), like the two triennial UK Confidential Enquiry into Maternal Deaths (CEMD) reports before it, highlighted suicide as a major cause of maternal death. Like the 1997–1999

report, it found suicide to be the leading cause of indirect or late indirect deaths in the year following delivery. The majority of these deaths appeared to be of women suffering from psychosis or a very severe depressive illness. Oates (2003) has estimated the suicide rate for puerperal psychosis to be 2 per 1000 sufferers. Lindahl *et al* (2005) estimate that suicide accounts for 20% of maternal deaths, even though the rate for all delivered women in the year after birth is lower than that of the general population. *Saving Mothers' Lives* (Lewis, 2007) found a decrease in the numbers of maternal suicide, which was mostly accounted for by a fall in the number of suicides between 6 months and 1 year after delivery. In the 2005–2008 triennium (Oates & Cantwell, 2011), there was a non-significant rise in the number of suicides before 6 months postpartum. From 2011 to 2013, 1 in 7 maternal deaths was a suicide and 23% of the women who died between 6 weeks and 1 year postpartum died from psychiatric causes (Knight *et al*, 2015).

The most common profile of a woman who is at risk of suicide in late pregnancy or after delivery is a white, well-educated older woman in her second or subsequent pregnancy, in a stable relationship and living in comfortable circumstances: 28% of those who died in the most recent enquiry were in professional occupations. She is likely to have had contact with psychiatric services and a history of mental illness, and may be in current treatment. She is likely to die violently, e.g. by hanging, drowning, jumping from a height or in front of a train, causing an intentional road traffic accident, self-immolation or throat cutting. In the most recent enquiry, 33% of the women who died had been referred to child protection services during pregnancy. Fear of their child being removed can lead to women disengaging from services.

Self-harm

A review in 1968 estimated that between 5 and 12% of women attempting suicide were pregnant (Whitlock & Edwards, 1968). In 1984, 0.07% of calls to a US metropolitan poison control centre were from or about pregnant women (Rayburn *et al*, 1984), and the attempt reported was usually the woman's first. Half of the overdoses were taken during the first trimester, most commonly using an over-the-counter analgesic, iron or a vitamin.

Studies in Sweden and the USA have found that issues relating to pregnancy and interpersonal difficulties are often cited as the main provoking factors for self-harm in pregnant women. These may include prior loss of children (through death or adoption), prior termination, desire for a termination or the potential loss of a partner.

Lindahl *et al* (2005) reviewed 27 studies that reported rates of suicidal ideation, intention, attempts and completed suicide in pregnant and postpartum women. Suicidal thoughts (assessed by endorsement of item 10 on the Edinburgh Postnatal Depression Scale: 'the thought of harming myself has occurred to me') occurred in up to 14% of pregnant women. The authors observed lower rates of suicide during pregnancy than that in

the general population, but found that when it did occur, violent methods were more likely to be used. Particular groups at risk are teenagers and women from cultures where being unmarried and pregnant is stigmatised. Women with past histories of abuse are more also likely to die by suicide. A USA study of over 2000 women who attempted suicide found that young, single, multiparous, less well educated, and African American women were more likely to harm themselves. Twenty six per cent of them were substance misusers (Gandhi *et al*, 2006). Follow-up found that those who self-harmed were more likely than controls to have a preterm labour, to have a Caesarean delivery and to require a blood transfusion. Their infants showed an increased risk of respiratory distress syndrome and low birth weight. A Hungarian study of 1044 women found that those who overdosed with a hypnotic containing amobarbital, glutethimide and promethazine were more likely to deliver an infant with an intellectual disability (Petik *et al*, 2012). Another report from the same data-set observed an increased risk of congenital abnormalities in infants born to women who had self-harmed with nitrazepam (Gidai *et al*, 2010).

Comtois *et al* (2008) reported a 27.4-fold increased risk of a suicide attempt requiring hospital admission if a woman has a psychiatric disorder, a 6.2-fold increased risk with a substance misuse diagnosis and an 11.1-fold increased risk with a dual diagnosis. A study of referrals to a perinatal mental health team in the UK observed that 58% of women booking for maternity care who had a history of postnatal depression disclosed an episode of self-harm with the intent of killing themselves (Healey *et al*, 2013).

Infanticide

Although the majority of postpartum women who die by suicide do not also kill their infant, the 2004 CEMD report identified three cases in which the infant was also killed at the time of the suicide. In two cases, an older child was also killed at the same time, and four suicides occurring in pregnancy near term also resulted in the death of a viable fetus. Infanticidal ideas are common in the severely mentally ill postpartum population. In a study by Chandra *et al* (2002), 43% of the mothers reported having infanticidal ideas, 36% reported infanticidal behaviour and 34% reported both. Depression and psychotic ideas predicted infanticidal ideas, whereas the presence of psychotic ideas towards the infant predicted infanticidal behaviour.

Infanticide is a legal term used in the UK to refer to the killing of a child under the age of 12 months. Neonaticide is not a legal term but refers to the killing of a child within 24 h of birth. Craig (2004) has reviewed the associated factors and Friedman *et al* (2005*a*) included infanticide and neonaticide in a wider review of child murder. They found that women who commit neonaticide are usually young, poorly educated and primiparous. They are often living at home with their parents and have often concealed their pregnancy. Most do not have a mental illness at the time of killing

their child. Very few of them are psychotic; where a psychiatric diagnosis is found, this is more likely to be a personality disorder or a mild or borderline intellectual disability. Nesca & Dalby (2011) describe a case of neonaticide linked to post-traumatic stress disorder and discuss the legal aspects.

Mothers who commit infanticide are more likely to be older and married or living with a partner. There is more likely to be a mental illness present, and the infant death is often part of an extended suicide or, occasionally, an 'altruistic' act based upon a delusional idea that some terrible fate was about to befall the infant. Schizophrenic mothers who relapse in relation to pregnancy or childbirth may incorporate the infant into their delusional system or be acutely disturbed and carry out the act for no rational reason.

Substance misuse is a factor often associated with infant homicide. Only very rarely is infanticide the consequence of factitious disorder by proxy.

Friedman and colleagues (2005*b*) examined a case series of mothers who had killed their children and were adjudicated as not guilty by reason of insanity ($n = 39$). Their children's ages varied from birth to 16 years (mean 3.7; one-third were infants). More than 80% of the mothers had a psychotic disorder or mood disorder with psychotic features and many had had recent contact with psychiatric services. Almost half had made previous suicide attempts and 56% had planned suicide along with the death of their child. Half were depressed and the majority were experiencing auditory hallucinations, including command hallucinations to kill their children. Three-quarters were delusional at the time of the killing, and two-thirds of these had delusions that involved their children. These delusions frequently involved a belief that the child was possessed by the devil or demons, that the mother herself was a god or religious figure, and that some terrible thing would happen to the child. More than one-third were pregnant or within the first postpartum year. The most common method used was suffocation.

In England and Wales, women who kill a child under the age of 12 months are usually disposed of by the judiciary by means of Chapter 36 of the Infanticide Act 1938 as amended by Section 57 of the Coroners and Justice Act 2009.

> 'Where a woman by any wilful act or omission causes the death of her child being a child under the age of twelve months, but at the time of the act or omission the balance of her mind was disturbed by reason of her not having fully recovered from the effect of giving birth to the child or by reason of the effect of lactation consequent upon the birth of the child, then, notwithstanding that the circumstances were such that but for this Act the offence would have amounted to murder, she shall be guilty of felony, to wit of infanticide, and may for such offence be dealt with and punished as if she had been guilty of the offence of manslaughter of the child.'

In Northern Ireland, the relevant legislation is the Infanticide Act (Northern Ireland) 1939. In Scotland, despite similar infanticide rates to England and Wales, there is no specific infanticide legislation and mothers are dealt with via the general homicide laws.

Disposal is usually non-custodial and can be tied in with ongoing treatment in a community rehabilitation order with conditions of treatment or a hospital order. However, this law gives rise to anomalies. For example, a women who kills her infant who is a day over a year old, despite clear evidence of her illness being consequent upon childbirth, will be charged with murder and, despite a plea of diminished responsibility, will be much more likely to receive a custodial sentence.

Management

Assessment

The assessment of any acutely ill puerperal woman is essentially the standard psychiatric examination (history, mental state examination and physical examination), with the addition of the biopsychosocial context of recent childbirth and the infant's well-being to consider, as well as the mother, her partner, and other children and family members.

It is essential in all women with depression or psychosis to assess suicidal and infanticidal ideas. Delusions should be clearly defined and the content examined carefully for reference to harming herself and/or her infant and/or older children. A mother who believes that her child has changed in some way, looks strange, is not hers, or is, for example, evil, is at risk of harming that child, as is a woman with command hallucinations to harm herself or her child.

Chandra *et al* (2006) found that 53% of women with a severe postpartum illness and 78% of those with psychotic postpartum disorders had delusional beliefs about their infant. The mothers whose delusions involved believing that the baby was a devil, ill-fated or someone else's baby were more likely to shout at or hit the baby or to have attempted to smother him or her. Caregivers of those women who believed their baby was God were more likely to consider the woman to be unsafe with her baby, and other delusions (more elaborate or bizarre) were associated with the mother being unable to manage chores related to the baby and with talking negatively about him or her.

A number of rating scales have been devised to assess disturbances of the mother–infant relationship. The Bethlem Mother–Infant Interaction Scale has seven subscales and was designed to be used on a weekly basis by nursing staff on an in-patient unit (Kumar & Hipwell, 1996). It can be repeated to monitor progress. There are also scales that assess mother–infant bonding (Brockington *et al*, 2001; Taylor *et al*, 2005). These last two have been compared (Wittkowski *et al*, 2007).

Some patients may superficially appear to have an acute mental disorder but, when an adequate history and examination are performed, are found to have an acute medical or surgical problem. There are case reports of chronic subdural haematoma presenting as puerperal psychosis in which the

patient's complaint of persistent headache after epidural anaesthesia was ignored (Campbell & Varma, 1993), and of a woman appearing confused and complaining of auditory hallucinations and *déja vu* the day after a Caesarean delivery, who was found to have a meningioma (Khong *et al*, 2007). The misattribution of physical symptoms to functional psychiatric disorder can cause a delay in making the correct diagnosis or lead to the admission of acutely medically ill women to psychiatric hospitals. Such mistakes led to the deaths of several women reported to the last three CEMD (Lewis & Drife, 2004; Lewis, 2007, 2011). In 2016, the report of The Maternal, Newborn and Infant Clinical Outcome Review Programme noted that the rate of maternal suicide had not reduced since 2003 (Knight *et al*, 2016).

In-patient care

Most acutely psychotic women will require admission, as will some of those with severe depressive illnesses and other diagnoses. Women who require acute admission for a severe mental illness in the postpartum should be admitted to a specialist mother and baby unit unless there are compelling child protection issues which preclude this. In Scotland, this is enshrined within the Mental Health Care and Treatment Act.

Drug treatment

Most women with psychotic illnesses will require antipsychotic medication in addition to antidepressants and/or mood stabilisers, depending upon the precise nature of the episode. Care should be taken not to over-sedate a woman caring for an infant, particularly if she is breastfeeding and needs to do night feeds. However, in the early days of an admission, many women will require their baby to be looked after in the nursery at night to allow them to sleep. At other times, even very psychotic women can, with the support of nursery nurses and psychiatric nurses skilled in the care of mothers, undertake a good deal of infant care and maintain a close bond with their baby. Prescribing for breastfeeding mothers is discussed in Chapter 9.

There are case reports of neuroleptic malignant syndrome (NMS) occurring in women with puerperal psychosis (Alexander *et al*, 1998; Price *et al*, 1989), and some authors have postulated that it may be more likely to occur in women with puerperal psychosis. NMS can be difficult to distinguish clinically from the 'organic' features of puerperal psychosis, or from acute sepsis or other physical complications of the postpartum period. However, it should be considered if a patient deteriorates after medication with psychotropics, and the serum creatine phosphokinase level should be checked.

Women in a very retarded or stuperose state may need anticoagulant therapy if they have recently delivered and are inactive, in order to

prevent venous thromboembolism. As such women may well need ECT, an anaesthetist's opinion should be sought well in advance. A systematic review of the treatments of puerperal psychosis has been carried out by Doucet *et al* (2011).

Oestradiol

There are three small case series examining the role that oestradiol might have as an effective treatment for puerperal psychosis. The first two describe women with low oestradiol levels and refractory to antipsychotics being given sublingual 17ß-oestradiol. The rise in serum concentrations is reported as paralleling the improvement in symptoms (Ahokas & Aito, 1999; Ahokas *et al*, 2000*a*). In the third study, 10 women with puerperal psychosis and low oestradiol levels after delivery were given sublingual 17ß-oestradiol 3 to 6 times daily until their serum concentration was 400 pmol/L (Ahokas *et al*, 2000*b*). Symptoms measured by the Brief Psychiatric Rating Scale improved by the end of the first week; however, it should be noted that two-thirds of the women had had treatment before starting oestradiol (psychotherapy and antipsychotics), although this is reported as having been ineffective. None of these studies report any safety data, which is important given the potential risks of thromboembolic events and endometrial hyperplasia. Clearly, there is a need for larger, controlled, methodologically sound studies before oestradiol can be declared an effective and safe treatment for puerperal psychosis.

There is a published report of progesterone used as a treatment for puerperal mania (Meakin & Brockington, 1990), but the improvement in the two cases reported in this paper could have been attributed to antipsychotic medication that was also prescribed. There are no controlled data to support the use of progesterone as a treatment for puerperal psychosis.

Electroconvulsive therapy

There has long been a belief that puerperal psychosis is particularly responsive to ECT, and this has been confirmed by Reed *et al* (1999), who reported that women with puerperal illnesses showed greater clinical improvement than those with non-puerperal disorder when given ECT. Babu *et al* (2013) carried out a naturalistic study of ECT in 78 in-patients with puerperal psychosis, most of whom had a mood disorder. He reported few transient side-effects in the women and no adverse effects on breastfed infants. Focht & Kellner (2012) reviewed the literature on ECT in the treatment of puerperal psychosis, concluding that as it may be effective more quickly than medication while avoiding some of the adverse effects of medication, it should be considered as a first-line treatment for puerperal psychosis. The use of ECT in pregnant women is described in Chapter 8.

Psychological treatment

Although no specific intervention has been trialled in women with puerperal psychotic illnesses, it is clear that many will benefit from psychotherapeutic work, particularly when the acute phase of the disorder is settling. There may be specific issues which need addressing, such as bereavement or coping with stressful life events and marital problems, in addition to coming to terms with having been acutely ill and what that means for the future. A woman with her first psychotic episode and her partner will benefit from education about the disorder, the risk of recurrence after later pregnancies or at other times, and what can be done to prevent it recurring. (The prevention of puerperal psychosis is described in Chapter 7.)

Contraception

Contraceptive needs must be addressed and in place before a woman begins periods of leave. Do not assume the primary care team will deal with this on discharge. If in doubt, seek advice from the midwife with a responsibility for contraceptive advice or the local family planning clinic. Mother and baby units should keep a stock of condoms to give to patients who have not made any contraceptive plans before going on leave.

Conclusions

Puerperal psychosis is a serious mental disorder, which can have devastating consequences for sufferers, their children and families. However, early identification, prompt treatment and care not to misattribute serious physical illness to puerperal psychosis can do much to reduce mortality and morbidity.

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