Follow-up of children of drug-addicted mothers

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Sardemann, H., Madsen, K. S., and Friis-Hansen, B. (1976). *Archives of Disease in Childhood*, 51, 131. **Follow-up of children of drug-addicted mothers.** During a period of 2 years (1971-72) 19 newborn infants were admitted to hospital because their mothers were drug addicts. To evaluate the prognosis in these children, 17 were followed up by a social adviser, a psychologist, and a paediatrician.

During the neonatal period 16 of the infants had withdrawal symptoms, for which 11 required medical treatment. One infant died of congenital malformations. Of the surviving 18 infants 14 were discharged to their mothers and 4 went to a children's home. During follow-up, which varied from up to 2 months to up to 2 years 8 months of age, 10 of the children had to be placed in a children's home for a period. No physical abnormalities were found in the children. Motor and perceptual development were normal in 12 but in 3 speech development was delayed.

Five mothers ceased to take drugs after delivery and 2 had done so during early pregnancy. The pre- and perinatal complications and the undesirable environment in which the children grow up show the need for a comprehensive treatment programme.

The special problems of pregnancy, delivery, and the neonatal period in drug-addicted women and their infants have been the subject of many papers, but only a few have reported the long-term prognosis of the children (Blatman, 1971; Wilson, Desmond, and Verniaud, 1973). Most addicted mothers are so unstable that they rarely maintain contact with doctors or institutions, and this makes follow-up difficult. The same factors also tend to make the future of the children uncertain. To find out what happened to the infants of addicted mothers who had been admitted to our neonatal unit we carried out a follow-up study.

Patients and methods

From 1 April 1970 to 31 March 1972 a total of 19 infants were admitted to the neonatal department because of maternal drug addiction. All had been born in the hospital except one who was transferred from another hospital because of respiratory distress. The infants were observed for withdrawal symptoms, urine was collected during the first or second day of life and examined for drugs, and information about maternal drug abuse was collected.

The mothers' statements had to be evaluated critically, but in most cases we were able to check them with in-

formation obtained from health visitors, private doctors, drug centres, 'mothers aid' centres, or from other hospitals. All 19 mothers had been on drugs during pregnancy and were addicted before they became pregnant, but 2 of the mothers stopped taking drugs early in pregnancy, when they realized that they were pregnant, and remained off them. The variety of the drugs taken (Table I) was greater than that reported in most other studies, where heroin or methadone, or both, predominated. The age of the mothers ranged from 15 to 28 years (mean 21), and 14 were primipara. 5 (31%) of

TABLE I
Drugs taken during pregnancy by 19 mothers

Drugs	No. of mothers
Morphine	6
Morphine and diazepam	2
Lysergic acid diethylamide (LSD)	2
Morphine and phenmetrazine (Preludin)	1
Morphine and heroin	1
Opium	1
Morphine, opium, ketogan, and tetraon (Papaveretum)	1
Phenmetrazine, ketogan, and cannabis	1
Morphine, LSD, amphetamine, and phenmetrazine	1
Phenmetrazine, amphetamine, and cannabis	1
Sedatives and psychosedatives	1
Unknown	1

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the infants were born before term, 7 (37%) had a low birthweight, and 3 were small for dates (Table II).

In 8 samples of urine collected from 15 infants and examined by thin-layer chromatography drugs were found which corresponded well to the information given by the mothers.

TABLE II

Birthweight and gestational age of 19 children of drug-addicted mothers

Birthweight (g)	No.	Gestational age (w)	No.
1501-2000	2	<37	5
2001-2500	5	37-42	11
>2500	12	>42	—
		unknown	3

Withdrawal symptoms in infants. 16 of the 19 infants developed more or less severe signs of withdrawal during the first 24 hours of life (Table III). Symptoms of irritability of the central nervous system were

TABLE III

Withdrawal signs in 16 infants

Signs	No. of infants
Central nervous system	
Hypertonicity	12
Hyperactivity	10
Twitching, convulsions	9
High-pitched cry	8
Tendency to cry	7
Tremors	6
Gastrointestinal	
Vomiting	2 (3)
Diarrhoea	3
Autonomic system	
Sneezing	3
Lacrimation	—
Hyperhidrosis	—
Hypersecretion	2
Yawning	1
Respiration	
Tachypnoea	2
Respiratory distress syndrome	—
Others	
Scratching	—
Fever	—

the most common. In 11 cases they were severe enough to require medical treatment (chlorpromazine, phenobarbital, or diazepam) for 1 to 12 days (mean 5.4 days).

Results of follow-up

To evaluate the social and medical problems related to their development the infants were followed up by a team consisting of a social adviser, a psychologist, and a paediatrician. Follow-up was achieved in 17 out of the 19 (10 girls and 7 boys). One infant died when 2 months old after

being transferred to another hospital. Microcephaly, intracranial haemorrhage, and congenital heart disease (VSD) were found at necropsy. One child could not be traced as the family had left Denmark. 11 of the children were examined in our outpatient clinic. Of the remaining 6, 5 were seen at their home by the team and one was examined by a general practitioner.

To assess the children's well-being we inquired into (a) the mother's drug intake and mode of life, (b) the mother's work status, (c) the residence and care of the child, (d) the supervision of the child, and (e) the child's development.

Mother's drug intake and mode of life.

Information concerning the mother's drug intake was based partly on her statements, which in some cases contrasted with those from other sources. We are certain, however, that 5 of the mothers had ceased to take drugs. 2 of these had stopped during early pregnancy. They explained that a sense of responsibility towards their child had helped them to stop and a fear that their child might be taken from them had stopped them starting again. A few of the remaining 12 mothers who had continued taking drugs had had periods of abstinence.

At the time of follow-up examination only 2 of the mothers were single, whereas 14 were either married or living with a boy friend. In 2 cases information on marital status was unobtainable. The 2 mothers living alone had both stopped taking drugs. In most of the other cases it seemed that the partner took the same drugs as the mother. 7 mothers were living in flats in residential properties, 2 in collective housing, and 2 in condemned flats. We did not seek information on the living conditions of the mothers whose children were no longer with them.

Mother's work. Only one of the mothers had permanent work. One was on sick leave, 2 stayed at home with their children, 3 were living on social security, and 4 had started higher education financed by the rehabilitation foundation.

Residence and care of the child. The residence of the 18 surviving children is shown in the Fig. 14 were discharged from hospital directly to their mothers; 4 were sent from hospital to a children's home as the mothers were considered unable to take care of them. Of these, however, 2 could later be placed in their homes and the other 2 were permanently boarded out in the care of a family.

Of the 14 children primarily discharged to their

FIG.—Changes of residence of 18 children after discharge from hospital.

mothers 6 had later to be placed in a children's home, either because of the mother's poor living and social conditions, or she was in hospital, or was the subject of a criminal investigation. 3 of these 6 children were later returned to their home, whereas the remainder were placed with foster families.

During the first 3 years of life, therefore, 10 of the 18 children had to be placed in a children's home for a period: 5 of these were later sent home and 5 were placed in family care. When last seen a total of 13 out of the 18 (70%) were with their mothers. Of the 13 mothers who had their child living with them 7 were still taking drugs, with short drug-free periods in a few cases. The child welfare authorities were in permanent contact with only 8 of these 13 homes and they considered the living conditions acceptable. 4 of the mothers were largely supported by their parents, who also had to look after the grandchild. Only 2 children had been attending day nurseries, and only for a short period.

Supervision of the child. 15 children had been seen regularly by community health visitors, who visit all mothers with newborn babies for the first year or more. The health visitors reported that all children were in good condition and none had suffered from any serious illness or nutritional disturbances. They seemed well kept and normally developed. The mothers' aid centre, the drug centre, and the child welfare committee who looked after the families thought the same. Prophylactic examinations and immunizations of preschool children are free in Denmark, but only one mother had taken advantage of this. Most of the mothers' general practitioners were unable to give any information about the children as they had never seen them nor visited the homes.

Development of the child. When last seen the age of the children varied from 2 months to 32 months (mean 18 months) (Table IV). Physical examination revealed no abnormalities or malformations, the nutrition of the children was good, and

TABLE IV
Age distribution at follow-up (17 children)

Age	No.
<6 m	2
6–11 m	3
1–2 y	6
> 2 y	6

their height and weight were within normal limits with the exception of one, who was overweight. 6 of the children had been admitted to hospital for upper respiratory infections, gastroenteritis, febrile convulsions, nicotine intoxication, or foreign body aspiration. The psychological development of the children was tested by Cattell's system (Cattell, 1960) in 7 children who were seen as outpatients. 5 children who were seen at home were evaluated only by spot tests. The motor and perceptual development was judged to be normal in all children except 2, who were above normal. The only abnormality found was that 3 of the children seemed to suffer from delay in talking, possibly owing to lack of stimulation.

Discussion

Our aim was to try to ascertain the prognosis for infants born of drug-addicted mothers. Schneck (1958) pointed to the importance of prolonged follow-up to determine the risk of any residual effect or organic brain damage from early drug exposure. A number of pre- and postnatal factors are important for the later development of these children. The incidence of malformations does not seem to be increased, but intrauterine malnutrition and infections, mostly hepatitis and syphilis, are relatively common (Stone *et al.*, 1971; Zelson, Rubio, and Wasserman, 1971). Furthermore, about half of these infants are of low birthweight and prematurely born (Cobrinik, Hood, and Chusid, 1959; Reddy, Harper, and Stern, 1971; Zelson *et al.*, 1971). Signs of withdrawal are seen in 60–80% of the children during the neonatal period. Intensive treatment has decreased the mortality from 30–35% to about 3% (Zelson *et al.*, 1971). The prognostic significance of these withdrawal symptoms is not known. After discharge to home the unstable environment which most of the mothers provide for their child is a major threat to its health and development. Some of the children may even start to receive narcotics at an early age.

All the 19 mothers in our study had taken drugs during pregnancy, but 4 ceased to take drugs before delivery and 2 of these did not start them again.

Furthermore, 3 of the remaining mothers succeeded in getting off drugs. Thus the responsibility of motherhood may help some women to resocialize, as Weir (1972) pointed out. Treatment with methadone combined with psychosocial support during pregnancy has been claimed as important in establishing a permanent contact with the mother (Blatman, 1971; Finnegan *et al.*, 1972; Harper *et al.*, 1974; Statzer and Wardell, 1972), even if methadone intake may increase the incidence of withdrawal symptoms (Rajegowda *et al.*, 1972; Zelson, Lee, and Casalino, 1973). Other authors have reported that a higher proportion of infants of methadone-treated mothers can be discharged to their mothers. Thus Finnegan *et al.* (1972) compared 29 drug-addicted pregnant women with no prenatal control with 56 patients who were treated with methadone. In the first group 68% of the infants were discharged to their mothers, 14% to the grandparents, and 18% to children's homes, whereas the comparable figures in the second group were 82, 2, and 14%. Of our infants 78% were discharged to their mothers and 22% primarily to children's homes.

Only few follow-up studies have been published. Blatman (1971) followed 14 children for 2 years and found that one was mentally retarded and another had poor language development. Wilson *et al.* (1973) followed 14 children up to 34 months and noticed signs of withdrawal up to 6 months of age in 18 infants. 7 children followed for more than one year were hyperactive, lacked concentration, and had outbursts of temper, and growth was retarded in 4. The behavioural disturbances were found in children staying with their mothers as well as in children who had gone to foster homes. The authors suggest that they may be due to some permanent damage of the central nervous system. We did not find behavioural disturbances, impaired intelligence, or growth retardation in our children. The poor speech development in 3 of our children may have been due to lack of stimulation as they had no other signs of mental retardation. The physical and mental health of the children staying with their mothers was generally acceptable.

We found that these high-risk infants were best cared for by public health nurses who visited the homes.

The relatively small number of children in our

series and the short observation period do not permit any general conclusions about long-term prognosis. It is encouraging that two-thirds of the infants were able to stay with their mothers during their first years of life. Nevertheless, the real difficulties may not start until the children are of school age. Mothers who continue to be addicted to drugs are unlikely to be able to create a secure home for their children. A comprehensive programme of medical and social pre- and post-natal treatment is absolutely necessary to improve the future of the children.

REFERENCES

- Blatman, S. (1971). Neonatal observations and follow-up. *Proceedings 3rd National Conference on Methadone Treatment*, p. 82. Public Health Service Publication No. 2172. U.S. Government Printing Office, Washington, D.C.
- Cattell, P. (1960). The measurement of intelligence of infants and young children. Johnson Reprint, Academic Press, New York.
- Cobrinik, R. W., Hood, R. T., and Chusid, E. (1959). The effect of maternal narcotic addiction on the newborn infant. *Pediatrics*, **24**, 288.
- Finnegan, L. P., Connaughton, J. F., Emich, J. P., and Wieland, W. F. (1972). Comprehensive care of the pregnant addict and its effect on maternal and infant outcome. *Contemporary Drug Problems*, Vol. 1, p. 795.
- Harper, R., Solish, G. I., Puro, H. M., Sang, E., and Panepinto, W. C. (1974). The effect of a methadone treatment program upon pregnant heroin addicts and their newborn infants. *Pediatrics*, **54**, 300.
- Rajegowda, B. K., Glass, L., Evans, H. E., Masó, G., Swartz, D. P., and Leblanc, W. (1972). Methadone withdrawal in newborn infants. *Journal of Pediatrics*, **81**, 532.
- Reddy, A. M., Harper, R. G., and Stern, G. (1971). Observations on heroin and methadone withdrawal in the newborn. *Pediatrics*, **48**, 353.
- Schneck, H. (1958). Narcotic withdrawal symptoms in the newborn infant resulting from maternal addiction. *Journal of Pediatrics*, **52**, 584.
- Statzer, D. E., and Wardell, J. N. (1972). Heroin addiction during pregnancy. *American Journal of Obstetrics and Gynecology*, **113**, 273.
- Stone, M. L., Salerno, L. J., Green, M., and Zelson, C. (1971). Narcotic addiction in pregnancy. *American Journal of Obstetrics and Gynecology*, **109**, 716.
- Weir, J. G. (1972). The pregnant narcotic addict. *Proceedings of the Royal Society of Medicine*, **65**, 869.
- Wilson, G. S., Desmond, M. M., and Verniaud, W. M. (1973). Early development of infants of heroin addicted mothers. *American Journal of Diseases of Children*, **126**, 457.
- Zelson, C., Lee, S. F., and Casalino, M. (1973). Neonatal narcotic addiction. Comparative effects of maternal intake of heroin and methadone. *New England Journal of Medicine*, **289**, 1216.
- Zelson, C., Rubio, E., and Wasserman, E. (1971). Neonatal narcotic addiction: 10 year observation. *Pediatrics*, **48**, 178.

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