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ABSTRACT

The prevalence of subtle handicapping conditions, such as learning disabilities, behavior problems, and recurrent illness, in a population of 88 high-risk infants was investigated when the children reached 9 years of age. Infants had had birthweights of less than 1500 grams or had required prolonged mechanical ventilation in the neonatal period. When the children had their ninth birthday, the Rutter Behaviour Questionnaire (RBQ), Rutter Child Health Form, and a School Achievement Questionnaire (SAQ) were sent to parents by post. With parental permission, the RBQ and the SAQ were sent to each child's teacher. Parents of 88 children, and 70 teachers, responded to the survey. Data were descriptive and represented preliminary findings. In general, the children were found to be in good health, although an increased risk of asthma was evident. Health was generally good, but a high percentage of children were either experiencing learning difficulties or exhibiting behavior problems. Thus the medical problems of infancy appeared to have been replaced with educational and behavioral problems in the school years. It is concluded that the perinatal, developmental, and social antecedents of these problems require further investigation. (RH)

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SCHOOL ACHIEVEMENTS, BEHAVIOURAL ADJUSTMENTS AND HEALTH

AT NINE YEARS OF AGE IN A POPULATION OF INFANTS

WHO WERE BORN PRETERM OR REQUIRED PROLONGED MECHANICAL VENTILATION

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## ABSTRACT

With advances in medical knowledge increasing numbers of very small and very sick infants are surviving. Only a small percentage of these infants have severe disabilities, however, the risk of more subtle handicapping conditions such as learning disabilities, behaviour problems and recurrent illness needs to be assessed. The prevalence of these conditions in a population of 88 high risk infants was investigated when these children reached nine years of age. In general the children were found to be in good health although there was an increased risk of asthma. In contrast a high percentage were experiencing learning difficulties or exhibiting behaviour problems. Thus the medical problems of infancy appeared to have been replaced with educational and behavioural problems in the school years. The perinatal, developmental and social antecedents of these problems require further investigation.

## INTRODUCTION

Advances in perinatal care have led to an increased survival rate of very low birthweight and very sick infants without a concomitant increase in the incidence of severe handicapping conditions [Kitchen, Yu, Orgill, Ford, Richards, Astbury, Lissenden & Bajuk 1983; Stewart, Reynolds & Lipscomb 1981]. However the risk of more subtle handicapping conditions such as learning disabilities, behaviour problems and recurrent medical problems, which may not become apparent until the school years, has not yet been fully investigated. With the incidence of major handicaps now well under control, it is necessary to turn attention to these less obvious disabilities as, in our highly technological society, they can represent significant problems for the children and their parents and a substantial cost to the community. Goldstein & Peckham (1976) and Rantakillio & von Wendt (1985) reported that the incidence of educational difficulties increased with a decrease in birth weight. Unfortunately, neither of these studies gave details of neonatal or developmental histories of the subjects, thus making it impossible to consider factors which might have contributed to poor school achievements.

Kitchen, Ryan & Richards (1980) published the results of an eight year follow-up study of children with birthweights < 1500 grams in which they found that although 92% of the children were attending normal school only 43% were regarded as completely developmentally normal. Similar findings have been reported by Lloyd (1984), Michelsson, Lindahl, Parre and Helenius (1984), Nickle, Bennett & Lamson (1982) and Vohr & Garcia (1985). However the perinatal care received by most of the infants in the above studies would be regarded as "pre-intensive" by current standards as it would not have included regular use of either mechanical ventilation or parenteral nutrition. The

introduction of these techniques needs to be evaluated in terms of the long term outcome of the infants receiving them. It has been a popular belief that in many cases learning disabilities are due to minimal brain damage resulting from adverse perinatal events [Pasamanick & Knobloch, 1966]. Rutter (1982) challenged this assumption arguing that most of the children who have learning disabilities show no evidence of neurological deficits whilst some children who have demonstrable brain damage show no evidence of learning disabilities. Children who require intensive care during the neonatal period are at high risk for minimal brain damage and hence represent a population in which the aetiology of learning disabilities can perhaps be more readily investigated.

It might also be hypothesised that infants who are very sick during the neonatal period will continue to place a burden on medical services throughout their childhood. This hypothesis needs to be tested as it has implications for a) the quality of life of the child, b) the cost effectiveness of intensive neonatal care and c) the understanding of the aetiology and prevention of disease.

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In addition the birth of a very premature or very sick infant undoubtedly places considerable stress on the parents which may distort the parent/child relationship [Field 1979] leading to an increased risk of behaviour problems during childhood.

The present study aims to investigate the prevalence of learning difficulties, behaviour problems and ill health in a population of nine year olds born between July 1977 and July 1979, who had birthweights of less than < 1500 grams or required prolonged mechanical ventilation in the neonatal period. All surviving infants in these categories cared for in the Intensive Care Nursery of the Mater Mothers' Hospital,

Brisbane between July 1977 and January 1982 have been followed up routinely at the Growth and Development Clinic at the Mater Children's Hospital, Brisbane. It is therefore planned to ultimately examine perinatal, medical, social and developmental factors associated with behaviour, learning and health problems during the school years in this larger population. At present the numbers are too small to permit detailed statistical analysis. The data presented in this paper are therefore descriptive and represent only preliminary findings.

### SUBJECTS

One hundred and fourteen (114) children born between July 1977 and July 1979 who had birthweights of < 1500 grams or required prolonged mechanical ventilation in the neonatal period. This represents the total population of infants in the above categories discharged from the Intensive Care Nursery of the Mater Mothers Hospital, Brisbane.

### METHOD

Information about the children was collected by means of a postal survey sent to parents and teachers at the time of the child's ninth birthday. Questionnaires sent to the parents were: 1) The Rutter Behaviour Questionnaire, 2) The Rutter Child Health Form, and 3) A School Achievement Questionnaire. With parental permission the Rutter Behaviour Questionnaire and the School Achievement Questionnaire were also sent to the child's teacher.

## RESULTS

Responses were received from the parents of 88 children (77% of the original sample). Four parents did not give permission for the child's school to be approached. Seventy teachers (80%) completed the questionnaires. Unfortunately not all parents or teachers completed every questionnaire items, therefore information on all 88 children is not always available.

### Behaviour Problems

Fifteen parents (17%) reported that their child showed some behaviour problems compared to sixteen teachers (23%). There was some overlap in the reports of parents and teachers, especially with regards to children with marked behavioural disturbance, however there was also considerable disagreement so that a total of twenty four children (29%) were regarded as displaying behaviour problems by either the parents or the teacher. Teachers reported behavioural disturbance in boys significantly more often than in girls ( $X^2 = 6.64$   $p < .01$ ). Parental responses showed no difference between boys and girls but they were significantly more likely to rate boys as overactive than girls ( $X^2 = 6.9$   $p < .01$ ).

### Learning Problems

Of the 88 children in the sample all but four were attending normal school. (Three of these four children are multiply handicapped and attending special schools, one is mildly intellectually handicapped and attending a special unit attached to a normal school).

Details about school achievements were available on 81 of the 88 children. As school achievement was based entirely on parental and

teacher reports rather than objective assessment fairly rigorous criteria were used in determining whether or not a child was experiencing difficulties at school. These were; that either the parent or the teacher reported that the child was experiencing difficulties in any two of the following four areas, reading, writing, spelling or maths; or the parent and teacher each reported problems in one area and these areas were different. There was a high degree of agreement between parents and teachers with regards to school achievements, although teachers were somewhat less likely to be happy with children's progress than parents. Parents rarely reported problems when none were perceived by the teacher. A total of 41 of the 81 children (51%) were seen by either parents or teachers to be experiencing problems at school. These figures are much higher than would be expected in the general population but are consistent with those reported elsewhere for preterm infants [Lloyd 1984, Vohr & Garcia 1985]. Significantly more boys than girls were experiencing learning difficulties ( $\chi^2 = 6.7$   $p < .01$ ).

On the teachers' ratings, behaviour problems and learning problems were related ( $\chi^2 = 10.4$   $p < .01$ ). This relationship did not hold for parental rating. This is, perhaps, not a surprising result suggesting as it does that children are more likely to display behaviour problems in an environment where they are experiencing other difficulties.

### Speech

Neligan, Kolvin, Scott & Garside (1976) reported that preterm and small for dates babies had an increased risk of speech and language problems at three years of age and similar results were found in the present cohort when they were assessed at three years of age [McAllister, Masel, O'Callaghan et al. 1985]. At nine years of age however, only



six children were reported to have speech problems (three of these children are multiply handicapped and one had a cleft palate). Significant speech problems therefore continue to effect only a small proportion of this population during the school years.

The results in relation to behaviour problems, learning difficulties and speech are summarized in Table 1.

INSERT TABLE 1 ABOUT HERE

### Health

The children in the present sample were all sick infants who required intensive medical care in the first few weeks of life. Many of them continued to experience frequent illnesses and hospitalization during infancy and early childhood. It is therefore important to assess whether they continue to experience ill health as they get older, as this is a significant factor influencing their quality of life.

### Medical Consultations

Parents reported that 88% of the children had visited the doctor less than six times a year (ie, less than once every two months) during their school years. Seven percent (7%) visited the doctor 7 - 8 times a year and only 5% need medical attention more than once a month (ie. more than 12 times a year). This latter group comprised two of the multiply handicapped children and two children with severe asthma. Most children (71%) had not required hospitalization during their school years and only 4% had been hospitalized more than three times. (These results are summarized in Table 2). Most hospital admissions were associated with asthma, ENT operations and accidents.

INSERT TABLE 2 ABOUT HERE

## Illnesses and Disabilities

As expected few of the children had major handicapping conditions\* but a significant number had persistent minor problems (see Table 3). A large number of children had visual problems most of which were

INSERT TABLE 3 ABOUT HERE

corrected with spectacles. Two children were blind in one eye but none were classified as blind. A very large number of children (42%) had had at least one asthma attack which had required medical treatment. A recent study [Roberts 1986] found that 26% of Queensland school children had experienced symptoms which could be attributed to asthma. The prevalence of asthma in the study population is therefore much higher than that in the general population. Asthma was found to be unrelated to mechanical ventilation or sex. Factors associated with the high incidence of asthma in this population clearly need further investigation.

\* The disabilities of the three multiply handicapped children were due to; maternal cytomegalovirus; a motor vehicle accident and Rett's disease. Therefore in none of these cases could the disabilities be attributed to prematurity or events in the perinatal period.

## CONCLUSIONS

These preliminary results suggest that the risk of serious disability in preterm and mechanically ventilated infants is quite small and that these infants generally enjoy good health during the school years although they may be more prone to asthma than other children.

The problems they experience appear to have shifted from the medical problems in infancy to educational and behavioural problems in the school years. It is important to now investigate the perinatal, developmental and social histories of a larger sample of these children in order to isolate factors associated with learning and behaviour problems if the incidence of these problems is to be reduced.

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Learning problems (Parents' and Teachers' Reports)	51%
Behavioural problems (Parents' and Teachers' Reports)	29%
Speech problems (Parental Report)	7%
Overactive (Parental Report)	33%

**Table 1:** Percentage of study children reported to have learning, behaviour or speech problems or a high activity level

### NUMBER OF MEDICAL CONSULTATIONS

< 3 Visits/Year	64%
3 - 6 Visits/Year	24%
7 - 8 Visits/Year	7%
> 12 Visits/Year	5%

### NUMBER OF HOSPITALIZATIONS

No Hospitalizations	71%
1 Hospitalization	9%
2 Hospitalizations	11%
3 Hospitalizations	5%
>3 Hospitalizations	4%

Table 2: Frequency of visit to the doctor per year and hospitalizations since six years of age.

## ILLNESSES OR DISABILITIES

	Number of Children
Asthma	36
Visual Problems (corrected)	9
Recurrent Headaches	9
Bed Wetting	4
Recurrent Abdominal Pain	2
Joint Pain	2
Sleep Disturbance	2
Minor Cardiac Problems	2
Hyperactivity (Requiring Medication)	3
Epilepsy (Treated)	3
Hearing Loss (Mild Unilateral)	1
Cleft Palate (Treated)	1
Soiling	1
Minor Motor Problems	2
Cerebral Palsy	1
Mild Intellectual Handicap	2
Multiply Handicapped	3

Table 3: Number of children in the sample with different illnesses or disabilities.\*

\* Some children had more than one condition and are therefore included under each illness or disability.