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## OCCURRENCE OF RISK FACTORS IN NEWBORN INFANTS. A STUDY OF 22359 CONSECUTIVE CASES

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### ABSTRACT

All the 22359 deliveries in 1971—1974 at the Institute of Midwifery, Helsinki, were analyzed for risk factors. 1196 infants (5.35%) had one or more risk factor at birth, the most common being an Apgar score of 6 or less at 5 or 15 minutes, hyperbilirubinaemia, and a birth weight of 2000 g or below. The other risk factors registered were neurological symptoms, respiratory difficulties, hypoglycaemia, newborn infants of diabetic mothers and cases with sepsis. 124 infants in the risk group died during the first week. This was 83% of the total neonatal mortality. Except for hyperbilirubinaemia, which was less frequent in 1974, there was no marked change in the composition of the risk group from 1971 to 1974.

KEY WORDS: NEONATAL MORTALITY; NEWBORN INFANT; RISK FACTORS

### INTRODUCTION

This study is part of a prospective follow-up research project of risk groups of newborn infants. The groups were chosen to include certain high risk factors, and this report describes the composition of the group, the occurrence of different risk factors and the neonatal mortality in the risk group.

- neurological symptoms of apathy, rigidity or marked hyperexcitability or other neurological symptoms, such as convulsions, apnoeic spells or prolonged feeding difficulties
- hypoglycaemia, at least two serum glucose values below 1.67 mmol/l in full-term and below 1.21 mmol/l in premature babies
- newborn infants of diabetic mothers
- cases with meningitis or sepsis

### RESULTS

The newborn risk infants selected according to the criteria given totalled 1196 children, 658 boys and 538 girls. The number of infants born at the Institute of Midwifery and the perinatal mortality during this time can be seen in Table 1 which also shows the number and the occurrence of infants at risk each year.

Table 1 also shows the perinatal mortality at the Institute of Midwifery and the neonatal mortality in the risk group. Of the 124 infants dying in the risk group during the first week of life, 28 had severe anomalies, such as anencephalus or multiple anomalies.

Table 2 shows the number of infants having the different risk factors. Many of the infants had two or more of the different risk criteria concurrently, for instance birth weight below 2000 g combined with asphyxia and hyperbilirubinaemia. The Table also

### MATERIAL

This study comprised children born in 1971—1974 in Helsinki at the Institute of Midwifery, where approximately 5000—6000 babies are born each year, about 10% of the babies born in Finland and 50% of the deliveries in the Helsinki region. In addition to the maternity wards the Institute of Midwifery has two wards for neonates, one mainly for premature babies and the other for observation and treatment of full-term infants. Neonates needing intensive care or special investigation are referred to the Children's Hospital, University of Helsinki.

The newborn risk infants of our series were selected according to one or more of the following criteria:

- birth weight < 2000 g
- Apgar scores < 6 at 5 or 15 minutes
- hyperbilirubinaemia, exchange transfusion performed or at least two serum bilirubin values above 340 mmol/l
- respiratory difficulties necessitating CPAP (continuous positive airway pressure) or artificial ventilation

TABLE 1

*Perinatal mortality at the Institute of Midwifery and the number and neonatal mortality of risk infants in the years 1971—1974.*

	1971	1972	1973	1974	1971—74
Number of infants born	6151	5975	4883	5350	22359
Perinatal mortality, ‰	1.25	1.32	1.25	1.40	1.31
Stillborn, number	40	41	24	37	142
Dead 1st week, number	37	38	37	38	150
Number of risk infants	303	303	306	284	1196
Per cent of infants born	4.93	5.07	6.27	5.31	5.35
Dead 1st week, number	35	27	34	28	124

TABLE 2

*Occurrence of different risk factors among live born infants 1971—1974.*

Year	1971	1972	1973	1974	1971—74	% of live born
Apgar $\leq 6$ at 5 or 15 min	113	86	71	102	372	1.67
Hyperbilirubinaemia	98	118	104	48	368	1.66
Birth weight $\leq 2000$ g	76	83	76	82	317	1.43
Neurological symptoms	54	38	62	41	195	0.88
Respiratory difficulties	36	47	44	34	161	0.72
Hypoglycaemia	10	22	35	37	104	0.47
Diabetes of mother	19	17	28	29	93	0.42
Sepsis, meningitis	3	3	12	18	36	0.16
All risk infants	303	303	306	284	1196	5.38

shows that except in the hyperbilirubinaemia group, which was smaller in 1974, there was no marked decrease in the number of infants in the different risk groups during these years. An increase was noted in children with hypoglycaemia and sepsis during the 4-year period.

## DISCUSSION

The risk group concept has been used since the beginning of the 1960s (9) and incorporated with the idea of detecting as many potential handicaps as possible in a group as small as possible (5). The structure of the risk groups in previous reports has not been uniform and they vary in size from less than 10‰ to 50—60‰ (4, 7, 9). A risk group which is reduced in size to one with known high risk factors comprising 5—10‰ of all children contains proportionally more severe handicaps (7).

This study was planned to consist of infants with certain known high risk factors (2, 7, 8, 11). It turned out to include about

5‰ of all live born infants. When the study was started, the importance of growth of the fetus was not yet fully understood. Now, a high risk group should also include infants who are small for gestational age (SGA) (1,3), but even then, if the birth weight of the SGA infants was 2000 g or less they belonged to our series, just as much as if they simultaneously had other risk factors. 151 of our infants (12.6‰) were small for gestational age.

When we started the study we believed that advances in the handling of newborn infants would reduce the number of infants belonging to the high risk group during this 4-year period. At the Institute of Midwifery new methods and technological advances contributed to better maternity care and better supervision of the deliveries, resulting in faster intervention in cases of threatening complications. For instance, caesarean sections increased from 8.5‰ to 12.8‰ and vacuum extractions from 2.6‰ to 3.7‰ (10). Also the use of cardiotocography (CTG) and fetal micro blood samples increased noticeably. The only significant decrease,

however, was seen in the number of infants with hyperbilirubinaemia from 1973 to 1974, as phototherapy was started at the end of 1973. The increase of the number of infants with hypoglycaemia and sepsis was probably due to the fact, that because of better supervision more cases were found in 1973 and 1974. Additionally, in 1973 and 1974, septic infections caused by  $\beta$ -haemolytic streptococci increased.

The perinatal mortality at the Institute of Midwifery during the investigation period was 1.31‰, at Central Hospital level in Finland 1.34‰ in 1975 (6). There are no comparable data of the number of risk group infants at maternity hospitals in Finland. We think, however, that our results represent the situation in Central Hospitals in the whole country as there are no great differences in handling deliveries and the newborn infant.

#### ACKNOWLEDGEMENT

This study was supported under a contract with the Association of Life Insurance Companies.

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Received for publication August 17, 1978  
Revised manuscript received October 30, 1978  
Accepted November 3, 1978

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