Mortality rates and neonatal intensive care for very small babies

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SUMMARY Mortality rates of very small babies (those weighing 1500 g or less) born to mothers normally resident in the 11 health districts of the London portion of the North-east Thames Health Region in 1971–73 and 1975–77 were compared with admission rates to neonatal intensive care units in 1972 and 1976 in the region. There was no significant correlation between mortality and admission rates for babies weighing 1000 g or less during either period. For babies born weighing between 1001 and 1500 g this was also so in 1972. In 1976 however, mortality rates were significantly correlated negatively at 24 hours but not at 28 days with admission rates to neonatal intensive care.

There has been much discussion about the importance of neonatal intensive care^{1–8} on the survival of very low birthweight babies. Reynolds^{9,10} has repeatedly maintained that since about 1965, when intensive care became more universally available, the proportion of small babies surviving has increased. Others argue that although there has been an overall improvement in survival rates,¹¹ the contribution that sophisticated neonatal care makes is doubtful.^{1–3 5 6}

A policy of regional organisation of intensive care services for very small and sick babies has developed in this country during the last decade.¹² In recent years there have been pronounced changes in the number of very small babies admitted and an increase in their lengths of stay.¹³ The high level of technology and skills devoted to neonatal intensive care has resulted in the provision of one or two centres for each health region, each centre serving a population of between 2 and 4 million. A disadvantage of such a concentration of services is that babies born in inaccessible parts of a region may make less use of the services.

To establish whether there are local disparities in the use of neonatal care services, and if there are differences in overall mortality rates for very small babies born in districts with varying utilisation rates of neonatal intensive care, admissions to such care in one region—the North-east Thames Health Region—have been reviewed.

Methods

There are two neonatal intensive care units in the

region—one at The London Hospital (Whitechapel) with 12 cots, and the other at University College Hospital (UCH) with 18 cots. Details of each baby's birthweight and the mother's home address were obtained for every baby admitted to the units during 1972 and 1976 from the ward record books. Details of age at admission could not be obtained as age was not consistently recorded at both units. Babies born to mothers normally resident outside the region were excluded.

For all districts the number of babies of very low birthweight, and the number of deaths in the first 24 hours and within 28 days were obtained for the years 1971–73 and 1975–77 from community health returns (LHS 27/1). Mortality rates were analysed separately for babies weighing 1000 g and less, and for babies weighing 1001–1500 g at birth.

A questionnaire was sent to all consultants at each of the 19 special care baby units to find out which neonatal intensive care units were being used by paediatricians and whether there had been any changes in practice between 1972 and 1976.

Results

Answers to the questionnaire were received from 17 of the special care baby units in the region. These showed that most paediatricians at special care baby units referred babies to either UCH (9) or The London (5) for neonatal intensive care. Three of these 14 said they only occasionally transferred babies as they considered they themselves were able to provide most forms of intensive care. One paediatrician said he never referred babies elsewhere.

Fig. 1 The Greater London part of the North-east Thames Health Region and location of neonatal intensive care (NIC) units.

Table 1 Survival rates of babies weighing 1500 g or less admitted to neonatal intensive care units in the North-east Thames Health Region 1972 and 1976 *

Neonatal intensive care unit											
The London Hospital				University College Hospital				Both hospitals			
1972		1976		1972		1976		1972		1976	
P	%	P	%	P	%	P	%	P	%	P	%
7/18	39	38/82	46	16/35	46	66/102	65	23/53	43	104/194	54

P = number of survivors/total admissions.

*Developed from data extracted from neonatal intensive care admission books at the two hospitals.

Table 2 Live births†, deaths within 24 hours† and 28 days†, and admissions‡ to neonatal intensive care for babies weighing 1000 g or less by health district, Greater London part of North-east Thames Health Region

Health district	1971-73				1972		1975-77				1976	
	Live births		Deaths within		Admitted for intensive care		Live births		Deaths within		Admitted for intensive care	
	24 hours		28 days				24 hours		28 days			
	No	%	No	%	No	%	No	%	No	%	No	%
Barking	13	10	76.9	12	92.3	0/5	12	7	58.3	12	100	0/6
Camden	21	11	52.4	18	85.7	1/7	19	4	21.1***	17	89.5	6/6
City and Hackney	63	45	71.4	51	81.0	4/23	45	26	57.8	38	84.4	7/8
Enfield	20	14	70.0	20	100	0/8	12	5	41.7	10	83.3	3/3
Haringey	33	10	30.3***	25	75.8	0/7	24	14	58.3	20	83.3	1/8
Havering	21	9	42.9	16	76.2	0/5	11	10	90.9	11	100	0/3
Islington	14	5	35.7	8	57.1	1/6	16	11	68.8	13	81.3	3/4
Newham	39	27	69.2	33	84.6	0/10	28	15	53.6	25	89.3	4/6
Redbridge	28	14	50.0	23	82.1	1/14	18	10	55.6	15	83.3	2/6
Tower Hamlets	13	6	46.2	8	61.5	2/3	12	5	41.7	10	83.3	3/3
Waltham Forest	26	21	80.8*	22	84.6	0/11	23	16	69.6**	20	87.0	3/3
All north east London	291	172	59.1	236	81.1	9/99	220	123	55.9	191	86.8***	32/56
England	4819	2905	60.3	3831	79.5	NA	3797	2129	56.1	2941	77.5	NA

†Figures obtained from DHSS, Local Health Statistics 27/1.

‡Figures taken from admission books, neonatal intensive care units at The London Hospital and University College Hospital.

NA = not available.

*0.01 < P < 0.05; ** 0.001 < P < 0.01; *** P < 0.001 when the value is compared with the relevant England figures.

Consultants at two hospitals in Essex said they normally approached the unit at Addenbrooke's Hospital, Cambridge. Because of this, it was decided to limit the analysis of utilisation to the Greater London part of the region (Fig. 1). Admission rates were calculated for babies weighing 1000 g and less, and for those weighing 1001-1500 g, for these 11 districts.

For babies transferred from special care baby units in these districts, it was stated that when referrals were made it was as a first or second choice to the two regional units. There was said to have been no change in the units approached in 1976 compared with 1972, but it was felt that it had become more difficult to get a baby admitted.

Survival rates of very small babies (those weighing 1500 g or less) admitted to the two units have increased (Table 1). At UCH this improvement is statistically significant (0.05 > P > 0.01). However these changes might be partly due to the admission of a greater number of less severely ill babies.

When babies born to mothers normally resident in the 11 districts of the north-eastern part of Greater London are considered, the percentage of babies of very low birthweight admitted to intensive care has increased strikingly, from 9% in 1972 to 57% in 1976 for babies of 1000 g or less at birth, and from 14 to 55% for babies weighing 1001-1500 g (Tables 2 and 3). The birthweights of babies admitted to intensive care from these 11 districts in the region during 1972

Table 3 Live births†, deaths within 24 hours† and 28 days†, and admissions‡ to neonatal intensive care for babies weighing 1001–1500 g by Health District, Greater London part of North-east Thames Health Region

Health district	1971-73					1972		1975-77					1976	
	Live births	Deaths within				Admitted for intensive care		Live births	Deaths within				Admitted for intensive care	
		24 hours		28 days					24 hours		28 days			
		No	%	No	%	No	%		No	%	No	%	No	%
Barking	34	13	38.2	19	55.9	0/12	(0)	30	9	30.0	15	50.0	1/7	(14.3)
Camden	42	9	21.4	17	40.5	5/13	(38.5)	50	4	8.0*	9	18.0*	8/14	(57.1)
City and Hackney	63	14	22.2	26	41.3	6/23	(26.1)	57	5	8.8*	18	31.6	12/16	(75.0)
Enfield	50	13	26.0	20	40.0	1/18	(5.6)	43	5	11.6	11	25.6	5/5	(100.0)
Haringey	75	12	16.0*	22	29.3*	0/17	(0)	47	6	12.8	12	25.5	6/16	(37.5)
Havering	42	9	21.4	18	42.9	0/19	(0)	20	3	15.0	5	25.0	1/6	(16.7)
Islington	47	7	14.9	19	40.4	4/18	(22.2)	35	2	5.7*	4	11.4**	7/8	(87.5)
Newham	70	21	30.0	32	45.7	2/28	(7.1)	65	8	12.3	25	38.5	11/27	(40.7)
Redbridge	23	5	21.7	6	26.1	0/10	(0)	27	3	11.1	5	18.5	6/11	(54.5)
Tower Hamlets	39	10	25.6	21	53.8	8/13	(61.5)	43	0	0***	7	16.3*	17/20	(85.0)
Waltham Forest	35	15	42.9*	16	45.7	0/14	(0)	48	7	14.6	21	43.8	5/13	(38.5)
All north east London	520	128	24.6	216	41.5	26/185	(14.1)	465	52	11.2***	132	28.4**	79/143	(55.2)
England	9209	2515	27.3	3957	43.0	NA		7809	1586	20.3	2711	34.7	NA	

†Figures obtained from DHSS, Local Health Statistics 27/1.

‡Figures taken from admissions books, neonatal intensive care units at The London Hospital and University College Hospital.

NA = not available.

*0.01 < P < 0.05; **0.001 < P < 0.01; ***P < 0.001 when value is compared with the relevant England figures.

and 1976 were similar (Table 4). Mortality rates for babies weighing 1000 g or less were similar to those for the rest of England in 1972 at 24 hours and 28 days and at 24 hours in 1976, but were significantly worse at 28 days in 1976 ($P < 0.001$). For the larger babies (1001–1500 g at birth) the mortality rates in 1972

Table 4 Comparison of birthweights of babies born, weighing 1500 g or less, to women normally resident in the north eastern quadrant of Greater London and admitted to neonatal intensive care at The London or University College Hospitals, 1972 and 1976

Birthweights (g)	Number of babies admitted to neonatal intensive care	
	1972 (n = 35)	1976 (n = 111)
<801	3	14
801–900	2	9
901–1000	4	9
1001–1100	4	21
1101–1200	6	17
1201–1300	1	11
1301–1400	3	14
1401–1500	12	16

 $\chi^2 = 3.19$, 3 df $P > 0.2$ Because of small numbers χ^2 was used for the following birth groups: <901, 901–1100, 1101–1300, and 1301–1500 g.

Median birthweight: 1972: 1200 g.

1976: 1130 g.

Median birthweight of babies weighing 1000 g and less:

1972: 900 g.

1976: 840 g.

Median birthweight of babies weighing 1001–1500 g.

1972: 1393.5 g.

1976: 1239 g.

Fig. 2 Death rates at 24 hours compared with admission rates to neonatal intensive care (1976) for babies born weighing 1000 g and less (1975–77).

were also similar to those for the rest of England at both ages. In 1976 the survival rates were significantly better at 24 hours ($P < 0.001$) and at 28 days ($0.01 > P > 0.001$) (Tables 2 and 3). The two districts in which the neonatal intensive care units are located have significantly better survival rates at both 24 hours and 28 days for the larger babies.

There was no correlation in 1972 between admission rates to neonatal intensive care and survival at 24 hours and 28 days for either birthweight group. This was the case also in 1976 for the smaller babies (Figs 2 and 3) but for babies weighing 1001 to 1500 g there was a correlation of $r = -0.73$ at 24 hours, and $r = -0.60$ at 28 days (Figs 4 and 5); the correlation was statistically significant ($0.02 > P > 0.01$, 9 df)

Fig. 3 Death rates at 28 days compared with admission rates to neonatal intensive care (1976) for babies born weighing 1000 g and less (1975-77).

Fig. 4 Death rates at 24 hours compared with admission rates to neonatal intensive care (1976) for babies born weighing 1001-1500 g (1975-77).

Fig. 5 Death rates at 28 days compared with admission rates to neonatal intensive care (1976) for babies born weighing 1001-1500 g (1975-77).

for survival at 24 hours but not at 28 days ($0.10 > P > 0.05$, 9 df).

Discussion

There have been notable developments in neonatal care during the last decade,¹⁴ and studies have shown that special care baby units are not equipped to provide the necessary highly specialised care.^{15 16} The impact of neonatal care on reducing community mortality rates of very small infants has been questioned.^{1-3 5 6} The present study however relates local survival rates to different levels of admission to neonatal intensive care. Higher survival rates for babies born in north-eastern London, weighing between 1001 and 1500 g at birth in 1976 were significantly associated with higher admission rates to neonatal intensive care. No correlation was shown between mortality and admission rates to intensive care for babies born weighing between 1001 and 1500 g in 1972, or for babies weighing 1000 g or less in 1972 or 1976.

This investigation has not been able to establish the importance of the speed with which admission is made, and the care available during transfer to neonatal intensive care because such information was not available for both units. It has been shown elsewhere that small and sick babies can be safely transported in specially equipped ambulances for fairly long distances,¹⁷ although outcome is better if transfer occurs *in utero*.¹⁸

There are large discrepancies in admission rates to neonatal intensive care of small babies. If greater benefit is to be attained, as has been advocated,¹⁹ it is important that policies of care should be agreed. As such services are truly regional, it is desirable that there should be regular surveillance and assessment to ensure that very small babies are speedily transferred to suitable units, and their outcome should be monitored.

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