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Perinatal Mortality in Twins, Australia, 1973-1980: I

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Abstract. The perinatal outcome of twin births in Australia is described from 1973 to 1980. Over that period, the perinatal mortality rate declined more slowly in twins that singletons. The stillbirth rate actually increased in twins due to a rise in antepartum deaths. An increasing proportion of monozygotic twins may have contributed to this trend. The overall perinatal mortality rate was 82.85/1,000 for twins and 16.49/1,000 for singletons, giving a relative risk of 5.0.

Key words: Perinatal mortality, Twins, Stillbirth, Neonatal mortality, Australia

INTRODUCTION

Hospital studies have produced widely varying perinatal mortality rates for twins. One review listed the results of 31 studies; the rate ranged from 92/1,000 to 280/1,000 [13]. The largest hospital series appears to be that of Obstetrical Statistical Cooperative in the United States [10]. The twin perinatal mortality rate was 124/1,000 compared with 49/1,000 in singletons. All these series suffer from sample bias and the comparative mortality for singleton pregnancies is usually not known. Population-based studies in Britain [2], Scotland [17], Japan [8,9], and the United States [6,12] show that the risk of perinatal death is increased about fivefold for a twin compared with a singleton. So, since two babies are at risk, if 1% of pregnancies are twin they will contribute 10% of perinatal deaths. Special programs of screening and early detection of twins may help to reduce perinatal mortality in twins [15,16]. Only population studies can show if there has been a general benefit.

This work was undertaken at the School of Public Health and Tropical Medicine, University of Sidney.

MATERIALS AND METHODS

Perinatal Death Certificate

In 1973 a special Medical Certificate of Cause of Perinatal Death was introduced throughout Australia. The Australian Bureau of Statistics (ABS) classifies the cause in accordance with the "International Statistical Classification of Diseases, Injuries and Causes of Death" (I.C.D.). From 1st January 1979 deaths were classified in accordance with the Ninth Revision of the I.C.D. [19] instead of the Eighth Revision [18]. Also recorded are fetal sex, maternal age, plurality, birth weight, period of gestation and time of cessation of heart beat in relation to labour. The deaths are then categorised into those due to lethal congenital malformation and those due to other causes. Comparisons between classifications in 1979 and earlier years are not strictly valid but should not be a serious source of bias for a major category such as lethal malformation. Data on confinements and perinatal deaths were obtained by the National Perinatal Statistics Unit at the School of Public Health and Tropical Medicine in the University of Sydney.

Mortality Rates

The ABS definitions of mortality are adhered to. Stillbirth relates to a child who shows no sign of life at any time after being born and weighs at least 500 grams or, when birth weight is not available, the corresponding gestational age of 22 weeks. There should not be any differential registration of twin and singleton stillbirths as fetal growth is independent of plurality until about the 27th week [11]. Neonatal death refers to a child born alive who dies within 28 days after birth. Before 1979 the cut-off point for stillbirths was a birth weight of 400 grams or gestational age of 20 weeks. To achieve consistency and comparability, the current definitions are used over the whole period, 1973 to 1980. As there may be incomplete reporting of events at the margin of a definition, registration may be less complete since 1979 but, as this would affect twins and singletons equally, comparisons between them should not be influenced. Mortality rates are calculated per 1,000 live or total births of each plurality.

RESULTS

The perinatal outcome of 1,868,851 total births from 1973 to 1980 is described. Of these, 36,437 (1.95%) were twins and 1,832,414 were singletons. There were 16,724 stillbirths, of which 1,158 (7%) were twins and 15,566 singletons. The resulting 1,852,127 live births comprised 35,279 twins (1.9%) and 1,816,848 singletons.

Of 33,209 deaths, 2,997 (9%) were in twins. Out of 16,724 stillbirths, 1,158 (7%) were in twins. From 16,485 neonatal deaths, 1,839 (11%) were accounted for by twins. In single births, a slight majority (15,566 = 51%) of the 30,212 perinatal

deaths were stillbirths. In twins, the pattern was reversed: 1,839 (61%) of the 2,997 perinatal deaths were neonatal deaths. The overall perinatal mortality rate for twins was 82.85/1,000 total twin births: that is, 2,997 deaths from 36,437 births. For singletons, the perinatal mortality rate was 16.49/1,000 total single births: that is, 30,212 deaths from 1,832,414 births. The relative risk of perinatal death in a twin birth vs a single birth is 5.0. Between 1973 and 1980, the perinatal mortality rate in twins fell 26%, from 95.92/1,000 to 12.84/1,000, while in singletons it fell 36%, from 19.99/1,000 to 12.89/1,000.

Table 1 - Births and neonatal mortality in twins and singletons, Australia, 1973-1980

Year	Twins			Singletons		
	Births (N)	Neonatal deaths (N)	Rate[a]	Births (N)	Neonatal deaths (N)	Rate[a]
1973	4,811	315	65.47	242,776	2,456	10.12
1974	4,667	296	63.42	240,437	2,423	10.08
1975	4,401	227	51.58	228,525	1,968	8.61
1976	4,487	261	58.17	223,264	1,895	8.49
1977	3,989	190	47.63	222,223	1,663	7.48
1978	4,287	202	47.12	219,780	1,524	6.93
1979	4,267	176	41.25	218,774	1,412	6.45
1980	4,370	172	39.36	221,069	1,305	5.90
Total	35,279	1,839	52.13	1,816,848	14,646	8.06

[a]Rate per 1,000 live births of that plurality.

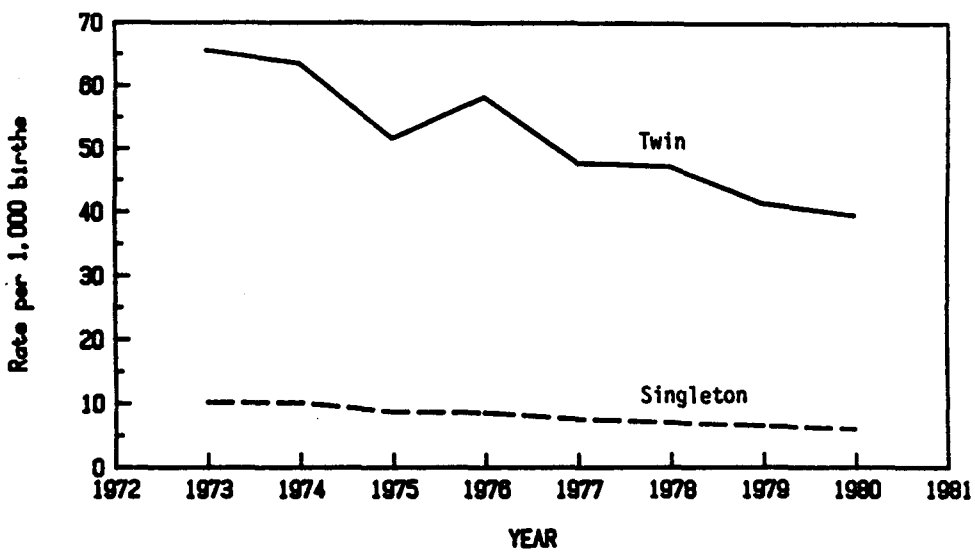

Fig. 1. Neonatal mortality, Australia, 1973-1980.

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Neonatal Mortality

Live births and neonatal deaths are given in Table 1. In twins, there were 1,839 neonatal deaths from 35,279 live births (52.13/1,000). In singletons, there were 14,646 neonatal deaths, from 1,816,848 births (8.06/1,000). The relative risk of a neonatal death in a twin birth vs a single birth is 6.5. The trend in neonatal mortality from 1973 to 1980 is shown in Fig. 1. The rate in singletons fell steadily from 10.12/1,000 to 5.90/1,000, a fall of 41.7%. The twin rate fell from 65.47/1,000 in 1973 to 39.36/1,000 in 1980, a fall of 39.9%. The relative risk of neonatal death in twins and singletons was 6.5 in 1973 and 6.7 in 1980.

Table 2 - Distribution of stillbirths in twins by type, Australia, 1973-1980

Year	Stillbirths										
	Antepartum			Intrapartum			Uncertain			Total	
	N	%	Rate[a]	N	%	Rate[a]	N	%	Rate[a]	N	Rate[a]
1973	83	51.2	16.69	51	31.5	10.26	28	17.3	5.63	162	32.58
1974	74	48.7	15.36	57	37.5	11.83	21	13.8	4.36	152	31.54
1975	74	52.9	16.30	48	34.3	10.57	18	12.9	3.96	140	30.83
1976	90	54.2	19.34	48	28.9	10.32	28	16.9	6.02	166	35.68
1977	77	60.2	18.70	35	27.3	8.50	16	12.5	3.89	128	31.09
1978	71	57.7	16.10	29	23.6	6.58	23	18.7	5.22	123	27.89
1979	83	60.1	18.84	40	29.0	9.08	15	10.9	3.41	138	31.33
1980	97	65.1	21.46	36	24.2	7.97	16	10.7	3.54	149	32.97
	649	56.0	17.81	344	29.7	9.44	165	14.2	4.50	1,158	31.78

[a]Rate per 1,000 total births of that plurality.

Stillbirth

The distribution of stillbirths by type and year in twins and singletons is shown in Tables 2 and 3. Between 1973 and 1980 there were 1,158 stillbirths in twins from 36,437 total births (31.78/1,000). Among 1,832,414 total single births there were 15,566 stillbirths (8.49/1,000). The relative risk of a stillbirth in twins vs singletons is 3.7. In both twins and singletons the majority of stillbirths occurred before labour started, 56.0% and 60.3%, respectively. The proportion of stillbirths occurring during labour was almost identical, being 29.7% in twins and 30.6% in singletons.

The trend in stillbirths from 1973 to 1980 is illustrated in Fig. 2. For single births, the stillbirth rate fell 30%, from 9.97/1,000 to 6.98/1,000 (Table 3.) The intrapartum stillbirth rate fell 41.5%, from 3.25/1,000 to 1.90, and these deaths constituted a smaller proportion of stillbirths in 1980 (27.2%), than in 1973 (32.6%). The antepartum rate fell 24.7%, from 5.84/1,000 to 4.40/1,000, being 58.6% of singleton stillbirths in 1973 and 63.1% in 1980.

The stillbirth rate in twins increased 1.2% between 1973 and 1980 from 32.58/1,000 to 32.97/1,000 (Table 2). Figure 2 shows the contribution of antepartum and intrapartum deaths to the increased rate. Antepartum mortality rose sharply while intrapartum mortality fell. Antepartum deaths increased

28.6%, from 16.69/1,000 to 21.46/1,000. As a proportion of twin stillbirths, these deaths increased from 51.2% to 65.1%. Intrapartum twin stillbirths fell 22.3%, from 10.26/1,000 to 7.97/1,000. They contributed 31.5% of the twin stillbirths in 1973 and 24.2% in 1980.

Table 3 - Distribution of stillbirths in singletons by type, Australia, 1973-1980

Year	Stillbirths										
	Antepartum			Intrapartum			Uncertain			Total	
	N	%	Rate[a]	N	%	Rate[a]	N	%	Rate[a]	N	Rate[a]
1973	1,433	58.6	5.84	798	32.6	3.25	215	8.8	0.88	2,446	9.97
1974	1,441	59.2	5.93	778	32.0	3.2	214	8.8	0.88	2,433	10.02
1975	1,168	57.4	5.07	708	34.8	3.07	160	7.9	0.69	2,036	8.83
1976	1,158	59.7	5.14	612	31.5	2.72	170	8.8	0.75	1,940	8.61
1977	1,082	61.3	4.83	519	29.4	2.32	165	9.3	0.74	1,766	7.88
1978	1,131	63.6	5.10	473	26.6	2.13	175	9.8	0.79	1,779	8.03
1979	996	61.7	4.52	453	28.1	2.06	164	10.2	0.74	1,613	7.32
1980	980	63.1	4.40	422	27.2	1.90	151	9.7	0.68	1,553	6.98
	9,389	60.3	5.12	4,763	30.6	2.60	1,414	9.1	0.77	15,566	8.49

[a]Rate per 1,000 total births of that plurality.

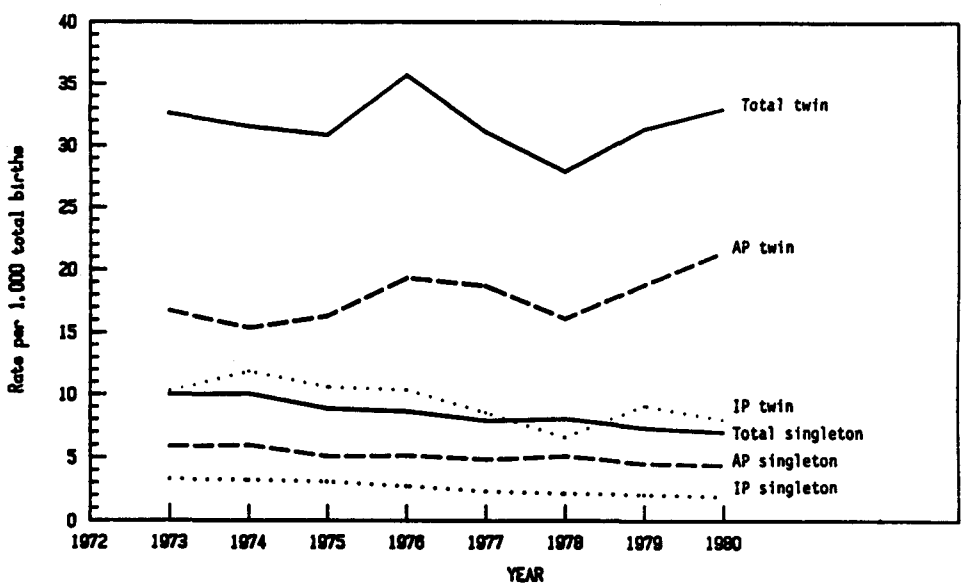

Fig. 2. Stillbirths by whether antepartum (AP) or intrapartum (IP), Australia, 1973-1980.

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DISCUSSION

This study confirms the high risks in twin pregnancy. The probability of a perinatal death is increased fivefold in twins compared with singletons. Therefore, a twin confinement has a tenfold increase in risk of a perinatal death over a single confinement. Direct comparison of mortality rates with other countries is difficult as stillbirths may be defined from 16, 20, 22 or 28 weeks of gestation and neonatal deaths are commonly restricted to the first week of life. However, the relative risk of mortality of twins and singletons can be compared internationally as it includes a common definition of each event, irrespective of plurality, within that country. Relative risks of perinatal death between 3 and 7 are found in different studies [4]. For Scotland in 1982 the relative risk was 5.2 [17]. A comparative study between America and Africa [14] gave a relative risk of 4.2 in 12 U.S. cities and 6.4 in Addis Ababa, Ethiopia. In Australia, the excess risk lies in the expected range.

From 1973 to 1980, perinatal mortality in singletons fell 36%, but fell only 26% in twins. So, the relative risk increased from 4.8 to 5.5. This was over a period when obstetric and neonatal innovations might reasonably have been expected to improve the prognosis of twins more than singletons.

A majority of the twin deaths (61.4%) occurred in the neonatal period. This is in line with other studies [2,5]. From 1973 to 1980 the incidence of neonatal deaths declined close to 40% for both twins and singletons and the relative risk did not alter appreciably. Clinical studies leave no doubt that the principal factor in these deaths is low birth weight due to preterm delivery [4,12]. Whether systematic attempts at early diagnosis of twins coupled with measures to prolong gestation actually reduce neonatal mortality is uncertain [7,15]. A randomised controlled trial of screening with ultrasound found no statistically significant difference in outcome of the pregnancies, though twins in the screened group were diagnosed at an earlier stage than those in the control group [1].

The incidence of stillbirth in twins increased 1.2% from 1973 to 1980. This is a small increase, but how can it be explained when over the same period the incidence in singletons fell 30%? While intrapartum death in twins decreased, and there was uncertainty about timing in fewer cases, the incidence of antepartum death increased 28.6%. This warrants further investigation to identify the maternal categories at risk. With greater use of intrapartum fetal monitoring over this period there was probably greater accuracy in the timing of death in relation to labour by 1980. So there may have been fewer incorrect allocations by type in the later years and the real trends in antepartum and intrapartum rates may be less divergent. However, if use of the technique had any success at all, its effect would be to transfer intrapartum stillbirths into the liveborn category.

It is possible that the increasing proportion of MZ twins was a factor in the stillbirth trend. This proportion increased from 38% in 1973 to 47.5% in 1979 and was 45.7% in 1980 [3]. As the stillbirth rate in MZ twins may be up to three times that in DZ twins [6], an increasing proportion of them amongst all twins would worsen the stillbirth rate. This factor cannot be quantified from the Australia data, as the sex combination of the twin pair from which the perinatal death came

is not known. Birth weight is not recorded on the death certificate, so it could not be evaluated as a contributory factor in mortality.

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